Toll Road Public-Private Partnerships in Malaysia: Using the CLIOS Process for Policy Improvements

By

John L. Ward

Bachelor of Science in Engineering
Harvey Mudd College, 2000

Submitted to the Engineering Systems Division and the Department of Civil and Environmental Engineering in Partial Fulfillment of the Requirements for the Degrees of

Master of Science in Technology and Policy and
Master of Science in Transportation

at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
June 2005

© 2005 Massachusetts Institute of Technology
All Rights Reserved

Signature of Author

Engineering Systems Division and Department of Civil and Environmental Engineering
May 13, 2005

Certified by

Joseph M. Sussman
JR East Professor
Professor of Civil and Environmental Engineering and Engineering Systems
Thesis Supervisor

Accepted by

Andrew Whittle
Professor of Civil and Environmental Engineering
Chairman, Departmental Committee on Graduate Studies

Accepted by

Dava Newman
Professor of Aeronautics and Astronautics and Engineering Systems
Director, Technology and Policy Program
Toll Road Public-Private Partnerships in Malaysia: Using the CLIOS Process for Policy Improvements

By

John L. Ward

Submitted to the Engineering Systems Division and the Department of Civil and Environmental Engineering on May 13, 2005 in Partial Fulfillment of the Requirements for the Degrees of Master of Science in Technology and Policy and Master of Science in Transportation

ABSTRACT

Malaysia has relied on private sector provision of toll roads for over twenty years using public-private partnerships (PPPs). While the program has been successful in providing close to 1,800 kilometers of highway in that time, it has several shortcomings that prevent it from better meeting societal needs. Lack of transparency, weak environmental protections, exclusion of public involvement, and higher tolls than necessary paid to politically-connected businesses are a few of the criticisms leveled at the Malaysian government’s handling of the program. The CLIOS process is proposed as a method to improve the Malaysian toll road program.

The CLIOS process as developed at MIT is designed to understand Complex, Large-scale, Integrated, Open, Socio-technical systems and to prepare robust strategies for meeting stakeholder goals for the system. Other researchers have used it for energy distribution, air combat command and control, and regional strategic transportation planning (RSTP). This last application provides a useful base for improving a toll road program but RSTP still requires significant adjustment before it can be applied to toll road PPP’s.

This thesis explores the application of the CLIOS process to Malaysia’s toll road program. The application to a generic nation is explored first so more general results can be used for other nations. A specific program is then developed for Malaysia with the Kuala Lumpur Metropolitan Region as the focus for toll road deployment. The performance of two alternatives to handling the Malaysian toll road program is also explored to provide a well-rounded comparison to the CLIOS process. These alternatives are qualitatively compared using measures for technical, economic, environmental, political, and financial performance. Results show the CLIOS process producing the highest performance but the qualitative nature of the evaluation and limited Malaysian data introduce uncertainty into the results.

Thesis Supervisor: Joseph Sussman
Title: JR East Professor
Professor of Civil and Environmental Engineering and Engineering Systems
Acknowledgments

I would like to thank Professor Joseph Sussman for all the time he put into commenting on this rather long thesis. It helped clarify my thinking process and my at times incomprehensible writing. Hopefully this is reflected in the quality of this thesis.

Further intellectual aid for my thesis on the subjects of CLIOS and Regional Strategic Transportation Planning was provided by Sgouris Sgouridis, Ali Mostashari, and Ralph Hall. Thanks for clarifying questions I had or providing useful references.

This thesis also would not have been possible without many people providing needed distractions:
My officemates provided me with hours of entertainment, whether throwing a football around, joking with each other, or plotting against the transit group. Thanks to Jeff Ensor, Bernardo Ortiz, Lev Pinelis, Lucile Guillaud, Travis Dunn, Josh McConnell, Janine Waliszewski, and Zulina Zakaria.

I can hardly forget to mention TPP ’02 for the interesting classes and social events (although I’m still not thrilled about what happened to my car’s rear window): Chris Hardin, Anup Bandivadekar, Chris Glazner, Adam Smith, Tom Curry, Kate Martin, and Mike Adams.

Scott Litzleman provided a lot of assistance during my accelerated move out of Tang when the Army Reserve activated me and I’d like to thank him for handling my stuff while I was away.

To the Omega Sector: Nathan Plant, Mike Banderas, and Jose “The Admiral” Caldwell. Thanks for the fun times and support over the years. I’m sure you guys are tired of hearing me complain about Boston weather. Maybe one day I’ll make it back to California or the southwest. Thanks also to Kristine Sy and Danielle Long for mailing me the occasional batch of cookies.

Finally, thanks to my parents Bernie and Pok Ward and my brother Peter. My parents had to put up with a lot over the years from the occasional heated disagreements to handling my affairs while I was eating lamb and drinking tea in the Sunni Triangle to requests for egg rolls whenever I visited. Thanks for all the love and support (and egg rolls).
# Table of Contents

1 Introduction .................................................................................................................. 13
  1.1 Problem Statement .............................................................................................. 13
  1.2 Purpose and Objectives ...................................................................................... 14
  1.3 Methodology ......................................................................................................... 15
  1.4 Organization ......................................................................................................... 16

2 Privatization and Public-Private Partnerships .......................................................... 19
  2.1 Introduction .......................................................................................................... 19
  2.2 What Is Privatization? ......................................................................................... 19
    2.2.1 Public-Private Partnerships within the Privatization Framework ...................... 21
    2.2.2 Benefits of Privatization ................................................................................. 22
    2.2.3 Disadvantages of Privatization ....................................................................... 24
    2.2.4 General Conclusions on Privatization ............................................................. 27
  2.3 Public-Private Partnerships and Toll Roads ......................................................... 27
    2.3.1 The Language of Transportation Infrastructure Public-Private Partnerships ...... 29
    2.3.2 Benefits and Costs of Using Public-Private Partnerships for Toll Roads .......... 30
    2.3.3 Structure and Risks of a Toll-Road Public-Private Partnership ......................... 35
    2.3.4 Conclusions on Supportable Public-Private Partnerships ................................. 43
  2.4 Public-Private Partnerships and Public Goals ..................................................... 43
  2.5 Evaluation Criteria ............................................................................................... 45
    2.5.1 Transportation ................................................................................................. 47
    2.5.2 Economic ......................................................................................................... 48
    2.5.3 Environmental and Social .............................................................................. 48
    2.5.4 Political .......................................................................................................... 49
    2.5.5 Financial ....................................................................................................... 50
  2.6 Conclusion ............................................................................................................ 51

3 Using the CLIOS Process for Toll Road PPP Policy ............................................... 53
  3.1 Introduction .......................................................................................................... 53
  3.2 The CLIOS Process ............................................................................................. 53
    3.2.1 What is a CLIOS System? ............................................................................... 53
    3.2.2 Key Concepts of the CLIOS Process .............................................................. 55
    3.2.3 The Representation Stage ............................................................................... 56
    3.2.4 The Design, Evaluation, and Selection Stage .................................................... 58
    3.2.5 The Implementation Stage .............................................................................. 59
  3.3 Applying the CLIOS Process to Regional Transportation Planning ..................... 60
    3.3.1 The Representation Stage in RSTP ................................................................. 62
    3.3.2 Design, Evaluation, and Selection in RSTP ...................................................... 62
    3.3.3 Implementation in RSTP ................................................................................. 64
  3.4 Extending RSTP to Toll Road PPP Program Development .................................... 65
    3.4.1 The Representation Phase ............................................................................... 65
    3.4.2 Design, Evaluation, and Selection ................................................................. 69
    3.4.3 The Implementation Phase .............................................................................. 70
  3.5 Conclusion ............................................................................................................ 71
## A Generic Application of the CLIOS Process to Enabling PPP Policy

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Introduction</td>
<td>73</td>
</tr>
<tr>
<td>4.2</td>
<td>Stage 1: Representation</td>
<td>73</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Step 1: Describe System: Issue Checklist and Initial Goal Identification</td>
<td>73</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere</td>
<td>75</td>
</tr>
<tr>
<td>4.2.3</td>
<td>Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram</td>
<td>75</td>
</tr>
<tr>
<td>4.2.4</td>
<td>Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere</td>
<td>87</td>
</tr>
<tr>
<td>4.2.5</td>
<td>Step 4B: Describe Links Among Components and Organizations</td>
<td>88</td>
</tr>
<tr>
<td>4.2.6</td>
<td>Step 5: Seek Insight About System Behavior</td>
<td>92</td>
</tr>
<tr>
<td>4.3</td>
<td>Stage 2: Design, Selection, and Evaluation</td>
<td>95</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Step 6: Identify Performance Measures, Refine System Goals, and Build Quantitative Model</td>
<td>95</td>
</tr>
<tr>
<td>4.3.2</td>
<td>Step 7: Identify and Design Strategic Alternatives for System Performance</td>
<td>96</td>
</tr>
<tr>
<td>4.3.3</td>
<td>Step 8: Flag Important Areas of Uncertainty</td>
<td>101</td>
</tr>
<tr>
<td>4.3.4</td>
<td>Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform &quot;Best&quot; Across Uncertainties</td>
<td>102</td>
</tr>
<tr>
<td>4.4</td>
<td>Stage 3: Implementation</td>
<td>105</td>
</tr>
<tr>
<td>4.4.1</td>
<td>Step 10: Design Strategies for Implementation in the Physical Domain and Implement</td>
<td>105</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Step 11: Design Strategies for Implementation in the Institutional Sphere and Implement</td>
<td>105</td>
</tr>
<tr>
<td>4.4.3</td>
<td>Step 12: Post-implementation Evaluation and Modification</td>
<td>106</td>
</tr>
<tr>
<td>4.5</td>
<td>Conclusion</td>
<td>107</td>
</tr>
</tbody>
</table>

## A Generic Application of the CLIOS Process to PPP Project Deployment

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Introduction</td>
<td>109</td>
</tr>
<tr>
<td>5.2</td>
<td>The Representation Phase</td>
<td>110</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Step 1: Describe System: Issue Checklist and Initial Goal Identification</td>
<td>110</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere</td>
<td>111</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram</td>
<td>111</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere</td>
<td>122</td>
</tr>
<tr>
<td>5.2.5</td>
<td>Step 4B: Describe Links Among Components and Organizations</td>
<td>122</td>
</tr>
<tr>
<td>5.2.6</td>
<td>Step 5: Seek Insights About System Behavior</td>
<td>127</td>
</tr>
<tr>
<td>5.3</td>
<td>Stage 2: Design, Selection, and Evaluation</td>
<td>131</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Step 6: Identify Performance Measures and Refine System Goals, and Build Quantitative Model</td>
<td>131</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Step 7: Identify and Design Strategic Alternatives for Performance Improvements</td>
<td>132</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Step 8: Flag Important Areas of Uncertainty</td>
<td>135</td>
</tr>
</tbody>
</table>
### 5.3.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties

<table>
<thead>
<tr>
<th>5.4 Stage 3: Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4.1 Step 10: Design Strategies for Implementation in the Physical Domain and Implement</td>
</tr>
<tr>
<td>5.4.2 Step 11: Design Strategies for Implementation in the Institutional Sphere and Implement</td>
</tr>
<tr>
<td>5.4.3 Step 12: Post-implementation Evaluation and Modification</td>
</tr>
<tr>
<td>5.5 Conclusion</td>
</tr>
</tbody>
</table>

### 6 The Toll Road PPP Program in Malaysia

<table>
<thead>
<tr>
<th>6.1 Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2 History of Privatization and PPP’s in Malaysia</td>
</tr>
<tr>
<td>6.2.1 The New Economic Policy</td>
</tr>
<tr>
<td>6.2.2 Malaysia Incorporated</td>
</tr>
<tr>
<td>6.2.3 The Privatization Master Plan</td>
</tr>
<tr>
<td>6.2.4 Other Economic Development Plans</td>
</tr>
<tr>
<td>6.3 The Extent of Private Toll Roads in Malaysia</td>
</tr>
<tr>
<td>6.4 The Policies and Processes of Toll Road Public-Private Partnerships in Malaysia</td>
</tr>
<tr>
<td>6.4.1 Enabling PPP Policy</td>
</tr>
<tr>
<td>6.4.2 PPP Project Deployment – The Process</td>
</tr>
<tr>
<td>6.5 The Outcomes of Toll Road Public-Private Partnerships in Malaysia</td>
</tr>
<tr>
<td>6.5.1 Division of Risk</td>
</tr>
<tr>
<td>6.5.2 Where Is The Transparency?</td>
</tr>
<tr>
<td>6.5.3 Public Involvement in the Malaysian Toll Road Process</td>
</tr>
<tr>
<td>6.6 Changes to the Toll Road PPP Program Evaluation Criteria</td>
</tr>
<tr>
<td>6.7 Conclusion</td>
</tr>
</tbody>
</table>

### 7 Alternative 1: Applying the CLIOS Process to Malaysian Toll Road Public-Private Partnership Policies

<table>
<thead>
<tr>
<th>7.1 Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 The Scenario</td>
</tr>
<tr>
<td>7.3 The New Malaysian Enabling PPP Policy</td>
</tr>
<tr>
<td>7.3.1 Representation Stage</td>
</tr>
<tr>
<td>7.3.1.1 Step 1: Describe System: Issue Checklist and Goal Identification</td>
</tr>
<tr>
<td>7.3.1.2 Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere</td>
</tr>
<tr>
<td>7.3.1.3 Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram</td>
</tr>
<tr>
<td>7.3.1.4 Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere</td>
</tr>
<tr>
<td>7.3.1.5 Step 4B: Describe Links between Components in the Physical Domain and between Actors on the Institutional Sphere</td>
</tr>
<tr>
<td>7.3.1.6 Step 5: Seek Insight about System Behavior</td>
</tr>
<tr>
<td>7.3.2 Design, Evaluation, and Selection Stage</td>
</tr>
<tr>
<td>7.3.2.1 Step 6: Identify Performance Measures, Refine System Goals and Build Quantitative Model</td>
</tr>
<tr>
<td>7.3.2.2 Step 7: Identify and Design Strategic Alternatives for System Improvement</td>
</tr>
<tr>
<td>7.3.2.3 Step 8: Flag Important Areas of Uncertainty</td>
</tr>
<tr>
<td>7.3.2.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties</td>
</tr>
<tr>
<td>7.3.3 Implementation Stage</td>
</tr>
</tbody>
</table>

---

7
7.3.3.1 Step 10: Design Strategy for Implementation in the Physical Domain And Implement .......... 191
7.3.3.2 Step 11: Design Strategy for Implementation in the Institutional Sphere and Implement .......... 193
7.3.3.3 Step 12: Post-Implementation Evaluation and Modification .......................................................... 193

7.4 The New Malaysian PPP Project Deployment Process ..................................................... 194

7.4.1 Representation Stage ........................................................................................................... 196
7.4.1.1 Step 1: Describe System: Issue Checklist and Initial Goal Identification ................................... 196
7.4.1.2 Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere ........................................................................................................... 197
7.4.1.3 Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram ... 197
7.4.1.4 Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere 207
7.4.1.5 Step 4B: Describe Links between Components in the Physical Domain and between Actors on the Institutional Sphere .................................................................................. 208
7.4.1.6 Step 5: Seek Insight about System Behavior ................................................................................ 211

7.4.2 Design, Evaluation, and Selection Stage .............................................................................. 214
7.4.2.1 Step 6: Identify Performance Measures, Refine System Goals and Build Quantitative Model ... 214
7.4.2.2 Step 7: Identify and Design Strategic Alternatives for System Improvement ......................... 215
7.4.2.3 Step 8: Flagging Important Areas of Uncertainty ....................................................................... 216
7.4.2.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform "Best" Across Uncertainties .................................................................................................................... 217

7.4.3 Implementation Stage ............................................................................................................ 218
7.4.3.1 Step 10: Design Strategy for Implementation in the Physical Domain And Implement .......... 218
7.4.3.2 Step 11: Design Strategy for Implementation in the Institutional Sphere and Implement .......... 220
7.4.3.3 Step 12: Post-Implementation Evaluation and Modification ..................................................... 221

7.5 Expected Outcomes .................................................................................................................. 221
7.5.1 Transportation ...................................................................................................................... 221
7.5.2 Economic ................................................................................................................................... 223
7.5.3 Environmental and Social ...................................................................................................... 223
7.5.4 Political ...................................................................................................................................... 224
7.5.5 Financial ................................................................................................................................. 225
7.5.6 Malaysia Specific ...................................................................................................................... 226
7.5.7 Uncertainties ............................................................................................................................ 226

7.6 Conclusion ................................................................................................................................. 227

8 Alternative 2: Incremental Changes to the Current Malaysian Process .................................. 229
8.1 Introduction ................................................................................................................................. 229
8.2 A Refresher: The Strengths and Weaknesses of the Current Malaysian Process ................ 229
8.3 The Scenario ............................................................................................................................... 230
8.4 Changes to Current Malaysian Processes and Policies ............................................................. 230
8.4.1 Public Involvement .................................................................................................................. 231
8.4.2 Improve the Importance of the Environmental Approval Process ........................................ 234
8.4.3 Create a More Transparent Process ....................................................................................... 235
8.4.4 Changes to the Enabling PPP Policy ....................................................................................... 237
8.5 Expected Outcomes ................................................................................................................... 239
8.5.1 Transportation ......................................................................................................................... 239
8.5.2 Economic .................................................................................................................................. 241
8.5.3 Environmental and Social ....................................................................................................... 241
8.5.4 Political ..................................................................................................................................... 242
8.5.5 Financial .................................................................................................................................... 243
8.5.6 Malaysia-Specific ...................................................................................................................... 244
8.5.7 Uncertainties ............................................................................................................................. 245
9 Alternative 3: Adapting the US Transportation Planning Process for Malaysia

9.1 Introduction
9.2 An Overview of the US Transportation Planning and Policy Process
   9.2.1 Transportation Planning Institutions in the United States
   9.2.2 The Regional Transportation Planning Process in the United States
   9.2.3 Integrating PPPs into the US Planning Process
9.3 Adapting the US Model to Malaysia
   9.3.1 The Scenario
   9.3.2 Structural Changes
   9.3.3 Procedural Changes
     9.3.3.1 Enabling PPP Policy
     9.3.3.2 PPP Project Deployment
9.4 Expected Outcomes
   9.4.1 Transportation
   9.4.2 Economic
   9.4.3 Environmental and Social
   9.4.4 Political
   9.4.5 Financial
   9.4.6 Malaysia Specific
   9.4.7 Uncertainties
9.5 Conclusion

10 Comparison of Alternatives
10.1 Introduction
10.2 Comparisons of the Comprehensive Outcomes
   10.2.1 The CLIOS Process vs. Incremental Changes
   10.2.2 The CLIOS Process vs. The Adapted US Process
10.3 Comparison of the Outcomes by Level
10.4 Conclusion

11 Conclusion
11.1 Restatement of Purpose
11.2 Key Findings
11.3 Future Research
11.4 Closing Words

References
List of Acronyms
Appendix A Further Privatization Background
   A.1 A Word on Contracts
   A.2 Stakeholder Analysis for Public-Private Partnerships
     A.2.1 Elected Officials
     A.2.2 Public Works and Transportation Departments
     A.2.3 Concession Companies
     A.2.4 Construction Companies
     A.2.5 Equity Investors
     A.2.6 Debt Investors

247
247
247
254
255
258
254
255
258
261
267
267
268
268
269
271
272
273
273
275
275
275
277
278
281
283
283
285
285
287
295
297
298
299
299
300
300
301
302
<table>
<thead>
<tr>
<th>A.2.7</th>
<th>Travelers</th>
<th>302</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.2.8</td>
<td>Landowners</td>
<td>302</td>
</tr>
<tr>
<td>A.2.9</td>
<td>Environmentalists</td>
<td>303</td>
</tr>
<tr>
<td>A.2.10</td>
<td>The Automobile Industry</td>
<td>303</td>
</tr>
</tbody>
</table>
List of Figures

Figure 2-1 - Project Delivery Methods for PPPs Adapted (Source: Miller) ........................................ 30
Figure 2-2 - Sample Cost Structure .................................................................................. 41
Figure 3-1 - The CLIOS Process and Metaphor (Source: Sussman, Sgouridis, and Ward) ............... 55
Figure 3-2 - Nested Complexity (Source: Dodder et al.) ......................................................... 56
Figure 3-3 - The Representation Stage .................................................................................. 57
Figure 3-4 - The Design, Evaluation, and Selection Stage ...................................................... 59
Figure 3-5 - The Implementation Stage .................................................................................. 60
Figure 3-6 - Stage 2: Design, Evaluation, and Selection in RSTP (Source: Sussman, Sgouridis, and Ward) .................................................................................................................. 65
Figure 3-7 - The Connections Between CLIOS Processes for Toll Road PPP Programs .......... 67
Figure 4-1 - Simple CLIOS Diagram Example ....................................................................... 78
Figure 4-2 - Generic Enabling PPP Policy Transportation Subsystem Diagram ...................... 80
Figure 4-3 - Generic Enabling PPP Policy Economy Subsystem ............................................ 82
Figure 4-4 - Generic Enabling PPP Policy PPP Subsystem Diagram ....................................... 84
Figure 4-5 - Generic Enabling PPP Policy Environment Subsystem Diagram ......................... 86
Figure 4-6 - Generic Enabling PPP Policy Institutional Map .................................................... 88
Figure 5-1 - Generic PPP Project Deployment Transportation Subsystem Diagram ................ 114
Figure 5-2 - Generic PPP Project Deployment Economy Subsystem Diagram ......................... 116
Figure 5-3 - Generic PPP Project Deployment Land Use Subsystem Diagram ......................... 118
Figure 5-4 - Generic PPP Project Deployment Environment Subsystem Diagram .................. 120
Figure 5-5 - Generic PPP Project Deployment Institutional Map ............................................. 121
Figure 5-6 - PPP Project Deployment in RSTP Stage 3 ............................................................ 138
Figure 6-1 - The PPP Project Deployment Process .................................................................. 154
Figure 7-1 - Malaysian Enabling PPP Policy Transportation Subsystem Diagram ................ 170
Figure 7-2 - Malaysian Enabling PPP Policy Economy Subsystem Diagram ....................... 172
Figure 7-3 - Malaysian Enabling PPP Policy PPP Subsystem Diagram .................................... 174
Figure 7-4 - Malaysian Enabling PPP Policy Environment Subsystem Diagram .................. 176
Figure 7-5 - Malaysian Enabling PPP Policy Institutional Map ............................................. 179
Figure 7-6 - The Kuala Lumpur Metropolitan Region (Source: Bunnell and Barter) ................ 196
Figure 7-7 - The KLMR Transportation Planning Institutional Structure (Source: Ishak) ........ 197
Figure 7-8 - Malaysian PPP Project Deployment Transportation Subsystem Diagram ............ 200
Figure 7-9 - Malaysian PPP Project Deployment Economy Subsystem Diagram .................. 202
Figure 7-10 - Malaysian PPP Project Deployment Land Use Subsystem Diagram .................. 204
Figure 7-11 - Malaysian PPP Project Deployment Environment Subsystem Diagram ............ 206
Figure 7-12 - Malaysian PPP Project Deployment Institutional Sphere ................................... 208
Figure 7-13 - PPP Project Deployment in RSTP Stage 3 .......................................................... 220
Figure 8-1 - The PPP Project Deployment Process .................................................................. 233
Figure 8-2 - The Modified Malaysian Planning Process ......................................................... 239
Figure 9-1 - The US Regional Transportation Planning Process (Source: Transportation Planning Capacity Building Program) .......................................................... 253
Figure 9-2 - The Feedback Process ...................................................................................... 259
List of Tables

Table 2-1 - Privatization Arrangements ........................................................................... 21
Table 2-2 - Risk Breakdown Between Sectors ................................................................... 41
Table 2-3 - Favorable Risk Allocations ............................................................................. 42
Table 2-4 - Initial Toll Road PPP Evaluation Criteria ...................................................... 46
Table 4-1 - Simple Link Matrix Example .......................................................................... 76
Table 4-2 – Generic Enabling PPP Policy Transportation Subsystem Link Matrix ............. 78
Table 4-3 – Generic Enabling PPP Policy Economy Subsystem Link Matrix ....................... 80
Table 4-4 – Generic Enabling PPP Policy PPP Subsystem Matrix .................................... 82
Table 4-5 – Generic Enabling PPP Policy Environment Subsystem Matrix ....................... 84
Table 4-6 – Generic Enabling PPP Policy Class 2 and Class 3 Links ................................. 91
Table 5-1 – Generic PPP Project Deployment Transportation Subsystem Link Matrix ..... 112
Table 5-2 – Generic PPP Project Deployment Economy Subsystem Link Matrix ............... 114
Table 5-3 – Generic PPP Project Deployment Land Use Subsystem Link Matrix ............... 116
Table 5-4 – Generic PPP Project Deployment Environment Subsystem Link Matrix .......... 118
Table 5-5 - PPP Project Deployment Class 2 and Class 3 Links ......................................... 126
Table 6-1 - Private Toll Roads in Malaysia ....................................................................... 146
Table 6-2 - Malaysia Specific Evaluation Criteria .............................................................. 160
Table 6-3 - Final Set of Evaluation Criteria ....................................................................... 161
Table 7-1 - Malaysian Enabling PPP Policy Transportation Subsystem Link Matrix .......... 168
Table 7-2 - Malaysian Enabling PPP Policy Economy Subsystem Link Matrix ................. 170
Table 7-3 - Malaysian Enabling PPP Policy PPP Subsystem Link Matrix ......................... 172
Table 7-4 - Malaysian Enabling PPP Policy Environment Subsystem Link Matrix ............ 174
Table 7-5 - Malaysia Enabling PPP Policy Class 2 and Class 3 Links ............................... 180
Table 7-6 - Malaysian PPP Project Deployment Transportation Subsystem Link Matrix ..... 198
Table 7-7 - Malaysian PPP Project Deployment Economy Subsystem Link Matrix .......... 200
Table 7-8 - Malaysian PPP Project Deployment Land Use Subsystem Link Matrix .......... 202
Table 7-9 - Malaysian PPP Project Deployment Environment Subsystem ...................... 204
Table 7-10 - Malaysian PPP Project Deployment Class 2 and 3 Links ............................... 210
Table 7-11 - Expected Outcome of the CLIOS Process ................................................... 228
Table 8-1 - Expected Outcome of the Modified Malaysian Process ................................. 246
Table 9-1 – Proposed Institutional Functions .................................................................... 257
Table 9-2 - Requirements for PPP Development in the Adapted US Process Alternative .... 266
Table 9-3 – Results of the Adapted US Planning Process ................................................... 274
Table 10-1 – Combined Expected Outcomes of the 3 Alternative Processes ..................... 276
Table 10-2 - Comparison of the Enabling PPP Policy Outcomes ..................................... 279
Table 10-3 - Comparison of PPP Project Deployment Expected Outcomes ....................... 280
1 Introduction

1.1 Problem Statement
Transportation is key to the development of an economy. People need it to travel to and from work, school, stores, and social activities. Companies need it to receive and ship goods. Providing a cost-effective transportation system is important in creating a regional competitive advantage. The three most common strategies for providing a transportation system are for the government to build it using money from taxes, the government to build it using user fees, or for the private sector to build it using tolls or real estate development to fund the construction and operation. The last strategy has become more popular throughout the world as developing countries do not have the funds to construct enough roads and developed countries find their budgets strapped by growing costs in other programs.

Private sector toll road construction and operation does not mean the government is excluded from involvement. On the contrary, these roads are built with the permission of the government, in the form of a concession agreement, and may include government subsidies to supplement toll revenues, often in the form of low-interest loans. The term “toll road public-private partnerships (PPPs)” will be applied to these projects to indicate that they are not solely private sector initiatives.

The concession agreement developed between the government and private sector company, known as the concessionaire, can have a variety of outcomes based on how the different risks and rewards are apportioned between the government and concessionaire. Risks include insufficient traffic and resulting toll revenue, construction delays, adverse changes in the exchange rate if a portion of the bonds are paid in foreign currency, and unfavorable government actions. The most tangible reward of a toll road is the toll revenue but there are other benefits such as increased access and development, raising property values and tax revenue. If the road is badly needed and the public realizes that it would not be built without the private sector, there may be political dividends to using a toll road PPP. The goal of the concession agreement should be to assign the risks to the party best able to manage them and divide the rewards accordingly although it is not always clear what this division is.

A danger of private sector involvement is that they will lobby for arrangements that are profitable for them but that may not be socially beneficial. With regard to the concession agreement, this may result in the government assuming many of the risks while the concessionaire receives the rewards. Another manifestation of this activity could be the approval of roads for areas that would be better served in other ways. In an urban area, this may be the approval of a toll road PPP when investments in mass transit would better serve the region. In a rural area, a heavily-subsidized toll road PPP may be approved when existing roads are sufficient in the near-term.

Malaysia has relied on toll road PPPs for highway expansion for over twenty years. The concession agreements have resulted in terms favorable to the concessionaire with a “first-come, first-served” policy for unsolicited bids for some projects, soft loans or other financial support provided, scheduled toll increases with compensation if the increases are not allowed, and a
demonstrated willingness by the government to renegotiate the agreement if the project does not go well. The lack of transparency in the process of awarding concessions combined with past awards to companies closely linked with the most powerful political party, UMNO, has eroded the public's confidence in the process. There is insufficient data readily available to quantitatively determine the performance of Malaysia's toll road PPP program but based on the qualitative evidence that can be gathered, the program does not appear to providing the value for society that it could.

A proposed method of handling complex problems that have technical and social dimensions is the CLIOS (Complex, Large-scale, Integrated, Open Social-Technical) process. The toll road program is based in the technical transportation system but has significant effects on how people travel and live and the competitiveness of businesses. Hence, we argue that the toll road PPP program is part of a CLIOS system to which the CLIOS process could appropriately be applied.

1.2 **Purpose and Objectives**

The purpose of this thesis is to determine if the CLIOS process is an appropriate method to structure the management of Malaysia’s toll road PPP program such that it provides greater value to society while remaining financially viable for the private sector. This determination will require meeting three objectives:

1. Determine the quality of Malaysia’s Toll Road PPP Program
2. Develop the use of the CLIOS process for a new application: toll road PPP policy and program development
3. Evaluate the outcome of the CLIOS process’ application to Malaysia’s toll road PPP program against the outcomes of other transportation planning processes

What is the value to society? The following five areas along with issues in each area provide some insight into the costs, benefits, and potential performance measures of a toll road PPP program to society:

- **Financial**
  - Tolls paid
  - Costs from financial support
- **Environmental**
  - Air and water pollution
  - Lost habitat from the road right-of-way and adjacent land development
- **Social**
  - Potential for improving or destroying neighborhoods
  - Improved accessibility to social activities and labor markets
- **Economic**
  - Economic development
  - Innovation
  - Changes in travel time, travel cost, and reliability
- **Political**
  - Transparency
  - Public involvement
  - Accountability
Three possibilities for managing the toll road PPP program are explored in this thesis: the CLIOS process, a version of the current Malaysian process with incremental changes, and a process similar to the US transportation planning process. The current process is used as a baseline for comparison. The changes in institutional structure necessary for each alternative process and the outcomes based on the anticipated actions of the stakeholders during the process will be investigated.

Along with meeting the goal of providing better value to society, the effort expended to achieve the value will be considered. If one alternative can achieve 90% of the benefit of the highest performing alternative but at only 10% of the cost, then it may be a better choice for Malaysia.

It should be noted that the toll road PPP program is divided into two parts in this thesis, a general policy applicable to all PPPs called “Enabling PPP Policy” and a process related to a specific toll road called “PPP Project Deployment”. The two parts do not necessarily have to use the same process. For example, a possible outcome is that the CLIOS Process is best for Enabling PPP Policy while the current Malaysian process is the best for PPP Project Deployment. The linkages between Enabling PPP Policy and PPP Project Development do make it difficult to separately evaluate each one, though.

The results should be useful for other countries pondering the creation of a toll road PPP program or considering changes to their existing program. While much of it is specific to Malaysia, the generic application of the CLIOS process to toll roads provides insight for any country. Those countries in similar situations with similar institutional environments to Malaysia may find fruitful results in the specific application of the three different processes to the toll road PPP program.

For those interested in the CLIOS process, this thesis explores an application that could be useful for other systems. The process for managing the system may be divided into phases separated by time, space, or other attribute. Here, the national Enabling PPP Policy developed with the CLIOS process affects the multiple PPP Project Deployments that occur in different geographical subdivisions and at different times. This thesis considers how the result of one CLIOS process, Enabling PPP Policy, affects the execution of other CLIOS processes for PPP Project Deployment.

1.3 Methodology

A literature search was relied on to develop the background for Public-Private Partnerships and Malaysia’s toll road PPP program, including the institutional structure that influences Malaysia’s program. The PPP background was used to develop the framework for evaluating Malaysia’s program on 19 measures of importance to the transportation system, management of the toll road PPP program, and society in general.

The performance of the three proposed alternatives to the existing program was developed using this data. Rather than evaluating performance on a program developed in an institutional vacuum, each alternative was developed with the expected actions of Malaysian institutions in mind. A qualitative evaluation on every measure was then done for each alternative. This qualitative evaluation is based on the author’s understanding of how the system works and how
the changes in the program caused by the new process would flow through the system. This system extends beyond transportation and into economic and political fields. As the performance moves away from transportation and into these other fields, the author’s understanding decreases while performance uncertainty increases. A quantitative evaluation was not performed on any measure due to the lack of data for the Malaysian transportation system.

This approach clearly has its limitations. The literature for toll road PPPs is well developed but the sources for Malaysia’s program are much more limited and dated. As will be shown, transparency is not a strength of the Malaysian program. The accurate development and evaluation of the alternatives depends on the quality of the sources for Malaysian institutions involved with the program. With a limited number of data sources for the institutions, the data quality is less than desirable.

1.4 Organization

Chapter 1: Introduction
The purpose of the thesis is provided along with the methodology and organization.

Chapter 2: Privatization and Public-Private Partnerships
Privatization and Public-Private Partnerships are poorly defined in mainstream use. These two concepts are investigated so that a clearer understanding is reached as to what each one represents and how they differ. Advantages and disadvantages of privatization and PPPs in general are provided.

Toll road PPPs have a few characteristics that set them apart from the typical PPP, causing changes in how the government should approach them. These characteristics and the risks involved in creating a toll road PPP are discussed. Finally, toll road PPP program evaluation criteria are presented.

Chapter 3: Using the CLIOS Process for Toll Road PPP Policy
The CLIOS process was developed to study a class of systems considered Complex, Large-Scale, Integrated, Open Socio-technical systems. The CLIOS process offers a method to consider these systems in a rigorous and organized manner so that better insight can be achieved and strategies developed.

This chapter explains the CLIOS process in three settings. First, it details the generic CLIOS process to display how it provides a useful platform for investigating CLIOS systems. Second, the CLIOS process’ applicability to transportation is explored using a previously developed application, Regional Strategic Transportation Planning. Finally, the CLIOS process is adapted from the RSTP case to the case of toll road PPPs. One of the key outcomes is that toll road PPP policy is best considered in two phases: Enabling PPP Policy and PPP Project Deployment. These two phases can be handled by separate CLIOS processes.

Chapter 4: A Generic Application of the CLIOS Process to Enabling PPP Policy
This chapter considers in much greater depth how the CLIOS process is applied to Enabling PPP policy for a generic nation. The goal is to understand what issues may be encountered during the
process and when this may happen. A clearer explanation of the scope of Enabling PPP Policy is included to better differentiate it from PPP Project Deployment.

**Chapter 5: A Generic Application of the CLIOS Process to PPP Project Deployment**
This chapter continues the development of the overall toll road PPP program through the CLIOS process with the focus shifting to PPP Project Deployment. The PPP Project Deployment process is placed in the regional strategic transportation planning process with toll roads handled as one alternative among others to meet transportation needs. There are special considerations for PPP Project Deployment that require an extension of the regional strategic transportation planning process. The constraints placed on the process by the Enabling PPP Policy will play an important role in PPP Project Deployment.

**Chapter 6: Toll Road PPP Policy in Malaysia**
Can a new toll road PPP program improve on the performance of the existing program? This is impossible to answer without knowing the performance of the existing program. This chapter investigates issues that will answer that question including the history and motivations for creating the program, the extent of toll roads in Malaysia, the handling of the Enabling PPP Policy and PPP Project Deployment, the division of risk, and the outcomes so far. With this in hand, the strengths and weaknesses of the program can be listed. These will provide a baseline for comparison with the toll road PPP programs developed later.

**Chapter 7: Alternative 1: Applying the CLIOS Process to Malaysian Toll Road PPP Policies**
This chapter is an extension of chapters 4 and 5 with adjustments made for Malaysian-specific issues and institutions. A weakness of the generic system process is the lack of a specific institutional environment. The availability and performance of strategic alternatives depends on the institutional environment so there is a limit to the information that chapters 4 and 5 can provide. The process can be explored in much greater depth with the actual institutional environment of Malaysia.

**Chapter 8: Alternative 2: Incremental Changes to the Current Malaysian Process**
The CLIOS process would require significant revisions of the current Malaysian system which may be difficult to execute in the real world. An alternative more acceptable to the government and to stakeholders who benefit from the current arrangement may be to make incremental changes in the current process directed at specific weaknesses. For example, a lack of public involvement in the toll road physical design could be addressed by adding public workshops during that step. This chapter hopes to discover if improvements can be made to the process by making relatively easy and inexpensive changes to the process.

**Chapter 9: Alternative 3: Adapting the US Transportation Planning Process to Malaysia**
A third alternative to the current Malaysian process is to adapt the process used in the United States for transportation planning. The US process is not copied in all its detail but several principles and the general regional planning process are used. The key principles adopted are decentralization and public involvement. Rather than have all PPP policy decisions made by the EPU, a Malaysian national agency, decision-making would be distributed between the EPU for Enabling PPP Policy and state planning committees for PPP Project Deployment. The public
will play an important role in determining the future plans for the transportation system and how that involvement is included in planning for toll road PPPs will be discussed.

**Chapter 10: Comparison of Alternatives**
The performance of the three alternative programs is compared qualitatively on several measures. Some of the measures will be drawn from the five areas in 1.2 while others will be developed using some of the Malaysian government’s objectives such as contributions to reaching developed nation status by 2020 or improvement of the status of ethnic Malays, commonly referred to as Bumiputera.

**Chapter 11: Conclusion**
A summary of the previous chapters and a roadmap for future work are provided.
2 Privatization and Public-Private Partnerships

2.1 Introduction
Governments worldwide have used privatization in the past two decades to achieve a variety of aims. This has not been without controversy as numerous groups have fought its implementation while others have supported it. Not all privatization programs have succeeded, either. Privatization is not something that can be sloppily implemented, relying on the market to take care of all problems. It requires careful thought to realize its claimed benefits.

One thing that needs to be clear is what is considered privatization. Privatization is a term that has several meanings depending on who is asked. One supporter of privatization views this imprecision as a roadblock in increasing its use (Savas, 300). Construction management employs several terms to describe the array of arrangements between the private sector and government used to build infrastructure (Miller, 79). Related to all of these are Public-Private Partnerships (PPPs), a term used to cover nearly as many arrangements as privatization but with slightly different connotations. It will be fruitful to investigate these distinctions and understand their implications on privatization and PPPs. First, privatization will be discussed as it applies in general, whether for infrastructure, social services, or any other field. How PPPs fit into the privatization rubric will then be discussed. Finally, the application of PPPs to toll roads will be investigated.

The purpose of this chapter is not to debate whether PPPs are the best policy for providing transportation infrastructure. It is assumed that the Malaysian government is committed to the continued use of PPPs. Rather, the goal of this chapter is to introduce the reader to the basic concepts of privatization and PPPs, the benefits and disadvantages associated with them, and effective practices in their use.

2.2 What Is Privatization?
The short answer to this question is that privatization is the increased use of the private sector to provide services the government has traditionally provided. The major problem with the term privatization is that people often assume that services provided by the government will not be partially provided by the private sector but fully provided with no government involvement. Whereas the service may have been originally funded through taxes with minimal user fees when run by the government, people will assume that it will be funded through direct user fees. This arrangement can irk people if there is not a corresponding decrease in taxes when services are privatized or if it is feared that an undesirable burden will be placed on vulnerable populations like the poor or the elderly. These negative connotations of the term will be used by opponents of privatization to maintain the status quo.

Privatization is better described as changing the provision of services from direct government provision to indirect provision. Direct government provision means that the service is provided by government employees and is funded by government funds. The government can gather these funds through taxes, borrowing with bonds, or user fees. With indirect provision, the service is provided by non-government organizations such as businesses or charities. The provision may
still be arranged by the government for its citizens or, in full privatization, the service may be purchased directly by the user with no government involvement. The service may be paid for fully by the government, fully by the user, or some combination of user fees and government subsidies. Expansive definitions of privatization may not even require that a service be changed from direct to indirect provision, just that a competitive process is used to determine who provides the service, whether public or private sector.

Savas provides a useful spectrum to describe the variety of arrangements and a simple way to classify the different arrangements. The provision of a service can be divided into two parts, service arrangement and service production. Service production is the actual provision of the service to the service consumer. Service arrangement is the assignment of a service producer to a service consumer (Savas, 64-65). The three parties that can conduct service production and arrangement are the government, the private and non-profit sectors which will be referred to collectively as the private sector, and the service consumers. Here is Savas’ taxonomy of arrangements, summarized in Table 2-1:

- Government service - “The delivery of a service by a government unit using its own employees.” (Savas, 67) Both the service arranger and the service producer are the government. The consumer has no choice in who provides the service.
- Government vending - The consumer purchases a service from the government. The producer is the government but the consumer acts as the arranger and may have a choice of private sector vendors. For example, an organization could choose to use a publicly-owned convention center over a hotel’s facilities.
- Inter-governmental agreements - An agreement for one government to provide a service to another. The service arranger is one government and the producer is another government. Firefighting mutual aid agreements are a form of intergovernmental agreements.
- Contracts - An agreement for a private firm to provide a service for the government. The service arranger is the government and the producer is the private firm. For example, the government can contract with a construction firm to build a road.
- Franchises (or concessions) - “An award of monopoly privileges to a private firm to supply a particular service in a specified area, usually with price regulation by a government agency.” (Savas, 79) The government is the arranger and the private firm is the producer. For example, the government may permit a private firm to build and operate a toll road. Franchises may also be non-exclusive, as with taxis in many cities, and can be considered a specialized contract.
- Grants - “A subsidy given by the government to the producer. The grant may be in the form of money, tax exemption or other tax benefits, low-cost loans, or loan guarantees.” (Savas, 81). The goal is to promote the consumption of a good that government considers beneficial to society. A private firm is the service producer. The government and consumer act as co-arrangers; the government selects a group of producers to receive grants and the consumer chooses from this group. Grants to artists and museums are an example of this arrangement.
- Vouchers - A subsidy given by the government to the consumer for specific purposes. Like grants, the goal is to promote the consumption of a good that the government considers beneficial to society. Unlike grants, the consumer acts solely as the service arranger, choosing from any number of producers. Food stamps are an example of
vouchers where the government provides certificates to the consumer and the consumer is free to choose from any market to buy food from.

- **Free market** – The arrangement for most goods best exemplified by buying things at a store. The consumer is the service arranger and a private firm is the service provider. The consumer pays for the good from their own funds. The government has limited involvement, usually concentrated on safety or product information concerns.

- **Voluntary service** – A voluntary or charitable organization arranges a service and either it or a private firm acts as service producer. A volunteer group may pick up litter in a park for free while a homeowner’s association may use its monthly fees to pay for services from a private security firm.

- **Self-service** – Do it yourself. The consumer acts as both service arranger and service producer. A common arrangement found for household services like cooking, cleaning, and yard work.

In transportation, the first five arrangements are the most dominant but the free market occurs in places. A government can build a road using its own employees with government service. It may sell transportation services to another city in the form of a public transit system for government vending. A group of cities may agree to form a single government transit agency in an intergovernmental agreement. The government could contract with a private firm to build the road or provide transit services to the disabled in contracting. The government may also arrange for concessions to build and operate a toll road or to provide bus service along specific routes to be awarded to firms. Free market examples include a real estate developer building roads for a subdivision or a private company providing unregulated transit services as occurs in some developing countries.

<table>
<thead>
<tr>
<th>Arrangement</th>
<th>Service Arranger</th>
<th>Service Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government</td>
<td>Private Sector</td>
</tr>
<tr>
<td>Government Service</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Government Vending</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Intergovernmental Agreement</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Contracts</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Franchises/Concessions</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Grants</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Vouchers</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Free Market</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Voluntary Service</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Self-Service</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### 2.2.1 Public-Private Partnerships within the Privatization Framework

The term “Public-Private Partnerships” is also used to describe these arrangements. There is not a precise definition of what a PPP is and perhaps the term serves the purpose of being a friendlier term for privatization as the two can usually be swapped with little loss of meaning. Some have tried to delineate between PPPs and privatization. “The hallmark of partnerships is cooperation - not competition; the disciplining mechanism is not customer exit or thin profit margins, but a joint venture that spreads financial risks between public and private sectors.” (Linder, 20)
FHWA uses the term PPP for “any scenario under which the private sector assumes a greater role in the planning, financing, design, construction, operation, and maintenance of a transportation facility compared to traditional procurement methods.” (FHWA “PPP’s Defined” website) These scenarios include going from design-bid-build to design-build procurement methods or using a toll road concession rather than building a freeway. PPPs also involve an element of risk-sharing. The public and private sectors have different abilities which result in unequal capabilities for managing risk and a PPP can be one way to manage these risks more effectively to society’s benefit. In general, PPPs consist of contracts, concessions, and grants to provide goods and services.

Perhaps a better definition can be reached by exploring why the arrangement is a partnership with cooperation. A more useful definition is: “A joint arrangement between public and private sector partners where the partners cooperate to achieve goals that would not be possible by working alone.” This definition requires that the goals of each sector be clearly defined but it should be noted that the two sectors do not need to have the same goals.

Further distinctions between privatization and PPPs are created when considering the funding source. Funding for a program may come directly from the user in the form of user fees, it may come from government funds, or it may be some combination of the two. The source of the funding may affect the incentives for the private sector to operate efficiently or exacerbate problems resulting from information asymmetry. This distinction can be critical to overall social costs when dealing with transportation infrastructure given the scale of investment and lifetime of most projects.

Privatization always indicates greater involvement of the private sector while this is not always the case for PPPs. For example, a particular research field could be concentrated in the private sector. Conditions may change such that the government wants to increase the amount of research to meet public needs. It could do this by funding partnerships between public sector scientists and private sector researchers, increasing the government’s involvement in the field.

2.2.2 Benefits of Privatization
Advocates of privatization promote several benefits of this practice. The chief benefits derive from the discipline that competition instills and the private sector’s ability to develop specialized skills. These benefits include lower costs and reformed practices. Other benefits include the introduction of new knowledge to government agencies and risk sharing. Some of the changes brought about by privatization will be seen as benefits or costs depending on one’s own ideology. These more disputed benefits include cost efficiency, power sharing between the public and private sectors and some of the practices that may be reformed, particularly with respect to changes in civil service practices.

Cost reduction is the most trumpeted benefit that privatization is expected to provide. The theory is that the introduction of competition to an area that was previously a government monopoly will force potential service providers to eliminate inefficient practices. This quest for efficiency will be maintained by periodically putting the service out for bids. Services with high similarities to private sector functions have the greatest potential for realizing this benefit. One simple method to determine this is the “Yellow Pages” test. If similar services to the one being
privatized can be found easily in the yellow pages then the chances of privatization success will be higher. Savas lists several studies which have found significant savings ranging from 20% to 33% lower than the original cost (Savas, 151).

Cost reduction benefits are not always so. Different accounting methods between the public and private sector make cost comparisons difficult. The government has shifted towards private sector accounting standards so costs should eventually be comparable. The two sides in the privatization debate also argue over the proper way to compare the costs, using either fully-allocated costs or avoidable cost accounting. Privatization can easily shift between success and failure depending on which one is used. In Santa Barbara, a shift of 20% of the transit service to private provision saved $20,000 using fully allocated cost accounting while avoidable cost accounting showed an additional $600,000 in expenses for private sector participation (Sciar, 65).

One way that costs may be reduced results from the contracting process requiring clearer definition of the work to be done. “In-house projects often show changes in scope, unforeseen design complications, and unexpectedly high levels of public involvement—in contrast to contracted work, which tends to be better defined in project scope and relatively predictable as to potential problems that could increase costs.” (Moore, 18) In-house work may also require greater public involvement. High levels of public involvement is not necessarily bad if it increases the legitimacy of the project but if it is too unstructured, it can lead to costly delays.

Improved service quality is another potential privatization benefit. Service quality can be improved through firmer control over the service provider with a contract or it can be improved by using specialized private sector skills lacking in government agencies. In a competitive environment, the government can more easily replace a firm providing low quality service than when it is provided by the government where civil service protections make firing poorly performing employees a lengthy process. Civil service protections may also extend to high-level managers, giving them a measure of autonomy from elected officials. In comparison, if a private sector contractor does not meet service goals, the government can choose not to renew the contract or to even replace the contractor during the contract if allowed by its terms.

Privatization allows the use of firms with specialized knowledge. A firm and its employees can build roads or operate water treatment plants throughout the world, learning and disseminating effective methods. Governments often do not have systems of a large enough scale or constructed often enough to produce as many learning benefits. Employees also have limited opportunities for learning and potentials for promotion if working for one city. If there is a learning curve associated with providing the service, the government would be unable to move as far down the marginal cost per unit curve as a specialized firm, resulting in higher unit costs. Moore notes several examples where the government turned to the private sector to provide that knowledge for limited periods without incurring the expense of permanent staff (Moore, 14-15).

Government budgeting can make it difficult to shift funds between capital and operating expenses even if the shift is an efficient use of public funds, a process that the private sector should have more flexibility in doing. A problem in government is that transportation funds are tilted towards capital expenses for infrastructure projects with more vulnerable funds used to pay
for maintenance and operating expenses. This can result in overcapitalization as it may be near impossible to shift funds to operations and maintenance funds. Unlike the government, a private sector company is less restricted in how it uses the payments from the government as long as the terms of the contract are met.

While some opponents complain that a significant portion of efficiency gains come from layoffs, privatization advocates consider this a benefit. Assuming the smaller workforce can provide the same amount and quality of service, then society is no worse off from having these people laid off. The people laid off were essentially doing no productive work before and in the worst case they are doing nothing productive now. The cost savings are effectively a transfer of money from the salaries of the laid off (minus welfare benefits and severance pay) to the taxpayers. If the laid off can find gainful employment, then society benefits as the department is still providing the same benefits while another organization is increasing their output from the newly-hired worker.

Finally, privatization permits the government to share risks with the private sector. Each sector should take on the risks that it can best manage rather than simply shifting the risks from one sector to another. In general, the private sector, with its orientation towards profit-making, is better than the government for managing financial risks. The government, with its emphasis on the political process and its legal authority, is better able to take on political risks. Risk allocation is discussed further in Section 2.3.3.

2.2.3 Disadvantages of Privatization

Opponents suggest privatization should not be pursued as a general policy for several reasons. The strongest criticisms attack the basis of the pro-privatization argument that competition will bring about reduced costs. While cost is important in service provision, government goals include other criteria such as distributional equity and it is willing to sacrifice cost efficiency for these goals. The private sector may only be willing to pursue these non-cost goals if they are spelled out in the contract. Other criticisms include accountability concerns and the ability to write a good contract with the private firm if the service is complex. There is even the possibility that goals of elected officials and private firms may align but to the detriment of society.

Privatization advocates' major argument for their position is that competition will reduce costs. This argument is based in the standard market model from economics, a model which makes several assumptions that do not apply in many situations confronted by the government. The standard market model assumes many buyers and sellers who act rationally in their self-interest, perfect information, commodity goods, and low barriers to entry and exit. Reality is not always compliant with the theory. Imperfections impose additional costs on transactions. The magnitude of these transaction costs compared to expected gains will determine if privatization is a wise decision.

Information asymmetries are one of the greatest divergences from the standard market model and can be problematic with privatization. One classic problem is the principal-agent problem where the agent must carry out the will of the principal but the agent has different goals that may come at the detriment of the principal. A contractor may want to maximize profit and decide that
lower construction quality is the answer. Other information asymmetries may lead the
government to choose a company that underbid with the intention of monopolizing the market
and raising prices later. Another problem could be the award of a contract to a company that
does not truly understand what they are entering and cannot provide the good or service with
adequate quality.

Mobility of assets and the ability to use them for other tasks will affect the private sector’s
willingness to participate in privatization and its actions when involved, which may reduce
benefits. If assets can be used for other tasks or in other places, the private sector will be more
willing to participate and a more competitive market will be attained as companies that do not
win contracts can easily leave the market. If the assets cannot be moved or used for other tasks,
then firms that win contracts will pursue policies that cement their place in providing the service
and reduce competition. They have made an investment where the losses cannot be reduced by
leaving the market and they will want a good return on the investment.

If provision of the good or service displays economies of scale, regulation will be required in the
new market to prevent monopolies. The phenomenon of economies of scale is the decreasing
average costs of production for a firm over the range of market demand. The company
producing the most goods can produce them at lower cost than competitors, leading them to
capture a greater share of the market and with a large enough advantage, the company can
monopolize the market. Regulation is the common response to such a situation, as seen in the
past with power generation and telecommunications. Other possible remedies to market
monopolies are to investigate whether the good can be broken up into smaller goods which can
be made into competitive markets. The ability to partition a good into sub-goods may change
over time, as demonstrated by the telecommunications industry in the United States which went
from a national monopoly under AT&T to several companies providing a variety of services
such as the old landlines of AT&T and new services like wireless and voice-over-IP.

The standard market model assumes that there are no costs involved with a transaction beyond
the price of the actual good or service. While this may be true of commodities, complex goods
require additional transaction costs. These costs occur because of information asymmetry and
opportunistic behavior. To protect themselves, the parties involved must spend time and money
reducing information asymmetries. This is done by researching the other party and structuring
the transaction to reduce opportunistic behavior, usually through creation and enforcement of
contracts.

Buying milk is a transaction that involves low transaction costs. The typical transaction costs
involved are a visual inspection to see that it is the right type of milk (2% vs. whole vs.
chocolate), it is not past the sell-by date, and it has not been tampered with. The cost of this
transaction is about ten seconds per milk container. Building a highway by using a concession
involves higher transaction costs. Potential concessionaires must be checked for their ability to
carry out a project of that scale. Complex contracts must be written to cover a number of future
situations such as poor construction quality, traffic far below expectations, toll rate increases, and
natural disasters while aligning the goals of the public and private sectors to reduce principal-
agent problems. Enforcing the terms of the contract requires inspections to verify compliance
with the contract and the use of an arbitration mechanism like the courts to resolve disputes. The transaction costs here are clearly much larger than those involved with buying milk.

The transaction costs involved with a service will help determine the level of privatization. Increased transaction costs are often dealt with through increased government involvement. Private contracts or free market arrangements are appropriate for services with low transaction costs, concessions and government contracts are better for moderate transaction costs, and high transaction costs are dealt with best by regulation or government provision (Gomez-Ibanez, 23).

It is worth noting that in situations where there are high transaction costs for individuals, the government can act as an intermediary to reduce those costs. Pollution is an example of a situation where there are high individual transaction costs involved in detecting the source, negotiating a solution, and enforcing the solution as there are numerous polluters and numerous people affected. It is more effective to have the government act on the behalf of one of the parties to negotiate (or impose) and enforce a solution.

Ideally the goals of the government and private firm align with privatization. This alignment reduces principal-agent problems or moral hazards. In what way can this be detrimental to the public? The goals may not be defined in ways that are beneficial to society but are beneficial to government officials. Schneider presents an interesting case with privatization in the prison system (Schneider, 193-194). Elected officials wish to appear tough on crime, which often involves tougher sentences for criminals and additional police funding to capture criminals. Private prisons want higher profits, profits which increase with additional prisoners. With more people being held for longer, total prison costs may increase as the additional inmates offset the efficiency gains. The type of people held or the durations involved may go beyond what is socially or fiscally beneficial but there are few incentives to combat this. The private firm does not want reductions in profits and elected officials do not want to appear soft on crime. The only check may be provided by the courts but this process is time-consuming.

In the transportation field, this could manifest itself as the construction of too much road infrastructure that leads to undesirable growth patterns. By using concessions, more infrastructure can be built than with pure government financing. This policy pleases politicians who like to cut ribbons for impressive structures which can increase their support. For highway infrastructure, this policy also pleases road builders, land developers, and automobile manufacturers. These groups may push for toll roads even if the roads do not support a sustainable long-term growth plan.

Restrictive policies in the government could prevent government agencies from being more competitive with the private sector. Appointed positions, civil service protections, and union demands make it difficult to remove poorly performing workers. If greater flexibility is permitted, the government can successfully compete with the private sector. The Indianapolis Fleet Service, responsible for the maintenance of 2,700 vehicles for the city government, was notorious for poor service and was one of the first targets of Mayor Stephen Goldsmith who had campaigned on a privatization platform. When he worked with the department and the unions to get rid of the deadwood, the department’s performance surged and costs were reduce by a third (Sclar, 132-150).
2.2.4 General Conclusions on Privatization

Privatization works best when a competitive market can be maintained, the quality of the good or service can be easily monitored, and information asymmetries are small. The ideal environment may be unattainable for many services although they may come close enough that efficiency gains offset losses due to oligopoly or information asymmetries. There are ways to limit undesirable behavior by companies supplying the privatized goods or services. As the market for the service becomes more removed from the ideal market environment, stronger government regulation or different relationships are required to ensure that possible enhancements in the provision of the good or service are realized. As these costs mount, privatization may no longer be a tenable strategy on economic efficiency grounds.

There are other reasons besides cost to consider some form of privatization. Government workers may not have the best experience in certain situations or a task requires the use of a skill in low-demand. Contracting for that specific skill for a short duration will be more effective than the government paying for the skills full-time when there is little opportunity to employ it or even maintain proficiency.

There are still many who will call for privatization because of their ideology, arguing that competition will reduce costs when close examination reveals that there will not be an effective competitive market. There will also be opponents of privatization who will use a variety of arguments to prevent it despite gains that it provides taxpayers. Clearly analyzing each situation for the appropriateness of privatizing the service or good is key to a privatization strategy that benefits taxpayers, the public sector, and the private sector.

For the rest of this thesis, toll roads built and primarily funded by the private sector in an agreement with the government will be referred to as toll road PPPs. There is often no clear line to delineate between privatization and PPPs, especially in a nationwide toll road program where some projects may use little public funds while other projects rely on them because one road is an urban road with high traffic while another is a rural road. Since the current literature prefers PPP, that will be the term used.

2.3 Public-Private Partnerships and Toll Roads

Using PPPs to provide toll roads has gained popularity in the past few decades, especially among developing countries that are strapped for funds, but it is hardly a recent concept. Government sanctioned, privately constructed and operated toll roads have been around for hundreds of years. England’s Turnpike Act of 1706 permitted private trusts to borrow money to build and operate roads and to collect tolls, eventually leading to 18,000 miles of turnpike. There were 2000 private toll road companies in the United States in the 19th century (Klein, 321). In recent years, several forms of PPPs have been used to build, operate, and maintain roads, rail, and airports worldwide.

Toll road PPPs differ greatly from the ideal privatization model and is a cause of the ‘partnership’ emphasis. A competitive market is near impossible to create because the scale of the typical facility necessitates large financial resources to construct it and limits possibilities for competitive facilities. Millions of dollars are needed up-front for land acquisition and construction leading to substantial debt for the companies involved. The facility is immobile so
if the market is below expectations, the company cannot easily exit. This is a sizable barrier to entry into the market.

The relationship between transportation facilities, economies of scale, and geography also limits the supply of infrastructure that can be provided to the market. There may be a regional market only large enough to support one facility and the construction of a second facility may lead to severe financial difficulties for both concessionaires. In cases where the region can support multiple facilities, geography becomes a factor in defining the market. Two toll roads that have the same endpoints will use different routes and service different neighborhoods between those points. These neighborhoods may have different densities and wealth and hence, the roads will have different financial viability.

When discussing privatization or the use of PPPs to provide transportation infrastructure, it typically means a move from direct government provision or contracting using design-bid-build to a different form of project delivery. Instead of separate contracts paid by the government for different phases of the facility’s lifecycle - design, construction, operations, and maintenance - the government can award one firm the responsibility for multiple phases, the authority to generate revenue, and the burden of the financial risk. When concessions are used, they will run for a number of years with twenty to thirty years being a common period for a toll road. Concession agreements have given the concessionaire control of the toll road from anywhere between 5 years in a couple Mexican concessions (Gomez-Ibanez and Meyer, 156) to 99 years for the 407 ETR in Toronto (Miller, 216). A few franchises have even been awarded in perpetuity.

The concession does not often give free rein to the private firm for all phases in the lifecycle of a facility. The government may specify the route, labor practices, or construction quality standards. Operations and maintenance concessions have also been used for existing facilities.

The most striking difference between contracting and concessions is that a concession may have the private firm finance the facility. With contracting, the government pays the private firm money from its own budget. The money generally comes from taxes or bonds that will be repaid from general government revenues. Some facilities may charge tolls or fees that contribute to financing the facility but this money goes to the government in a contracting arrangement. With self-financed concessions, the private firm is responsible for paying for its construction and operation. User fees like tolls are a common source of revenue although some concessions recover costs from increases in property values for adjacent land. The government can regulate the fees so that the private firm does not take advantage of its monopoly position, although aggressive regulation may limit the financial viability of the facility as occurred in France where toll regulation contributed to the failure of three of the four concession companies (Gomez-Ibanez and Meyer, 118). In some cases, concessions may generate revenue while also receiving subsidies from the government. In Malaysia, if the government prevents a company from enacting a scheduled toll increase or forces it to rollback tolls, the government must compensate the firm for foregone revenue. The subsidy may also serve other government goals such as social equity if the government feels that relying on a higher toll to solely fund the facility would be an undue burden on low-income groups.
2.3.1 The Language of Transportation Infrastructure Public-Private Partnerships

Construction management has its own language to better communicate the differences between PPPs. This language principally refers to the different phases that the private firm is responsible for, how the phases are integrated, and the funding mechanism. This thesis will not dwell on the pros and cons on specific methods. The goal is to perform a survey of concessions versus traditional contracting and understanding how the specific infrastructure terminology maps onto the privatization vocabulary.

Figure 2-1 - Project Delivery Methods for PPPs Adapted (Source: Miller)

Miller uses a quadrant framework to help distinguish between the privatization methods that can be used, as shown in Figure 2-1 (Miller, 33). The horizontal axis is the project delivery axis, similar to Savas' framework. The left end constitutes highly segmented project delivery where a contract is put out for bid for each phase. Typically, one firm will be awarded a contract to design a facility. When the design is completed, another contract competition is held to construct the facility. Operations and maintenance are similarly put out for bid. The right end of the axis is combined project delivery with the private firm responsible for multiple phases.

The vertical axis refers to the funding arrangement. The top end represents direct government financing while the bottom end represents indirect financing that the private sector may gather, such as tolls. Quadrants I and IV would be considered contracting in Savas' framework while Quadrant II would be a franchise. Quadrant I would shade more towards a concession but the government is still the source of funds. Quadrant III is more difficult to place but it only constituted 0.1% of projects specified by the US Congress between 1780 and 1933 (Miller, 84).

In the United States, the predominant method since the start of the Interstate Highway System has been Design-Bid-Build (DBB). As shown in Figure 2-1, this method is a highly segmented, directly financed method. A contract is put out for each phase so the designers of a facility may
not be the ones who construct it. The government will pay for these services directly out of its budget. DBB can be a slower delivery method as time is necessary for at least two contract competitions, one for the design phase and one for the build phase. An effective bid process cannot be held without the bidders knowing what the design is. DBB may be a more expensive method as firms will not find it beneficial to make tradeoffs between phases. For example, Firm A could submit a design that may not quite meet the goals of the client as well as Firm B but be much cheaper to construct by Firm A because of its specific knowledge in certain construction techniques. In such a case, the overall lowest cost project may not proceed past the design competition.

Design-Build (DB) combines the design and build phases so only one contract competition is held and one firm provides both services. Operations and maintenance are still bid on separately. This method is expected to save money compared to DBB as firms can make tradeoffs between the two phases that take advantage of a firm's strengths, unlike DBB. Without the build competition, time to project completion should also be shorter. This method is still contracting in the general privatization terminology as the government directly pays for the service.

Further integration of the phases occurs in the Design-Build-Operate (DBO) and Design-Build-Operate-Maintain (DBOM) methods. These methods still rely on government financing. The financing may be in the form of a lump-sum payment or a series of payments from the budget, it may come from user fees collected by the facility operator, or it can be a combination of the two if the user fees do not cover the costs. This is still contracting as the government is guaranteeing payments for the private firm's services and the financial risk still lies with the government.

The method that best corresponds to a concession arrangement is called Design-Build-Finance-Operate (DBFO). DBFO may be referred to by several other terms such as Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), and Design-Build-Operate-Transfer (DBOT). In comparison to DBO, the financial risk of DBFO is borne by the private firm. In other words, the ability to get a loan, issue bonds, or solicit equity investment for a project is based solely on the expectation that revenues generated by the facility can repay the bonds. The financial risk may be mitigated by the resources of the private firm to cover shortfalls. The government has no obligation to support the firm if the revenues do not cover the costs of the project. When the $90 million Camino-Columbia toll road in Texas could not service its debt due to traffic much lower than projections, the state let it fail. The Texas DOT then purchased the bankrupt road for $20 million (Texas Department of Transportation).

2.3.2 Benefits and Costs of Using Public-Private Partnerships for Toll Roads

The benefits of toll road PPPs differ from general privatization due to market characteristics and the current use of contracting to provide many services. Like privatization in general, some of the arguments used to promote toll road PPPs may only apply in limited cases rather than in general. There are benefits but they require some attention to the partnership process to capture, otherwise the costs can easily overwhelm them.

Cost Efficiency

Cost efficiency gains are more limited with toll road PPPs than with other services. First, the low level of competition that can be attained reduces the incentives for firms to engage in
efficiency-increasing behavior. The high price of the typical project limits the number of investors. The high debt will produce a counterforce to the possible loss in efficiency.

Second, the firms that would be involved in the concession process are usually the same firms involved in the contracting process. The firms that often bid for a concession are consortiums put together solely for that facility. The consortiums are made of individual firms covering design, construction, operations, maintenance, and financing. These firms may have achieved many of the efficiency gains possible through competition for traditional contracts. Gomez-Ibanez and Meyer state in reference to toll roads that “shifting from a public to private franchise on a toll road may not significantly alter the cast of players; and since many of the same people may be involved either way, costs may also not be too much altered.” (Gomez-Ibanez and Meyer, 203) He does note that there may be some gains if the concession grants more flexibility in the process than in the contracting process but this may not be desirable if the firm’s goals are not well-aligned with the government’s goals.

The operations and maintenance aspect of the concession will help align the goals of the two sectors. The government wants a well-maintained toll road capable of moving a high volume of people and goods. The private sector partner wants to maximize profit which is aided by being able to move a high volume of people and goods. Poorly-maintained roads will cause drivers to drive slower or use other routes and it can lead to more accidents, reducing road capacity. The concession agreement may also require the road to be in a certain state of maintenance at the end of the concession period and delaying repairs can greatly increase their cost. To maximize profit while meeting the terms of the contract, firms may reduce the lifecycle costs of the facility through efficient maintenance to less than those of the traditional contracting process, a cost reduction that is more difficult when maintenance funds must be secured through political processes. These maintenance incentives can also reduce contract monitoring transaction costs for the government.

Higher Traffic Capacity
A new toll road clearly results in greater capacity compared to not being able to build the road due to lack of funds. With modern Electronic Toll Collection (ETC) systems that can detect vehicles at freeway speeds, the capacity can be as high as a freeway. Whether this is good or not depends on the situation and the stakeholder.

In highly congested situations or with rapidly developing economies, high capacity is necessary. Tolling also permits regulation of the need for capacity, especially with congestion or value pricing. It can encourage greater use of carpools or transit and help spread the demand throughout the day. People who commute on parallel routes will appreciate the additional capacity as they can use it or other commuters along their route may switch to the new toll road. Ensor discusses pricing strategies in greater depth (Ensor, 51-95).

When congestion is not too great or the road goes through undeveloped land, some stakeholders like environmentalists may not consider the additional capacity a benefit. There will be pressure to develop the land as it can increase the concession company’s revenue. The newly developed land can be an uncompetitive market for transit, thus increasing the environmental damage.
Access to Capital

Rather than cost efficiency, a major benefit that is touted by some is the ability to draw on capital that the government cannot, thus increasing total infrastructure investment. Gomez-Ibanez and Meyer point out two limitations with this argument: it may not be necessary to use the private sector to tap those markets and total economic investment may not actually be increased but rather redirected from one segment of the economy to infrastructure (Gomez-Ibanez and Meyer, 101). These limitations may be moot if institutional issues prevent efficient practices by the government.

The private sector has no inherent advantage in access to capital. The private sector would presumably back any bond financing with revenue generated by the facility. This arrangement could be replicated by the government in financing the facility. Since the financial backing of the bonds is the same, it should make little difference to investors whether it is the government or the private sector that oversees the project, all else being equal.

The private sector’s advantages lay in institutional issues. There may be laws that limit access to certain types of capital such as foreign capital or the amount of debt that can be incurred by the government. The private sector has a greater ability to use innovative financing methods, whether because of higher willingness by the private sector or legal roadblocks for the government to use them. In other cases, political obstacles may limit the government’s ability to fund a project. Funding for major transportation projects via bonds or sales taxes requires voter approval in some areas such as California where such measures by local governments and agencies require two-thirds approval. If voters feel the government has managed funds poorly in the past, perceives the projects as unworthy of funding regardless of actual merit, or thinks that there are already enough taxes, it may be very difficult to secure funding. This has not been a problem recently in the United States with most bond issues passing in the November, 2004 elections.

Politicians may also be unwilling to spend political capital to get approval if more politically advantageous issues are on the same ballot. Voters are more willing to approve a measure if they do not perceive it as costing them money, which will draw the support of people who won’t use the facility, or if it is clear that the facility will not get built otherwise, which retains some of the support of potential users who would be willing to pay.

Does the private sector have an advantage in accessing capital markets? It appears that they do. Are these advantages sustainable? They probably are. The government could change the laws but this requires going through a cumbersome political process.

Toll road PPPs may not increase total investment in the region. Investors may choose to invest in private infrastructure bonds, government infrastructure bonds, or other investments based on the expected risk and return. If an investor is dedicated to investing in infrastructure, then their investment in private infrastructure simply reduces what they may have invested in public infrastructure. “Privatization usually does nothing (at least directly) to increase the pool of savings on which private capital markets draw.” (Gomez-Ibanez and Meyer, 101) Government subsidies may also distort the expected risk and return of the project, making it appear as a better

---

1 California Constitution, Article 13C, Sec 2d for special sales taxes, Article 16, Sec 18a for bonds
investment than it truly is. These subsidies may be financial backing or the expectation that the government will rescue the project if performance is far below expectations. This can result in capital being diverted from worthier investments for society.

Innovation

One area where privatization can offer a definite advantage is in innovation although this may lead to other problems. Successful businesses are always searching for ways to improve profits. Government and elected officials are risk-adverse. They do not want to give the impression that they are wasting taxpayer money so they prefer the tried-and-true over risky ventures. Private firms are more willing to take risks if the returns are commensurate with those risks.

This arrangement can be politically advantageous. Elected officials who privately support certain programs may not want to publicly support them as they will be held accountable for failures. By using private firms, elected officials can shift part of the accountability to the private sector. If the program is successful, the official can easily associate themselves with the program by demonstrating how their support helped create the program. If the program fails, they can distance themselves by blaming the private firm’s implementation of the program, claiming that they have been deceived, or noting that little taxpayer money was wasted, although this ignores the net social cost.

Congestion pricing, also known as value pricing, is an example where the private sector took the lead on innovation in the United States. While the concept has been around for awhile, it had yet to be implemented. It was unknown how voters would react if value pricing was pursued on a road. In California as part of a legislative initiative, AB680, a consortium proposed adding toll lanes in the median of an existing highway, Route 91, and using value pricing for solo drivers while carpoolers could drive for free. These High-Occupancy/Toll (HOT) lanes have been successful despite initial reluctance to use them and are being replicated on other roads in the United States. While opponents may deride them as “Lexus Lanes” because of the perception that the wealthy will have a high-speed lane while others wait, all income groups have found them useful when they face a time pressure situation such as catching a flight or picking up children from daycare.

Toll collection in general is an area of innovation by the private sector. The toll road company’s goal is to maximize profit. The most efficient way to do this is to make tolling as painless as possible. The California Route 91 HOT lanes made up the first fully-automated toll facility in the world2, opening in December 1995. The 407 ETR in Toronto became the world’s first multi-lane fully-electronic toll road in the world in 1997 and used a variety of transponders, cameras, and communications technologies to detect and identify users (Miller, 209, 211-212). These technologies make toll roads even easier to use by eliminating toll plazas altogether, which even previous electronic toll systems like EZ-Pass required to properly read transponders.

Another area of innovation is in road design and services. One of the other projects approved as part of the AB680 program was an extension of Route 57 in Southern California. The major innovation was the proposed construction of the facility over a viaduct, saving on politically and

---

2 [http://www.91expresslanes.com/learnabout/snapshot.asp](http://www.91expresslanes.com/learnabout/snapshot.asp)
Chapter 2

financially expensive land purchases, although this would be partially offset by the greater construction expenses. Unfortunately, this project never went past the proposal stage.

Maximizing traffic flow as a means to maximize profit would encourage firms to reduce any disruptions to the flow. It would be interesting to research whether private firms are using or developing innovative programs to more quickly and inexpensively detect and clear incidents or how their maintenance procedures differ from government maintained highways.

Innovation does require supportive government processes but these processes have complications. Innovation can come in the form of an unsolicited proposal from a private firm. The government can evaluate the proposal for its appropriateness in meeting the government’s transportation goals. If the proposal meets them, the government can either negotiate solely with the private firm that wrote the proposal or the government can put it out for bid. While the latter may produce the best results for the public for that specific project, it will have a chilling effect on later proposals.

The proposals are not cheap to put together and firms will be warier about putting one together if there is a good chance it will lose during the bidding process. A government policy of negotiating solely with the proposal writer will increase the private sector’s willingness to put proposals together but it can lead to a loss of transparency in the process or the perception of corruption. An alternative may be to compensate the firm for promising proposals or to give the firm preference during the bidding for its initiative.

Innovative activity does have side effects which are seen with Malaysia’s toll roads. The concessionaires all wanted to minimize the disruption created by tolling, increasing traffic flow and revenue, so they turned to electronic toll collection. Unfortunately they turned to different standards so driving around Kuala Lumpur required several transponders or cards to navigate the toll roads (Lin, 154). Eventually the government stepped in and a single standard is now required. While innovation is good, if a region has several concessions operated by different companies, they may pursue similar initiatives to maximize their profit. The government should use its regulatory powers to help them standardize on initiatives like certain toll road technology where different standards could lead to chaos. An Intelligent Transportation System (ITS) architecture would reduce this problem.

Allowing too much freedom in creating road design and services may not be desirable. The private firm desires to construct a road as inexpensively and quickly as possible so that it can start generating revenue and retire its debt. This could lead it to reduce margins of error in the design that could lead to problems if a disaster like an earthquake occurs. The government should retain some approval power for plans although this must be balanced against the desire to prevent micromanagement.

Services also have to be monitored to ensure that the firm is not taking advantage of its near monopoly position such as pricing above what is needed to ensure a reasonable rate of return. High pricing may also have the effect of maximizing revenue but not reducing network congestion as users are priced off the toll road and onto lesser cost, lower capacity facilities. This regulation must also be carefully managed so that firms do receive a reasonable return for
the investment risks. A careful crafting of the concession agreement can help reduce these problems but it is not easy.

Not all transportation innovation occurs in the private sector. EZ-Pass was in use in the northeastern section of the United States before the California Route 91 HOT lanes were constructed. London’s use of a toll for driving in the city center was an innovative government application, as well. Much of the innovation does occur in the private sector, though, due to the profit incentive.

2.3.3 Structure and Risks of a Toll-Road Public-Private Partnership

The structure of the PPP must be created with an idea of the risks involved while those risks will be shaped by that structure influencing the outcome. There are several sources of risk for a PPP such as political risk, revenue risk, financing risk, and construction risks. The structure of the PPP must allocate these risks among the partners, ideally to the partner that can best manage the risk, rather than for one party to attempt to transfer all the risk to the other. This section will discuss each risk and how it interacts with the structure of the partnership.

Revenue Risk

Revenue risk is perhaps the greatest risk for toll road partnerships. Since revenue is a function of traffic flow, it is also known as traffic risk. The risk is that revenues are far from meeting expectations during normal road operation and it can be quite sizable given the uncertainty that accompanies traffic forecasts. Loss of revenue caused by government regulations not covered by the concession agreement or by disasters is not considered revenue risk while poor performance due to an economic recession is a part of revenue risk. Optimistic forecasts that do not pan out can lead to a dire financial situation as was demonstrated by the Camino-Columbia toll road in Texas, a road which the state acquired at a steep discount when the concession company went bankrupt. This risk is appropriately placed on the investors. If the project succeeds beyond expectations, they should reap the windfall just as they should suffer the losses when the project performs poorly.

Construction and Related Risk

Construction risks as the name implies involve risks in building the road. These cover schedule delays, changes in the cost of materials and labor, pre-construction preparation, and unexpected geological conditions. The private sector partner is in the best position to manage most of these risks as it manages the construction and any delays in schedule will delay the generation of revenue while interest payments to debtors continue. The government can manage some risks, especially in the pre-construction phase.

Preconstruction risks are the risks involved in environmental compliance and in obtaining the right-of-way. Right-of-way risk may be handled at a lower cost by the government. It can use its powers of eminent domain to acquire land while the private sector would have to negotiate directly with the landowners. Stubborn landowners can increase the costs to government by suing it. When the private sector is responsible, the landowner can hold out for more money but it also allows some flexibility as these additional costs can be offset by other landowners willing

---

3 Investors may require 50% greater projected traffic than needed to break even financially to cover the uncertainty according to consultants at Wilbur Smith performing toll road forecasting.
to reduce their price if an on-ramp and an off-ramp are placed near their remaining land. Despite this, the government may still obtain land quicker and cheaper than the private sector. In California’s AB680 program, eminent domain power was available as a last resort for its PPPs (Poole, 11-12).

The public sector partner may be the best choice for shepherding the project through the environmental compliance process. The process is time-consuming and expensive. Requiring the private sector to engage in the high initial costs with no guarantee of approval may decrease their willingness to participate in PPPs. Poole lists two possibilities to manage the risk (Poole, 14).

Related to construction risk is the long-term maintenance risk. The risk is that the road will require expensive maintenance procedures due to poor construction or an undesirably low investment in maintenance during the concession agreement. The government can shift some of the burden to the private sector partner with the length of the concession. A longer concession will create incentives for the private partner to use quality construction techniques and to invest in maintenance as it will be responsible for those costs over an extended period of time. Still, the most profitable level of construction or maintenance may not meet the quality standards of the public sector. If the government demands high standards, it must retain some of this risk and employ inspectors to ensure that quality is maintained and that violation enforcement is pursued.

Political Risk
Political risks cover a plethora of problems. Environmental and safety regulations may change after the concession agreement is signed, increasing operating or construction costs. The government can limit the tolls charged. Changes in political administrations may cause significant changes in policy towards toll road operators. The government is in the best position to manage this risk but it may not always be inclined to do so in a manner favorable to the partnership.

Portions of the risk can be managed through the concession agreement. Certain political decisions that lead to reductions in revenue, such as limiting the tolls to lower levels than specified in the agreement, can be cause for compensation. This payment may be a direct cash payment but it may also be an extension of the concession period, which can be more politically and financially feasible. In other cases, risks can be shifted to the private sector. The proposed new concessions law in Spain includes a progress clause that requires the toll road operator to “maintain and operate the public works according to the technical, environmental, and safety regulations that may be applicable at each moment.” (Vassallo, 5-6) Investors would then have to calculate the probability and cost of regulatory changes into their investment decisions.

Another form of political risk is the public support for the project. The concession company will find itself at greater risk for political opportunism when the public does not support the project. This may lead to schedule delays, project cancellation, or greater willingness by the government to limit tolls or increase regulation. High tolls for the proposed Lyon Peripherique Nord road caused protests so severe that the project was cancelled. (European Commission, 54) Both sectors are responsible for developing and maintaining public support. The government is in the best position to shape the initial level of public support. If a PPP is the only way to provide the
infrastructure and it is a necessary piece of infrastructure, the government must convince the public of it. Once the private sector partner is selected, the new partner can also take part in the campaign. Ralph Stanley, the CEO of the Dulles project, spoke at over 70 local events between 1989 and 1992 to meet local concerns (Klein, 336).

The public must be involved in the pre-construction phase of the project so that the negative impacts are reduced and the project gains legitimacy in the eyes of the public. The private sector must then maintain public support through construction and operation of the toll road. Consultations with the public must be maintained to inform them of future activities and to solicit ways to improve service for them. Toll increases could also be accompanied by an information campaign to give the reasoning behind the increase and reduce public anger.

PPPs work best when the institutional framework supports them. The laws must support PPP implementation, the ability to renegotiate contracts, awarding concessions in an equitable manner, and transparency throughout the whole process. The process should achieve some predictability for the private sector. Transparency is important so that both potential private partners and the public know why a concession was approved or denied and that there is no undue influence on the government. Public acceptance will drop for concessions approved using low transparency processes if they perceive it as payments to politically-connected construction and investment firms. Private companies will also be hesitant to engage in the process if they cannot estimate the chance of success for a proposal or if they fear the proposal will be awarded to a competitor with closer ties to the government.

While transparency is important, it must be implemented in a way that allows flexibility. The long-term, partnership aspect of the arrangement may require more flexibility in the dealings between the private and public sector than in traditional contracting arrangements. It requires the establishment of trust and greater use of relational contracts, described in Appendix 11.4A.10. Some governments may require arms-length dealings with the private sector to minimize corruption but partnerships require that closer relationship. Public outreach is needed to assure the public that the closer relationship is not corruption but a necessary practice for the greater social benefit.

Strong government support for PPPs is very desirable for investors. They need to know that the government will not break the contract for its politically advantage. Some of this risk can be handled through contract clauses where the government is allowed to take actions that may be favorable for politicians but that the concession company is compensated for. This type of clause can demonstrate government support for the PPP. The clause constrains the government's behavior through financial penalties, although these penalties are often spread across all taxpayers rather than those who benefit from the toll rate decision.

A supportive legal system that upholds the contracts in the face of government pressure is also a necessary feature. The 407 ETR is currently in court against the Ontario provincial government over the right to raise tolls. The first two court levels have supported the owner, 407 International, in the dispute but the government is pursuing an appeal. 407 International claims the original concession agreement does not require it to get approval for toll raises from the government but the government believes it does have approval authority (407 International
Since an opposing party approved the project, it may just be an exercise to gain popularity with voters.

Achieving innovation through PPPs is something that can be blunted by an unsupportive institutional framework. The government must first be able to accept unsolicited proposals if they fit the agency's mission. Then the government should be able to negotiate solely with the firm that wrote the proposal rather than put it out to bid to anyone. At the very least, firms whose proposals will be placed in open competition should be able to receive some compensation, otherwise firms will not undertake the effort to propose innovative projects.

More dramatic risks that investors must worry about are disruptive changes in government such as coups or revolutions or even the election of a government with drastically different politics. There is no guarantee that the company will be able to continue operating the road as in the past or that the new government will honor the original contract. To protect itself from such losses, the concession company can sometimes purchase insurance for these events.

**Financial Risk**

Financial risks contain two major risks. The first risk is exchange rate risk for foreign debt. This risk is much larger for countries with smaller capital markets that do not have enough domestic investment to support a toll road concession. The second risk is in how the investment in the project is structured. Not enough equity may cause early financial troubles and poor alignment of goals between the public and private sector partners. Too much equity may cause long-term return problems when most of the tolls are paid to equity investors and this is partially a political risk.

Exchange rate risk is generally shouldered by the private sector. It is an investment decision and foreign investors must take into account possible gains and losses incurred by changes in the exchange rate when they choose to invest their money. The concession company must also choose the appropriate level of foreign debt to use. The exchange rate risk should force the private partner to carefully scrutinize its assumptions about the project and whether the return on the project can support possible downside risks. Spain's 1972 concession laws protected companies from this risk which led them to search for foreign debt at low interest rates while not considering the expense that exchange rate fluctuations may cause. This led to yearly payments by the Spanish government around 40 billion pesetas (approximately $270 million) when Spain suffered a recession in the early-1980s and the currency dropped (Gomez-Ibanez and Meyer, 130).

The public sector is not freed from some responsibility for this risk. The government may make decisions that directly affect the exchange rate such as pegging the local currency to a specific exchange rate with a stable foreign currency like the dollar or euro. It may also approve projects on such a scale that a significant amount of foreign debt is required. Like the progress clause in Spain for construction risk, it is a value judgment as to whether the impacts of a government decision that directly affects the concession should be shouldered by the public sector that made the decision or the private sector who will integrate these risks into the cost of capital. While Spain perhaps should not have taken on all of the exchange rate risk in its 1972 concessions law, it had to provide some protection to draw in enough investment for all the proposed toll roads.
The government should try to minimize its exposure to exchange rate risk but there are times when the benefits of completing the toll road network more quickly outweigh the risk.

The balance between equity and debt is often mandated by the contract. The government can force a minimum and maximum level of domestic debt, foreign debt, and equity investment for the project. This structure will affect the financial performance of the road. Debt is necessary to make these projects happen due to their scale and to the long lag time between the initial investment and the return on investment, a lag that may run over a decade. Few companies have the resources to invest in one project whose costs run into the hundreds of millions of dollars, whose returns are usually delayed for significant periods of time, and which may fail.

The downside of debt from the concession company's perspective is that they must make payments on a regular basis. Another way to consider this is that the equity investment can be considered a buffer for underperformance. A high level debt leaves little buffer. If revenues do not meet projected levels for an extended period time, the minimal buffer could lead to bankruptcy. Debt does have the upside of creating incentives for the road to be completed on time. The sooner that the road is generating revenue, the sooner the company is paying back its debt. This incentive is diminished if the government provides loan guarantees. It also has a lower cost of capital than equity investment. This can be good for the consumer since tolls can be lower.

In equity financing, investors are expected to suffer through periods of poor performance but this must be balanced with periods of high performance for which the investors will expect to be compensated. This does lead to higher costs of capital for equity than debt. These higher returns may cause problems later. One model of the payments between operations and maintenance, debt, and equity returns is in Figure 2-2. While the equity investors receive little in the early years, once the debt is retired a significant portion of the tolls is returned to investors.

When the public sees the results in the later years of the concession, all they consider is the high profits the toll company is currently making. If the concession company proposes to raise tolls within the limits of the contract, the public will complain that the company is already making large profits. A long-term view may show that these are appropriate returns over the life of the investment for the equity investor, who received little or no returns during the early years. Politicians may take advantage of the situation to regulate tolls in a manner unfair to the concessionaire and its equity investors. These matters are best handled before the fact.
The government must work with the private sector partners to balance these financial risks. Debt will be necessary to finance major toll roads and it may require the government to assume some risk to draw in enough investors. It must be careful to not provide too many guarantees otherwise the private sector will have little incentive to properly manage the financial risks. Investors may also perceive a more desirable risk/return ratio than is warranted. Equity investment is desirable as it can spread risk to later time periods, albeit at greater cost to the consumer.

A summary of the responsibilities for the public and private sector is provided in Table 2-2. These responsibilities are ones that the particular sector is more adept at managing.

Another way to consider the risk allocation is to consider what a favorable outcome for the public sector is and what a favorable outcome for the private sector is as shown in Table 2-3. This can be useful when evaluating an existing program. If many of the risks are borne by one party and the revenue is not appropriately allocated, it may be wise to refine the program.
Table 2-2 - Risk Breakdown Between Sectors

<table>
<thead>
<tr>
<th>Risk</th>
<th>Public Sector Responsibilities</th>
<th>Private Sector Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>- Actions by the government that significantly and directly affect revenues</td>
<td>- Traffic forecasting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Economic difficulties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Minor changes in legal obligations</td>
</tr>
<tr>
<td>Construction</td>
<td>- Ensure that the toll road is in a desirable state at the end of the contract</td>
<td>- Schedule risks, material and labor costs.</td>
</tr>
<tr>
<td></td>
<td>- Guide the project through the environmental process</td>
<td>- Ensure that the toll road is in a desirable state for the life of the contract.</td>
</tr>
<tr>
<td></td>
<td>- Right-of-way risk</td>
<td></td>
</tr>
<tr>
<td>Political</td>
<td>- Institutional framework supportive of PPPs</td>
<td>- Long-term public support</td>
</tr>
<tr>
<td></td>
<td>- Compensation for moderate to significant changes in operation</td>
<td>- Minor political changes</td>
</tr>
<tr>
<td></td>
<td>- Initial public support</td>
<td>- Drastic political changes – coups or revolutions</td>
</tr>
<tr>
<td>Financial</td>
<td>- Assumption of risks necessary to drawn in needed investment</td>
<td>- As much risk as possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Alignment of investor goals with concession company goals</td>
</tr>
</tbody>
</table>

Concession period and Compensation

The arrangement with a private sector partner involves a combination of toll levels and contract length. The government may award it to the company that promises the lowest tolls or proposes the shortest concession period. Another method that has been used in Chile is the Least-Present-Value-of-Revenue (LPVR) method which uses a fixed toll with a variable concession period.

The first method to award concessions is where the government determines the period for the agreement and companies bid on who will provide the service with the lowest toll. Risk is high for the private investor if revenues are below expectations but they should expect to reap the awards of drawing high traffic. The government may also choose a contract length so short that it makes it difficult to draw investors. Poor initial traffic projections may not be balanced out over the long-run since the operating life is so short after time for construction is included. The short contract length may also require very high toll rates. The period may have been chosen for political factors over economic ones. It does push the company to finish construction as quickly as possible as any delays cause an equal reduction of the time that the highway is operating and generating revenues. A longer concession period can be chosen, providing incentives to the company to maintain the road well rather than letting it deteriorate over the life of a short contract.
Table 2-3 - Favorable Risk Allocations

<table>
<thead>
<tr>
<th>Risk</th>
<th>Favorable to Public Sector</th>
<th>Favorable to Private Sector</th>
</tr>
</thead>
</table>
| Revenue | - No minimum traffic guarantees  
- Caps on revenue with excess going to the government | - Minimum traffic guarantees  
- No caps on revenues  
- Long concession period |
| Construction | - Delays and cost overruns borne by private sector  
- Concession period begins when agreement signed  
- Private sector responsible for environmental compliance  
- Private sector pays for right-of-way | - Concession period begins when construction finished  
- Public sector provides environmental compliance approval before agreement signed  
- Government provides right-of-way at no charge to private sector |
| Political | - Private sector has to comply with changing regulations at their own expense  
- No compensation to private sector if tolls reduced from agreement levels  
- Private sector responsible for any change-in-government risks | - Compensation for the private sector if changes needed to meet new regulation or if tolls not allowed to increase as agreed to  
- Government reduces political instability risks with favorable laws or even paying for insurance if there is high instability |
| Financial | - No assumption of exchange rate risk  
- Concession structured to support long-term financial feasibility with no need for government bailouts | - Government assumption of exchange rate risk  
- Government bailouts if financial troubles encountered |

The second method is the reverse of the previous method. The government fixes the toll and companies bid on the concession period. The shortest period wins the concession. The government will set toll rates low enough to draw traffic while also being politically acceptable to the electorate. Low tolls have the danger of not being able to draw in enough investors as the return on investment may be delayed quite awhile if there are low traffic levels. It does allow the private sector to set a more appropriate concession period for the expected return on investment while also not alienating the public with high tolls.

In the LPVR method, companies bid on the least present value of the toll revenue. The concession ends when the total discounted revenue over the years equals the bid (Engel, 69). The LPVR method will lead to variable concession period, a period that is unknown when the agreement is made. This reduces the need for renegotiations if traffic is either much higher or lower than expectations. All that happens is the concession period is changed until the value of the revenues equals the bid. Public support may be easier to maintain while providing support to investors. The process is transparent as is the revenue stream. It helps prevent catastrophic losses by investors while preventing great windfalls. The latter point is not good from the investor’s point of view but it can improve support among the public who fear toll road companies achieving high profits at their expense. As Engel, et. al. point out, this risk reduction comes at no loss to the consumer as they pay the same amount in either case (Engel, 70).
Incentives to draw traffic are reduced as it merely shortens the concession period. This may be a drawback as congestion relief may not be as great as expected but it could also be a positive as it reduces incentives for the concession company to promote greater automobile use.

Value pricing introduces another wrinkle. What levels of congestion correspond to specific tolls? Who sets those tolls? How does the bid process work? Most bid processes fix the toll or the concession period in the process. The process must take into account maximum tolls charged or how those charges will change with congestion.

2.3.4 Conclusions on Supportable Public-Private Partnerships

With the information provided in Section 2.3, a general framework can be constructed for what makes a good toll road PPP. The prospect for success is aided by the following factors:

- A supportive, transparent institutional framework is necessary. Legal institutions must allow PPPs to exist and an equitable return to be earned even if politically unpopular. The government must also stand behind the PPPs rather than experiment with their use in an uncommitted manner.
- Risk should be allocated to the party best positioned to manage it. Financial and construction-related risks should be borne to the greatest extent possible by the private sector while political risks are preferably managed by the government.
- The government should minimize the use of guarantees unless it is the only way to build a needed road or if there are more urgent social needs. Toll road investment is a risk and that risk includes losing all money invested. A corollary is that greater than expected returns should be kept by the private sector.
- The public must be involved in the process. The public can ruin a partnership if neither public sector nor private sector involves them meaningfully in the process of deploying a toll road.
- Flexibility in the relationship between the public and private sector is desirable. This will reduce friction and costs when disputes arise. Policies need to be updated to permit flexible relationships.
- Institutions should support innovation by integrating it into their bid procedures. Unsolicited proposals should be considered and negotiated initially with proposing firm or the firm should be compensated if put out for bid.
- The contract needs to be structured so that the public sector goal of providing much-needed infrastructure, well-maintained for the long-term, and with equitable access and the private sector goal of maximum profit are balanced.

2.4 Public-Private Partnerships and Public Goals

PPPs are a tool to achieve greater goals, not an end unto themselves. Care must be taken during the planning process to keep this principle in mind, otherwise a toll road PPP program may take a life all its own. Projects may be accepted based on their financial viability even if they do not meet the long-term regional goals. Zegras writes regarding this conflict, “Unless a project has carefully passed full social, environmental, and economic appraisal, as part of a comprehensive strategy for the city, the negative consequences (environmental, land use, community disruption, etc.) of a “successful” urban road concession may outweigh any private benefits.” (emphasis added) (Zegras, 5)
How do we align the goals of the public-private partnership with the goals of the regional transportation system? First, the goals for each should be stated. For the public-private partnership, the goals are a mixture of public and private goals. The private goal is clear: to maximize profit. The public goals are more complicated and include those for the regional transportation system. For the toll road PPP, the public sector partner wants to provide a well-operated and maintained road that can support high traffic volumes at low cost to the consumer, with minimal government subsidy, while minimizing the negative externalities like pollution on the public. For the regional transportation system, the government wants to provide a well-functioning, cost-effective transportation system that degrades the environment as little as possible. Other goals are supporting economic development, efficient movement of freight, enabling rather than inhibiting neighborhood culture, and providing opportunities for the disadvantage.

Public sector goals should not be sacrificed just so the project proceeds. Providing a longer concession period or government subsidies can be used to compensate the private sector partner for agreeing to public sector goals, offsetting potential profit reductions. This solution is only a local optimum; it assumes the toll road PPP is beneficial to the regional transportation system. The best point to ensure that the toll road PPP will meet the regional transportation system’s goals is when the project is going through the approval process. The first decision point should not be whether the project is profitable or not; it should be if the project supports the region’s goals. If it does, then the profitability test can be considered.

This test is a nice ideal but how will it work in an actual political environment? There are two groups that hold major powers in approving PPPs. The first group includes government agencies. This is usually a department of transportation but it may be an economic development agency or some other department. The way to force the department to consider the regional goals first can either be done through department policy or through legislation. Legislation may be the most effective solution and by combining the goals of economic efficiency with social goals, it may draw support from a variety of politicians. Its effectiveness over other solutions such as department policies is due to the greater legal weight given to it in the court systems should problems arise and it is easier to track changes at that level. Supportive legislation is best made when the legal framework for PPPs is first being drawn up. Trying to add to it later may be more difficult as there will be less support among the free market minded politicians.

A department policy may be easier to implement than legislation, especially if the department heads support the regional transportation goals. The first requirement is that there is no legislation that prevents the department from considering goals other than economic efficiency.

Transparency is very important at this level. Less attention is paid to the everyday decisions made within government departments than to legislative efforts. Lack of transparency is a disservice to PPPs. People may begin to think that PPPs are just sweetheart deals for politically-connected firms at the common person’s expense. Companies may choose not to compete for PPPs if they cannot tell whether the competition is in good faith or not, leading to a worse outcome for the facility’s customers who may pay a higher price or receive a lower quality product and for taxpayers if the facility requires subsidization.
Regulatory capture could become a problem if PPPs become widespread. The government decision-makers may approve projects and then switch jobs to the better compensated private sector. The private sector has an incentive to engage in this behavior if the toll road market becomes quite profitable, especially in a rapidly-growing country with increasing transportation needs. Examples of regulatory capture abound in the US defense industry. One recent case involves Darleen Dryun, an Air Force procurement official, who received a job at Boeing after giving them preferential treatment for years (Merle, E5). After this was discovered, procedures were changed for when an employee leaves to reduce unethical behavior.

Elected officials have the ultimate power to approve or deny projects. If the toll road PPP supporters can show that the PPP provides benefits to the correct people, there is little to stop a PPP no matter its worth to the regional transportation system. A transparent process will improve accountability of the elected officials and it should limit corruption. Whether elected officials will be held accountable is questionable as people vote for them based on a portfolio of issues and poor PPP decisions alone will probably not be enough to unseat them.

### 2.5 Evaluation Criteria

Before investigating processes for reinventing toll road PPP programs, the performance measures should be defined. The toll roads developed through the PPP program should provide greater value to society than other options. Value to society encompasses value from several different perspectives. A toll road PPP program provides this value by supporting the following goals:

- **Meet anticipated transportation needs.** The program's ability to meet these needs will be measured by travel cost, travel time, reliability, and integration with the rest of the system.
- **Promote the economy.** This could be through improving access to markets or innovation.
- **Support an environmentally and socially beneficial transportation system.** Requiring the design to meet environmental standards, promote sustainable practices, and support neighborhoods are desirable. These allow some of the externalities produced by the project to be internalized.
- **Use a process where the reasoning behind decisions is clear, the public have the opportunity to provide input to the process, and the final results are supported by the government.**
- **Achieve these goals in a financially efficient manner.** Financial efficiency is met by allocating risks to the party that can best manage them and by ensuring that government financial support is at an appropriate level.

For each of these five areas, the following measures are useful in determining the success of a toll road PPP program, as shown in Table 2-4.
Table 2-4 - Initial Toll Road PPP Evaluation Criteria

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
</tr>
<tr>
<td></td>
<td>Travel Cost</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
</tr>
<tr>
<td></td>
<td>Integration</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
</tr>
<tr>
<td>Environmental and</td>
<td>Pollution</td>
</tr>
<tr>
<td>Social</td>
<td>Sustainability</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
</tr>
</tbody>
</table>

Many of these goals are difficult or impossible to quantify. Either the data is unavailable or the measure is qualitative in nature. Ordinal rankings are more appropriate for this application. It may be easy to determine if one process has higher transparency than another but impossible to quantify. Even if a measure is quantifiable, such as travel time, the data may be difficult to find. The expected outcome will have to be qualitatively derived.

In this thesis, comparisons will be made against a base process, the current Malaysian toll road PPP program. In a specific measure, the performance of the alternative process will be examined. If the expected result is better than the base process, the alternative will be given a ‘+’. If the alternative’s result is worse on that measure, it will receive a ‘-‘. A ‘0’ indicates that the alternative is expected to perform no better or worse than the current Malaysian toll road PPP program.

An exception to this scheme is on the Ease of Changes measure. It will always be more difficult to change something than to leave it the same so all alternatives would receive a ‘--’, making it not a meaningful measure. For this measure, the scheme will be ‘0’, ‘-‘, and ‘--‘ to indicate no difficulty in making changes, minor difficulty, and major difficulty, respectively.

The measures are not intended to provide an absolute guide to evaluating a toll road PPP program. Just because one alternative has more ‘+’s and fewer ‘-‘s than another does not automatically mean it is the better choice. If the differences are few, the programs should be compared in depth. One alternative may have fewer ‘+’s but it could greatly outperform the other alternative where it does have those ‘+’s, offsetting the measures where it performs poorly. The measures do provide a reasonable first test for excluding alternatives that are clearly worse.
than others. If one alternative has significantly fewer ‘+’s and more ‘-’s, it is probably a poor alternative. Even if it performs well where it has a ‘+’, the large number of ‘-’s indicate that it may not be a robust solution.

These measures are negatively correlated at times; an action that improves one measure could lead to declines in another. For example, travel times can be reduced, a good result for that measure, by increasing tolls, a bad result for that measure. Ideally, there would be enough data to calculate if the tradeoff is worthwhile. If there is not, the comparisons will have to be on estimated magnitude. For example, will the policy produced by a process lead to minor improvements in travel time at significant cost?

2.5.1 Transportation

Travel Time
Travel time is the time used to drive between points on the toll road. It does not consider effects like a high toll causing drivers to clog up the surface streets. Lower travel times are better since travelers can use the saved time for more productive uses. This can be negatively correlated with travel cost since higher costs will reduce the congestion and travel time on a road. Another strategy is differentially priced lanes. California Route 91 is one application of this strategy where most lanes are free but two lanes in each direction are toll lanes for single-occupant vehicles and free lanes for high-occupancy vehicles that provide much lower travel times.

Travel Cost
Lower travel costs are better for society, all else being equal. Indirect effects such as fewer companies interested in toll road PPPs will be ignored in this measure. Lower travel costs make businesses more competitive in the global economy and permit travelers to use their money for other purposes, increasing their standard of living. Major components of travel costs are tolls, gas, vehicle costs, and insurance. Tolls will be the main difference between PPP policies; the others will be approximately the same.

Reliability
Reliability is the variability in travel time. Lower variability is better; travelers and freight carriers can manage their time more effectively. The variability in travel time is typically for a given point in time. Travel time will obviously be higher during rush hour than midnight; the important characteristic is how variable the travel time is during rush hour. Reliability can be improved through good operations such as responding to and clearing incidents quickly.

Network Integration
Greater network integration with the rest of the transportation system can facilitate lower travel cost, lower travel time, and higher reliability. Network integration can be in terms of physical integration where the lanes, speeds, and other physical characteristics are consistent with other roads. Another form of network integration is ensuring the alignment and intersections make sense from a network perspective. Landowners, neighborhood activists, and the concessionaire will try to change the alignment to meet their goals which may not coincide with network efficiency.
Network integration is also operational in nature. Malaysia had problems where different toll roads would use different standards for electronic toll collection, resulting in people needing multiple transponders. Other forms of operational integration include sharing traffic information with a traffic management center and following the directions of a traffic management center.

Operational integration may include highway patrols and emergency response. PLUS, the largest concessionaire in Malaysia, has service trucks patrol their roads to clear any minor incidents that disrupt traffic. Hypothetically, operators for the rest of the system may want to know if they could receive support from PLUS in the case of a major incident on their roads, similar to the mutual aid pacts between fire departments in neighboring towns.

**Needs-Based Process**
This measure is based on the ability of the process for developing a PPP project to meet transportation needs such as the ability to accommodate freight or to provide some amount of capacity. It should not be based on the government's ability to have someone else pay for infrastructure. For instance, an urban highway should not be built over a needed transit system just because the road will be profitable. Another aspect of needs-based design is if it serves its intended purpose. If a toll road is intended to serve freight needs, truck-only lanes may be desirable so smaller vehicles do not disrupt freight traffic.

2.5.2 **Economic**

**Access to Markets**
Improving access to markets will help accelerate economic growth and allow a more efficient use of resources. Access includes access by businesses to markets for buying and selling goods and access by people to employment markets or other economic activities.

**Innovation**
More innovation is better for society. It can reduce the costs of the transportation system such as innovative construction techniques or increase the benefits like employing operations strategies that reduce congestion. It may also be useful to the economy by helping develop an industry and skilled workers. To encourage innovation, the benefits of the innovation should be internalized to the innovator. For toll roads, companies should have some space to develop innovative designs, implying that the government should not over-specify the design. Unsolicited proposals that are innovative should be rewarded. Compensation could be sole-negotiation rights, cash, patents, etc.

2.5.3 **Environmental and Social**

**Pollution**
Lower pollution is desirable since it improves the health of the population. Better health provides direct economic benefits in medical cost savings and improved worker productivity. A cleaner environment will also help companies recruit skilled workers who have opportunities in different regions and may use environmental quality as a criterion in their employment decisions. An environmental approval process that requires project compliance with environmental standards early in the project before momentum is created to build it is superior to a process where a non-binding assessment occurs after the project has been approved for construction.
Sustainability
When sustainability is referred to in this thesis, it will be using the OECD’s definition for sustainable transport:
“A sustainable transport system is one that:
- Provides for safe, economically viable, and socially acceptable access to people, places, goods, and services;
- Meets generally accepted objectives for health and environmental quality (e.g. those concerning air pollutants and noise put forward by the World Health Organization (WHO));
- Protects ecosystems by not exceeding critical loads and levels for ecosystem integrity; for example those adopted by the United Nations Economic Commission for Europe (UNECE) for acidification, eutrophication, and ground-level ozone;
- Does not aggravate adverse phenomena such as climate change, stratospheric ozone depletion, and the spread of persistent organic pollutants” (Caid et. al., 220)

There is an emphasis on what is referred to as 3-E sustainability: Environmental protection, Economic development, and social Equity. More sustainable practices are preferred since they will aid society in the long-term.

The extent to which a toll road PPP policy promotes sustainable or unsustainable activities should be considered. For example, a policy that permits congestion pricing is more sustainable than one that does not since congestion will be reduced, reducing environmental pollution from idling vehicles and wasted time of travelers or freight which has economic value.

The 3-E’s are covered separately so this measure will not cover basic improvements in those areas. Improvement in sustainability will require the integrated and balanced consideration of the 3-E’s.

Neighborhood Effects
Roads can have significant effects on a neighborhood, providing or restricting access to a variety of economic and cultural activities. The best outcome would be a transportation project that manages to provide the transportation benefits while minimizing damage to the neighborhood. Requiring the involvement of the public and urban planners will improve the sensitivity of the process to local concerns. Requiring approval of a planning department would further improve the internalization of costs that a project may place on people who live adjacent to the facility.

2.5.4 Political
Transparency
The voting public should have an idea as to what their elected officials are doing and why they are doing it. For this reason, more transparency is better. Ways to have high transparency include having open meetings when discussing toll road PPPs, publishing official policies, providing evaluation criteria used when selecting toll road PPPs, or allowing the public access to bid documents and government reports.

49
Public Involvement
Increased public involvement is desirable since it will increase the acceptance of the final project. Higher levels of public involvement would include being able to provide input on key decisions and having some members of the general public explore issues in depth. Increased public involvement may subject projects to “Not In My Backyard” (NIMBY) arguments from the public that may delay or even cancel the project.

Accountability
Higher accountability is desirable. If, given the data available, bad decisions are made, the officials who made those decisions should be punished. For very poor decisions, this could mean no reelection or the loss of a job. An official that makes decisions on a wide variety of issues would have low accountability since good performance on other parts of their job may offset the bad decisions on toll road PPPs. An official who only does work on toll road PPPs could be highly accountable assuming there are mechanisms to remove the official. Again, these are on decisions made with the available data. If the official made a reasonable decision with the data available at the time but unforeseen events caused the failure of a project, the official should not be automatically removed.

Ease of Changes
Changing the process to something better will involve a cost. If the changes are significant, institutional inertia will make it difficult to reach the desired goals. The Ease of Changes measure is intended to capture the level of difficulty in moving from one process to another.

Government Program Support
Government program support is critical in persuading investors to participate in the program. Better support is created through measures that increase the binding on government actions regarding the program. Official government policies are good for establishing support; laws are even better if the legal system is strong since government policies will change over time. Government willingness to renegotiate contracts is another way to demonstrate support.

Another form of support is the scale of the program. The government can demonstrate support by increasing the number of toll road PPPs approved. It can also show a reduction in support by decreasing the number of toll road PPPs approved.

2.5.5 Financial
Financial Support
Financial support includes soft loans, revenue guarantees, and exchange rate risk assumptions made by the government to reduce the risk to the concessionaire. Less support is considered better for society assuming the same amount of infrastructure is built. The same benefits result with fewer public expenditures. This caveat is important. Eliminating financial support may lead some worthwhile projects that have benefits that are difficult to internalize from being built.

Risk Allocation
Costs of the program should be minimized if risks are allocated to the party best able to manage them. An example of poor risk allocation is if the construction risk is assumed by the public sector such as giving the concessionaires loans where interest is not charged until the road is
opened. Another example is when political risk is assumed by the private sector such as no compensation if the government forces concessionaires to reduce tolls below levels allowed in the concession agreement.

2.6 Conclusion

Privatization has been touted as a tool to reduce government costs by either using the private sector to deliver them for the government or by completely eliminating the government's role in providing the service. There are benefits to privatization in certain circumstances but savings are not universal due to issues like barriers to competition and high transaction costs for some services. PPPs share many similarities with privatization since they often involve increased private sector cooperation. While privatization intends to place as much risk and responsibility on the private sector by the government as possible while still fulfilling service goals, PPPs are intended to reallocate risks so public sector and private sector goals are met in an effective manner.

Toll road PPPs can be a useful tool for meeting transportation needs but they require care to provide the desired benefits. Understanding PPPs as applied to toll roads requires understanding the benefits, costs, and risks of the venture. Creating a PPP without much thought could easily lead to the PPP failing to achieve one or both of the partners' goals. Risks include revenue risk, construction and related risk, political risk, and financial risk. These risks need to be allocated in such a way that both public and private sector goals are met but it will not be clear what the optimum allocation is. The government and concessionaires will need to negotiate the allocation based on historical results and the characteristics of the proposed toll road PPP.

One thing that should not be done is to sacrifice public goals for private ones. The regional transportation system should not be shaped around toll road PPPs because the government does not have to pay for them. Toll road PPPs should be shaped to support the regional transportation system. Social and environmental needs must be considered when evaluating the use of a toll road PPP.

To determine if a proposed new toll road PPP program performs better than the existing program or other alternatives, evaluation criteria have been proposed that are relevant to society. The alternatives are compared on the criteria using a simple '+', '0', '-' scheme. This system can be used to quickly identify those alternatives that are clearly worse than others. An in-depth comparison should be done for alternatives with few differences between them.

In the next chapter, a process that can be used for managing a toll road PPP program will be examined. This process, known as the CLIOS process, is targeted towards complex socio-technical systems such as the transportation system. It could potentially be a useful process for ensuring that the toll road PPP program supports transportation needs and provides a good value to society.
3 Using the CLIOS Process for Toll Road PPP Policy

3.1 Introduction

Complexity in transportation planning has increased greatly in the past few decades due to the growth of metropolitan regions and the power of the suburbs, environmental concerns, greater integration of information and communications technology, and concerns about equity and quality of life. The growth in complexity has gone beyond what traditional processes can handle, necessitating the use of more adaptable processes to prevent system failure. One framework for managing this complexity, proposed by Dodder et al., is the Complex, Large-Scale, Integrated, Open Socio-technical (CLIOS) process. The CLIOS process is intended for use for a wide variety of problems where technical systems interact with social and policy systems. This chapter will discuss the CLIOS process, its prior application to Regional Strategic Transportation Planning (RSTP), and how it can be used to manage a toll road PPP program.

3.2 The CLIOS Process

Researchers at the Massachusetts Institute of Technology have pursued the work on the CLIOS process as a way to analyze a class of engineering systems. A sample of systems that the CLIOS process has been used on includes supply chain modeling, transportation planning, energy distribution, air combat, and telecommunications (Sussman, Sgouridis, and Ward, 2). The process has 12 steps that are divided into three phases, as shown in Figure 3-1. This section will provide an overview of the process. For an in-depth explanation of the process, the reader is referred to Dodder et al.

Dodder et al., use the concept of a Christmas tree as a metaphor for the CLIOS process. No matter what system is being analyzed, the steps in the process remain the same, like the Christmas tree itself. The tools used to analyze the system are then the ornaments on the tree. The tools are selected for the system under consideration. Analyzing the transportation system requires different methods than analyzing air combat. Depending on the setting of the tree, whether indoors, outdoors, in a large room or a dorm room, the ornaments used will be different.

3.2.1 What is a CLIOS System?

What is meant by the term “CLIOS System”? Let’s break it down into its components:

- Complex – “A system is “complex” when it is composed of a group of interrelated units..., for which the degree and nature of the relationships is imperfectly known” (Dodder et al., 3)
- Large-scale – The effects of the system are large in magnitude or the system itself is large
- Integrated – Subsystems are connected to each other, usually including feedback loops, rather than independently operating entities.
- Open – The system includes social, economic, and political aspects.
- Socio-technical – The system includes both social and technical components that interact.
- System – A group of related elements making up a whole.

---

4 The terminology for CLIOS has changed since the version of Dodder, et. al. used here was written so there are minor differences.
These characteristics make evaluating a CLIOS system difficult. Relationships between components in the system may be difficult to analyze and many relationships may be missed by investigators.

Figure 3-1 - The CLIOS Process and Metaphor (Source: Sussman, Sgouridis, and Ward)

One term encountered when dealing with CLIOS is engineering systems. "Engineering systems are systems designed by humans having some purpose and are composed of interacting components" (Moses, 3). Engineering systems also have the property of being very open and require interdisciplinary skills to analyze. For instance, the transportation system is considered an engineering system. It has greatly affected society, it is difficult to manage, and there are a variety of tools necessary to analyze it as a whole, from quantitative tools in the engineering and economics fields to qualitative tools found in fields like political economy or institutional analysis. The interdisciplinary nature does not require a heavy social component. The strong social component differentiates CLIOS systems from the more general engineering systems.

Engineering systems should not be confused with other fields like system engineering. System engineering is a set of techniques to manage a technical system throughout its lifecycle, especially systems that have integrated subsystems involving different engineering disciplines. A satellite requires a system engineering perspective since mechanical, aerospace, and electrical engineers are all needed to construct it successfully. As opposed to engineering systems, system engineering does not necessarily include any social or political aspects. Engineering systems are
The CLIOS process is used to study CLIOS systems, which is a class of engineering system.

3.2.2 Key Concepts of the CLIOS Process

The CLIOS process has three key concepts that can be used for analyzing engineering systems (Dodder et al., 4-5). These concepts are the CLIOS System Representation, Nested Complexity, and Types of Complexity.

The motivation for a CLIOS System Representation is to understand how the system works in a way that can be easily communicated with other stakeholders. With better information on the inner workings of the system, the evaluation of alternatives can be done in an informed manner. The representation is expected to be a combination of diagrams and text. A diagram attempting to capture all the complexity of a CLIOS will be far too cluttered to be comprehensible. The diagram portion of the representation should give a clear idea of what components make up the system. Links between the components can show which components influence each other while the text gives greater detail on the nature of that influence.

The system representation by itself is not unique. There are many other ways to represent systems such as system dynamics. It becomes unique when used in conjunction with the concept of nested complexity. The concept of nested complexity is that a complex physical system lies within a complex institutional sphere as shown in Figure 3-2. The physical system is managed or affected, to a degree, by the institutional sphere and the institutional sphere responds to changes in the physical system. This representation leads to connections from the sphere to and from the physical system which are called projections. The physical system components that the projections are connected to are called policy levers, points where institutions can direct or affect the physical system.

In the CLIOS process, complexity is considered in three ways. Internal complexity comes from “the number of components in the system and the network of interconnections between them.” (Dodder et al., 5) Behavioral complexity arises when the behavior of the system is difficult to predict. This may be due to unforeseen relationships, time lags, and feedback in the system, among other causes. Evaluative complexity occurs when the stakeholders measure the performance of the system differently. What one stakeholder considers desirable system performance may be undesirable from another stakeholder’s point of view. This has implications on the policy levers and alternatives that will be feasible.

Figure 3-2 - Nested Complexity (Source: Dodder et al.)
3.2.3 The Representation Stage

The first stage in the CLIOS process is to understand the system we are trying to analyze and why it is being analyzed. As Figure 3-3 shows, the stage is further divided into two substages. The first involves developing the structural representation of the system - the subsystems, components, and actors that compose the system. Once the system's structure has been adequately described, the behavioral representation is developed - how the parts affect each other, what lags are involved, and the magnitude of the effects between components. This does not have to be a quantitative representation and trying to quantify some components and behavior may give a false sense of accuracy. In many cases, especially in connections involving the institutional sphere, a qualitative representation may be the only one possible.

Before the system can be represented, the system under scrutiny must be identified as part of step 1. The boundaries for the analysis of the system, the issues of concern, and the goals of the system must be discussed and negotiated by the system stakeholders. This step will likely be revisited during other steps of the CLIOS process as improving knowledge of the system forces stakeholders to reframe their concerns and adjust system boundaries.

When the stakeholders have bounded the system, they then identify the subsystems in step 2 of the CLIOS process. The subsystem identification may be by technical discipline, function, or other logical arrangement. One subsystem arrangement for transportation systems is the common modal arrangement: highway subsystem, rail subsystem, sea subsystem, air subsystem,
and transit system. Another arrangement could be by function: high value freight, commodity freight, long-distance traveler, and commuter.

Step 3 involves the development of a basic representation of the system. The subsystems identified in step 2 are expanded while a basic representation of the institutional sphere is created. The components in each subsystem and the links between components, whether in the same or different subsystem, are created. The links are not developed in any depth at this point in the process. They just note that one component influences another. To handle the complexity of the system, the techniques of Nesting, Layering, and Expanding are used (Dodder et al., 11-13).

Step 4 is broken up into two parts that may be done in parallel. The first, step 4A, is to describe each component. In the CLIOS system representation, a component can be one of three possibilities: a plain component, a policy lever, or a common driver. A policy lever is a connection that an institution can use to drive the system. It represents a way policymakers can manage the system. A common driver is a component that is shared across multiple subsystems and it may be exogenous to the system. There may also be a greater degree of uncertainty surrounding the common drivers and their effects on the system. Most of the components will just be plain components, though.

Whereas in step 3 components were simply linked no matter the characteristics of the link, step 4B involves investigating the characteristics of the link. There are a variety of characteristics that may be covered by the links such as magnitude, direction, time lags in the influence of one component on another, or uncertainty in the relationship. While it may be possible to capture some characteristics using notations in the diagram, some characteristics will be too complex to comprehensibly place on the diagram. Supplemental text must be used to adequately communicate the link characteristics. Again, the link characteristics do not need to be quantitative. It is preferable to be quantitative if the situation allows but it should not be forced on a link if the data is just too uncertain.

The final step in the Representation Phase is to seek insight about system behavior. Things to look for include feedback paths such as vicious or virtuous circles, strong interactions between policy levers and other components, inertia in the system that runs counter to the goals, and irreversible effects. Dodder et al., note that many insights will be made just in the act of creating the representation and they provide several questions that can guide the practitioner in gaining greater insight (Dodder et al., 16).
3.2.4 The Design, Evaluation, and Selection Stage

Figure 3-4 - The Design, Evaluation, and Selection Stage

With a well-developed system representation, a proper design, evaluation, and selection of alternatives can take place. The goal is to develop a set of alternatives that can be used on the system to meet system goals that are grounded in the reality of how the system works rather than alternatives based on ideological grounds. The alternatives are then evaluated on a mixture of technical efficiency, satisfactory performance in the face of uncertainty, and political feasibility.

The first step in the Design and Evaluation phase parallels the first step in the Representation phase. It involves a negotiation among the stakeholders in determining how to measure performance of the system, much like they must negotiate what the system and issues to be studied are in step 1 of the process. This step may not lead to an agreement on the best performance measures but it can lead to a better understanding of other stakeholders’ viewpoints. The ability to measure certain kinds of performance may lead to a refinement of the system goals.

One difficulty in this step is coming up with performance measures that provide useful information. Consider Los Angeles’ measurement of accessibility. Accessibility is a determinant of quality of life and it describes the ease with which a person can go to certain places like work, stores, parks, and schools. This ease may include considerations for the mode used. Measuring accessibility along all these dimensions can be difficult and costly. Los Angeles uses a very simple measure of accessibility: the percentage of people who live within a 45 minute commute from work to home during the PM peak period, for both car and transit (SCAG, 159). This measure misses out on other important factors of accessibility, namely the numerous other places people like to travel to other than work, but data can be more easily gathered with LA’s measure. A more accurate measure would require data involving where people shop, what days and times of days they travel, how often they like to go to the park, etc.
Los Angeles developed their imperfect metric based on their ability to gather relevant data. It is a useful metric given the constraints but it is not the ideal one.

Step 7 involves the generation of alternatives that may be used to achieve system goals. Dodder et al. identify two approaches to identifying alternatives, the "outside in" and "inside out" methods, both of which should be used (Dodder et al., 17-18). The "inside out" method searches for changes that can be done with the physical subsystem components and then determines the appropriate changes needed in the policy sphere to support them. The "outside in" approach identifies the policy levers available to decision-makers and then traces the effects from the institutional sphere into the physical system. In both methods, the effects need to be traced through to the performance measures and to other components beyond the ones targeted by the policy to gauge their effect on the whole system.

Step 8 may be done in parallel with Step 7. The stakeholders must “look for the uncertainty in the performance of the CLIOS [system], both at the subsystem and CLIOS [system]-wide level.” (Dodder et al., 18) The uncertainty may come from common drivers, exogenous factors, unclear interactions between elements, or even political uncertainties. The areas of uncertainty that appear to have the greatest effect on the system and the alternatives that may be used to guide the system should be flagged.

In the final step of the Design and Evaluation phase, the stakeholders will rate the alternatives from step 7, considering the effect of the areas of uncertainty in step 8, and choose the ‘best’ ones. ‘Best’ includes the raw performance, performance in the face of uncertainty, cost, and political feasibility. It does not rest solely on measurements of technical efficiency.

3.2.5 The Implementation Stage

The final phase in the CLIOS process is choosing a strategy for implementing the alternatives chosen and feeding the results back into the process. The stakeholders should not relent in their efforts during this process by assuming the hard work is over now that a set of alternatives has been selected. A poor implementation will waste the efforts of the previous nine steps. Recommendations of the best alternatives from step 9 are an inadequate resolution, as well. The different alternatives will interact with each other and decision-makers who lack a systems perspective may choose from among the alternatives without due consideration to these effects.
There are two strategies that need to be created through the selection of a group of alternatives that complement each other and perform adequately across different future scenarios. Developing the strategy should be similar to creating a well-balanced investment portfolio. If specific alternatives are performing poorly, other alternatives are included that are expected to perform well in those circumstances so the net performance is satisfactory. While the downside may be that potential performance is not as high, downside risk is reduced, making the strategy more politically feasible.

Step 10 addresses the strategy design for the physical domain. The tools used during strategy design tend to be quantitative. Developing strategies for the physical domain is not uncommon. In the United States, metropolitan planning organizations must develop long-range transportation plans that lay out the development of the infrastructure over the next twenty years. The development should take into account uncertainty and political feasibility. A strategy that angers a specific group may become too troublesome and expensive to be implemented as the opponents throw up roadblocks.

In step 11, a strategy for the institutional sphere must be developed. Rather than take the sphere as immutable, the CLIOS process assumes that it can be changed to improve system outcomes. Dodder et al., use the concept of an architecture for this strategy. The architecture is a plan for the organizations, their responsibilities, and their relationships with each other. Because of the focus on organizations, the tools used to compare different strategies are usually qualitative.

The final step is the evaluation of how well the strategies have worked, modifying the strategies where appropriate, and feeding these back into earlier steps of the process as the CLIOS process is used again to create new strategies. An important part of this is to determine not only how well the strategy worked but why. Were there unexpected events that changed the dynamics of the system so an alternative performed significantly better or worse than expected? Did an organization act in an uncooperative manner or participate in the CLIOS process in bad faith? These results will lead to refinements in the process and to improved strategies in the future if investigated properly.

### 3.3 Applying the CLIOS Process to Regional Transportation Planning

This thesis will not be the first time the CLIOS process has been applied to transportation planning. Sussman, Sgouridis, and Ward discuss its application in the realm of regional strategic transportation planning. Dodder et al., apply it to the Mexico City Metropolitan Area as part of a strategy to improve air quality. Sgouridis uses CLIOS for integrating supply chain management issues into the regional transportation planning process. The application to toll road public-private partnerships (PPP) is usually not done only at a regional level. The legal framework and implementing policies are often developed at the national and state levels.

Planning for toll road PPPs will require coordination between the national and regional levels to ensure that the policies developed and their implementation are mutually supportive in order to have a reasonable chance of meeting the goals of the governments at both levels and the goals of the private sector partner. The application of the CLIOS process to developing policies for toll road PPPs will use the case of regional strategic transportation planning as a springboard.
Regional strategic transportation planning (RSTP) is the process of long-term planning for the regional transportation system that not only considers the infrastructure that will be built but also considers planning for operations and institutional changes that could be used to meet future transportation needs. The region under consideration is a metropolitan region which may span across several cities and numerous smaller municipalities and may be split across multiple states, provinces, or even countries. The institutional complexity and the scale of the planning region demand a process that can integrate the many issues and concerns that face a region, especially considering the interactions of the transportation system and the economic and environmental well-being of the region. Sussman, Sgouridis, and Ward propose using the CLIOS process to handle the complexity of RSTP.

Sussman and Conklin found several shortcomings in the regional long-range transportation plans when using traditional planning processes, which Sussman, Sgouridis, and Ward added to:

**Shortcoming of Current Transportation Planning from Sussman, Sgouridis, and Ward:**
- **Intermodalism.** The unimodal perspective usually adopted in planning as opposed to the often more fruitful intermodal approach. Planning seems to lack an integrative flavor and leans towards multimodalism where several modes coexist but little effort is made to ease the transitions between them.
- **Economic integration.** The lack of emphasis on economic integration and creation of regional competitive advantage. Transportation plans have only recently started to seriously consider business firms, freight issues and private sector involvement.
- **Freight.** The overemphasis on travelers and the underemphasis on freight in the planning process. This picture has started to change in areas where freight transport is critical.
- **Private sector involvement.** The lack of private sector involvement in the planning process and in financing of transportation infrastructure.
- **Operations.** An overemphasis on a master plan defining conventional infrastructure and an underemphasis on integrating operations planning into the overall process.
- **Technology scanning.** The absence of long-term technology scanning—looking out several decades for technological developments that could impact the regional transportation system and its customers.
- **Transport and telecommunications.** Shortcomings in considering the synergistic relationships between telecommunications and transportation systems.
- **Human resources.** A lack of direct concern with the development of human resources in the professional transportation community—of particular concern in this era of an aging workforce and the need for transportation professionals to understand new technologies, systems methods, and institutions.
- **Sustainability.** Limited focus on long term multi-dimensional sustainability.
- **Institutional change.** Lack of proactive planning for comprehensive institutional change in the planning and operations process rather than on a project-by-project basis, engendered by the regional scale of operations and changing pressures on the transportation system.
- **Uncertainty management.** The lack of emphasis on dealing with uncertainty and utilizing appropriate tools to forecast future demand and to value the flexibility of designs.
• **Public Involvement.** The current process for public involvement does not make the best use of insights that stakeholders may have and can lead to adversarial relationships. (Sussman, Sgouridis, and Ward, 4)

The greater comprehensiveness and the emphasis on institutional factors that the CLIOS process embodies are intended to ameliorate many of these problems. Sussman, Sgouridis, and Ward dub the application “RSTP as CLIOS” which will henceforth be referred to as RSTP.

### 3.3.1 The Representation Stage in RSTP

Step 1 is straightforward in RSTP. The specific goals will depend the region but one possible goal that Sussman, Sgouridis, and Ward adapted from Hall and Sussman is: “A regional strategic transportation plan should ensure (i) an adequate, efficiently operated, robust, and secure transportation network based on (ii) a regulatory framework that in coordination aim to maximize total societal benefits within a sustainable framework.” The region is left to determine the balance between the different parts of that goal as it depends on their economic or environmental situation and political constraints.

In step 2, the most relevant subsystems in the context of RSTP are the economy, land use, environment, and transportation. Major actor groups are also added to the institutional sphere. Major ones include government, business, and citizen groups.

In step 3, transportation modes, technologies, and demand for transportation, among others, would be added as components to these subsystems. Regulations and policies can be identified as policy levers. Specific institutions can be added. The institutional sphere would include government agencies involved in planning, transportation, and the environment as well as construction companies, land developers, and financiers. Citizen groups are also members of the institutional sphere. These groups include neighborhood advocates, environmental activists, and government watchdogs among others. Specific areas can be expanded, nested, or layered to improve comprehensibility of the overall CLIOS system diagram.

Steps 4 and 5 are simply as in the general CLIOS process. Mostashari and Sussman have developed the Stakeholder-Assisted Modeling and Policy Design (SAM-PD) as one tool for seeking insight about system behavior. The idea is to use a system dynamics model to communicate stakeholders’ different conceptions of the system to each other. System dynamics is the preferred method since they feel it could be used to intuitively communicate between stakeholders much faster than other models, which may be important when involving the public in time-constrained situations.

### 3.3.2 Design, Evaluation, and Selection in RSTP

In the refinement of system goals, Sussman, Sgouridis, and Ward argue that an added emphasis should be placed on the ability of RSTP to support an increased competitive regional advantage. This added emphasis will percolate down to other areas such as operations, institutional communications, informational integration, freight policies, and environmental policies as regions develop a strategy for economic competitiveness. Along with this, performance measures must be identified. While performance measures exist for many of the individual goals, a useful measure for the whole system is lacking. Regions are left with multi-criteria
analysis or political judgment applied to the individual measures to determine if the transportation system as a whole is meeting the goals. This process is value-laden and the result, no matter how impartially done, may not even prove to be a good measure. More research needs to be done on this issue.

The strategic alternatives of step 7 can encompass infrastructure projects, operations improvements, and regulatory policies. For instance, the alternatives for reducing congestion along a corridor could include adding lanes, building a parallel road, constructing a heavy or light rail line, bus rapid transit, ITS technologies, or congestion pricing. Air pollution can be dealt with by mandating technological change, congestion pricing or increased fuel taxes to reduce vehicle use, improved public transit, and changes in land use policy to encourage higher accessibility and lower demand for the transportation system. Beyond these basic alternatives, variations on each alternative can be considered. Will that new road be built from public funds or will a toll road PPP be the preferred method? Should the technological change to reduce emissions be emission control devices, fuel changes, or both? Institutional alternative must also be considered. Improved performance may come from a new organization or by adjusting the roles between existing organizations.

Standard areas of uncertainty in step 8 include traffic forecast risks, deviations from expected economic conditions, gas prices, or even natural disasters. Stakeholders should investigate how much uncertainty is expected from the different areas and if any of the areas are linked. Rising gas prices will lead to reduced driving and may cause slower economic growth.

The evaluation of the alternatives in step 9 can be done with a variety of tools. Scenario planning as developed by Peter Schwartz in *The Art of the Long View* is one such tool. It can be used with the SAM-PD model to develop more insightful views of the future over just predicting different growth rates for population and the economy. Alternatives can then be ranked on their performance in different scenarios. Other tools include real options, simulations, and benefit-cost analysis.

This stage is shown graphically in Figure 3-6. The term “Strategic Options” towards the center of the figure is synonymous for Strategic Alternatives. Alternative is the preferred term in the CLIOS process as option is reserved for real options or financial options.
3.3.3 Implementation in RSTP

With the alternatives and their possible effects now evaluated, different strategies can be created to meet system goals. Steps 10 and 11 will produce three major plans and tradeoffs can be made between the steps. Because of these tradeoffs, steps 10 and 11 should be done in parallel rather than sequentially. The goal is to provide strategies that have been developed in an integrated manner and are mutually supporting.

The implementation strategy for the physical domain is termed the Regional Infrastructure Network. It is an output similar in content to current long-range transportation plans developed by metropolitan planning organizations in the United States but the integration with other fields and with institutional changes is expected to provide improved system performance. A simple
description would be that it is “lines on a map” but it may include integration of technology into the infrastructure to improve operations.

The implementation strategy for the institutional sphere is split into two plans, the regional operating architecture (ROA) and the regional planning architecture (RPA). Again, architecture refers to the organizations, their roles, and their relationships, not to any physical objects like a road or a technical ITS architecture. The emphasis in the ROA is on communications and information flows as operations organizations must communicate effectively to efficiently operate the system. The RPA’s emphasis is on ensuring the effectiveness of the overall planning process. It will investigate whether a good choice in stakeholders was made, ways to improve their involvement, were any skills needed but not available, or if new tools are needed. During the process of creating the RPA, the performance of several past planning processes could be investigated as the results may only now become apparent. The goal is to reinvent the planning process for the next iteration of the CLIOS process.

3.4 Extending RSTP to Toll Road PPP Program Development

The RSTP process as developed by Sussman, Sgouridis, and Ward cannot be directly transferred to the application of developing a toll road PPP program. National agencies may have a greater role in project selection and implementation than previously where these roles are mostly delegated to the local or regional level. Financial risk and traffic risk are expected to have a greater impact on toll roads than when considering the whole transportation system and significant losses could deter future transportation investment. While RSTP is largely applicable, the differences with developing a toll road PPP program and their impact on how the CLIOS process will be implemented must be enumerated. This section will provide an overview of using CLIOS for toll road PPPs with an extended explanation in Chapter 4 and Chapter 5.

3.4.1 The Representation Phase

The goals and issues identified in Step 1 will depend on where the system boundaries are placed which may be a difficult task for a toll road PPP program. Identifying issues created or accentuated by toll road PPPs will help frame the development of system boundaries. Once the system is bounded, goals may be discussed. One aspect to keep in mind is that a toll road PPP program must be supportive of the overall regional or national transportation plan rather than the other way around.

Who is developing the toll road PPP program and who is selecting specific projects within this program must be made clear to understand how toll road PPPs will fit in the general transportation strategy. These entities may not be the same organization. The national government may set the general policy but delegate project selection powers to state, provincial, or regional agencies. These regional agencies could independently develop their own policies and project selection procedures in the absence of a national toll road PPP program. At the other end of the spectrum, general policy and project selections may be decided by the national government. A mixed structure is also possible where the national government develops some toll road PPP policies, local governments can develop further policies within the national framework, and both levels select and manage projects.
Perhaps it will be fruitful to consider 'Enabling PPP Policy' and 'PPP Project Deployment' in a separate manner. First an Enabling PPP Policy must be developed that delineates the conditions for when a PPP may be used and drives the creation of legal and institutional framework that is consistent with the aims of the policy. The PPP Project Deployment issue then becomes one of choosing projects and structuring their concession agreements in a way that is consistent with both the Enabling PPP Policy and with the objectives of the transportation plan at the government level selecting the plan. In this manner, the issues that apply to Enabling PPP Policy and PPP Project Deployment can be approached with greater independence from each other and focused on the level that is responsible for the issue. This is depicted in Figure 3-7 where the Enabling PPP Policy affects multiple PPP Project Deployment process at different times. The results of these PPP Project Deployment processes will feed back into the CLIOS process to develop a new Enabling PPP Policy.

Figure 3-7 - The Connections Between CLIOS Processes for Toll Road PPP Programs

The two processes will consider different issues. Concerns for the Enabling PPP Policy may include transparency, domestic or foreign financing requirements, the ability of domestic markets to support large scale private toll road programs, and even equity distribution between ethnic groups. At the PPP Project Deployment level, public support, specific financing structures to allow the project to proceed, right-of-way acquisition, and toll rate regulation will be of more importance.
As an example of this division, consider how it would happen in the United States. PPPs are permitted under certain Federal Highway Administration programs like SEP-15. States can develop their own policies, as was done in California with AB680 in 1989. With a general policy framework in place, projects can be chosen. Much of this part occurs at the state level. State Route 91 was part of the AB680 program that was selected at the state level with input from the Orange County and Riverside County region.

The PPP Project Deployment issue can be dealt with as part of the general RSTP process. PPPs are simply another alternative to be considered in meeting regional transportation goals. The PPP particulars such as risk responsibility or concession period are some of the variations for a particular PPP alternative.

The goals for the Enabling PPP Policy can now be considered more or less independently from how they will be implemented in a particular case. Economic development and cost-effective provision of infrastructure from the government’s point of view are often the two major goals of the Enabling PPP Policy. Sustainability and environmental issues may be of less concern at the national level than at the regional level where their effect are more directly felt and can be managed or it may be the other way around.

It will help the discussion if a clearer delineation can be made between what is included in Enabling PPP Policy and what belongs to PPP Project Deployment. As a general rule, Enabling PPP Policy considers the range of choices or process guidelines that may be used by agencies in developing and managing PPPs while PPP Project Deployment involves the decisions that lead to a specific choice or how their processes will abide by the guidelines set out in the Enabling PPP Policy. The Enabling PPP Policy may eliminate the need for something to be addressed in the PPP Project Deployment phase if it mandates a specific course-of-action. For example, the alternatives for obtaining a right-of-way for a project include acquisition by the private sector directly negotiating with landowners and financing it, the government using its eminent domain powers to secure land and to compensate the landowner from its own funds, or the government using its eminent domain powers but with compensation money coming from the private sector. The Enabling PPP Policy could restrict these alternatives by requiring that eminent domain powers not be used to obtain right-of-way for the project; it is a risk borne entirely by the private sector. Here’s a rundown of questions that policymakers must consider:

**Enabling PPP Policy**
- Who develops Enabling PPP Policy? Can different portions be developed by different departments or regional levels?
- How is the Enabling PPP Policy created? How can it be changed?
- When it is appropriate to use a PPP rather than government provision of infrastructure?
- How may PPPs be proposed? Do they come from government master plans, private sector proposals, or both? Especially of concern for private sector-initiated proposals, how may the bid be handled? Will the private sector have exclusive negotiation rights?
- What range of PPP arrangements can be used to deliver infrastructure (DBFO, Design-Build, Operations and Maintenance, etc.)?
- Who is responsible in the government for the different phases of the project and what powers and responsibilities do they have for oversight?
• What are the guidelines on the process used to choose a private sector partner?
• Who can participate in selecting the winner and what criteria can the government use in bidder preselection and the award of the contract?
• Which stakeholders should be involved in the different phases of PPP deployment (decision to pursue a PPP versus other solution, project specifications, bids, alignments, etc.) and what requirements should there be on the level of participation of these stakeholders?
• Should there be requirements to investigate alternatives to the toll road PPP and if so, what should those requirements be (for example, no build, differing alignments, or public transit alternatives investigated)?
• What are the limits on the financial structuring of a project such as minimum or maximum debt-to-equity ratios, foreign equity requirements, or debt repayment periods?
• Under what conditions should the government provide financial support? What are the types of instruments that government can use such as soft loans, minimum traffic guarantees, bankruptcy protections, government equity investment, or assumption of exchange-rate risk?
• How should tolls be determined and what factors can be used to calculate them? Should the public participate and should equity concerns be addressed? Is government approval required to raise tolls? Is congestion pricing permitted?
• What requirements are there for an environmental assessment of a PPP? At what point should one be done (before or after private sector involvement)? Should the process differ from the process for non-PPP roads?
• What government powers are available for right-of-way acquisition? If the government can use eminent domain powers, is one party required to pay the costs or is it a negotiable part of the concession agreement?
• What other requirements does the PPP have to meet? Minimum content from disadvantaged ethnic groups? Access to the facility by low income or disadvantaged groups? Maximum limits on the impact a PPP can have on a neighborhood?

PPP Project Deployment
• Who is in charge of the PPP Project Deployment process?
• Is a PPP the best or even a reasonable way to address the transportation needs of the population? Does the PPP integrate well into the long-term vision for the transportation system?
• What arrangement is used to provide the service or project? Are there aspects of the project that make a Design-Build or other arrangement preferable to a DBFO or vice-versa?
• What will be the bid process for the project? What are the selection criteria?
• Who will be the private sector partner for the project?
• If there is a choice among government agencies for managing different parts of the project, which agency will be in charge of which part?
• How should the public or other stakeholders be integrated into the process? How should their needs be balanced with private sector concerns over project viability?
• Which alternatives should be investigated? What criteria will be used to evaluate them with the proposed PPP?
- Whose responsibility is it to carry out the environmental assessment? What can be done to address environmental concerns?
- Does the project have to be financially self-supporting?
- What will be the financial structure of the project based on expected risk and government support?
- What support will be needed to ensure the viability of the project (soft loans, real estate development, minimum traffic guarantees, exchange rate risk assumption)? Does the required support affect the project in such a way that it would be better for the government to build it?
- What is the desired toll structure for the facility? Are there maximum tolls for the facility due to equity concerns and is this maximum below a financially viable level? Will congestion pricing be used? Will there be discounts for high-occupancy vehicles? Under what conditions may tolls be raised?
- What is the alignment and design of the project?
- How will the right-of-way be acquired? Who will pay the cost?
- How will the project meet other goals specified by the Enabling PPP Policy?

Although the toll road PPP program has been divided into two parts, it should not be assumed that they are developed completely independently. They still affect each other, especially from the Enabling PPP Policy level down to PPP Project Deployment. These effects must be considered when applying the CLIOS process otherwise the strategies developed at the end will be a muddle with little improvement over current processes.

The subsystems identified in step 2 of RSTP, as described in Section 3.3.1 are an adequate base for this application. A national focus for the policy could lead to less emphasis on the land use subsystem or even its exclusion as a subsystem with its relevant components distributed between the other subsystem. A toll road PPP-specific subsystem could also be used that would focus on the intersection between the economy, transportation, and toll road PPP feasibility.

Steps 3 through 5 remain unchanged for both Enabling PPP Policy and PPP Project Deployment.

3.4.2 Design, Evaluation, and Selection

Performance measures in Enabling PPP Policy and PPP Project Deployment identified for step 6 will be different from RSTP. One possible set of performance measures is offered in Section 2.5. The stakeholders are free to develop their own performance measures.

These performance measures will be useful for both Enabling PPP Policy and PPP Project Deployment. General program considerations may focus on economic and social measures. The program should not adversely affect sensitive populations and it should not guarantee financial success to investors. PPP Project Deployment measures should be more concerned with technical measures of success. Is the toll road PPP reducing congestion as expected in beneficial manner for both sectors?

The alternatives available in step 7 are based on the same foundation as RSTP but there are some alternatives that will be enumerated specifically for toll road PPPs. The major alternatives are on the division of risk. Does the investor assume exchange rate risk or must the government to
attract sufficient investment? Will the government require the concessionaire to pay the costs for any environmental regulations imposed on them? Who is responsible for public relations throughout the different phases of the project so public approval risk is managed? The Enabling PPP Policy should provide guidelines on division of risk.

Implementation of the guidelines created from Enabling PPP Policy provides many of the alternatives for PPP Project Deployment although there are some that may be reserved for PPP Project Deployment. The Enabling PPP Policy may permit the local government to use its eminent domain powers to obtain a right-of-way but the local government may consider the alternative of shifting this responsibility to the private sector partner. Revenue generation alternatives are critical for PPP Project Deployment. Can the concession company use value pricing or real estate value capture or is it only allowed to charge flat tolls? Alternatives for operations and maintenance should also be developed, alternatives like who provides and funds highway patrols and emergency services for the road.

The areas of uncertainty for step 8 are the same as RSTP. Traffic forecast risks are of much greater importance since it will drive the desirability of the investment in a toll road PPP and the cost of capital.

From an Enabling PPP Policy perspective, the tools used for alternatives evaluation in step 9 will focus on those used in the social sciences. Scenario analysis should be useful as scenarios with high use of toll road PPPs can be compared with low or no use scenarios. Benefit-cost analysis may also be useful to a degree but they may be better suited for PPP Project Deployment. Stakeholder analysis and system dynamics are well-suited for Enabling PPP Policy where specific projects are not on the table and the long-term effects of the policy may be more difficult to predict using technical tools.

When dealing with PPP Project Deployment, quantitative tools are of much greater value. Real-options analysis is one method to quantify value to the decision-maker of the different alternatives available. Benefit-cost analysis is of more use than the Enabling PPP Policy case as the benefits and costs may be more quantifiable with greater accuracy. Trade-off analysis or multi-criteria analysis can be useful in deciding between different alternatives or project bids. The financial viability of a proposed PPP can be tested with a sensitivity analysis. Scenario analysis, stakeholder analysis, and system dynamics can still play a role in PPP Project Deployment.

3.4.3 The Implementation Phase

The goal in the development of an Enabling PPP Policy is developing a range of alternatives for use in the PPP Project Deployment process and on a legal and institutional framework that will support this. Implementation is usually through policy-setting or legal channels to create the desired physical system and institutional sphere changes. Both channels can be used to enact the strategy.

The legal channel is preferable if the chosen alternatives have are expected to be long-lasting to them or a significant institutional change is required. Passing a law requires significant political
effort and it should not be done lightly. The changes that are made through law should be well thought out since it may be difficult to undo the law once passed.

Policy-setting methods are better if the changes are not significant or the government does not want to make it too difficult to change. This may be due to inexperience with toll road PPPs or uncertainty over the possible outcomes. If the outcome of the policy is poor, it can be more easily changed than if it were enacted through a law.

Given the way that Enabling PPP Policy and PPP Project Deployment have been divided, feedback mechanisms are required to send results from PPP Project Deployment to Enabling PPP Policy development. Feedback can be quite difficult if the responsibilities have been divided between different levels of government. Feedback can be promoted by requiring reports to a central authority as part of the Enabling PPP Policy or it may be improved through the participation of regional agencies in the policy development process. Conferences, publications, and lobbyists could be other ways to disseminate information between regions and to the policy development authority. An important requirement is that the feedback should have some balance between the stakeholders otherwise policies could be steered toward goals that are not beneficial to society.

Some of the linkages between the Enabling PPP Policy process and PPP Project Deployment process are shown in Figure 3-8. These two processes will affect each other although the most direct path is from Enabling PPP Policy to PPP Project Deployment. The path in the opposite direction is much slower as it may take years before enough results are produced from PPP Project Deployments to necessitate a change in Enabling PPP Policy. The next two chapters will explore the connections in much greater depth. The connections here are not the definitive representation.

3.5 Conclusion
Dodder et al, have proposed the CLIOS process as a framework to solve increasingly complex problems; transportation planning certainly qualifies as one such situation. The CLIOS process is flexible and allows analysts to use the tools most appropriate to the system under study. Sussman, Sgouridis, and Ward have adapted this process to the case of RSTP. In this case, one of the chief benefits is the increased focus on institutions rather than only considering infrastructure as the solution to every transportation problem.

While useful for regional transportation planning, it does not directly translate into a useful process for developing toll road PPP policy. The final part of this chapter described a variation on the RSTP methodology that could be more useful for the case of toll road PPP policy. While a theme of CLIOS is solving problems in an integrated manner and this approach divides the problem to a degree, it does enable the analyst to gain a clearer view of what exactly the problems are in developing toll road PPP policy. The usefulness of this approach will be examined as a walkthrough of the CLIOS process for a generic nation is conducted for Enabling PPP Policy in Chapter 4 and for PPP Project Deployment in Chapter 5.
Figure 3-8 - Linked Enabling PPP Policy and PPP Project Deployment

Enabling PPP Policy Process

1. Describe System: Issue Checklist and Goal Identification
2. Identify Major Subsystems of the Physical Domains and Major Actor Groups on the Institutional Sphere
3. Populate the Physical Domains and the Institutional Sphere on the CLIOS Diagram
4A. Describe Components on the Physical Domain and Organizations on the Institutional Sphere
4B. Describe Links Among Components And Organizations
5. Seek Insights about System Behavior
6. Identify Performance Measures, Refine System Goals, and Build Quantitative Model
7. Identify and Design Strategic Alternatives for Performance Improvements
8. Flag Important Areas of Uncertainty
9. Evaluate Strategic Alternatives And Select Robust Bundles That Perform “Best” Across Uncertainties
10. Design Strategy for Implementation in the Physical Domain and Implement
11. Design Strategy for Implementation in the Institutional Sphere and Implement
12. Post-Implementation Evaluation and Modification

PPP Project Management

1. Describe System: Issue Checklist and Goal Identification
2. Identify Major Subsystems of the Physical Domains and Major Actor Groups on the Institutional Sphere
3. Populate the Physical Domains and the Institutional Sphere on the CLIOS Diagram
4A. Describe Components on the Physical Domain and Organizations on the Institutional Sphere
4B. Describe Links Among Components And Organizations
5. Seek Insights about System Behavior
6. Identify Performance Measures, Refine System Goals, and Build Quantitative Model
7. Identify and Design Strategic Alternatives for Performance Improvements
8. Flag Important Areas of Uncertainty
9. Evaluate Strategic Alternatives And Select Robust Bundles That Perform “Best” Across Uncertainties
10. Design Strategy for Implementation in the Physical Domain and Implement
11. Design Strategy for Implementation in the Institutional Sphere and Implement
12. Post-Implementation Evaluation and Modification
4 A Generic Application of the CLIOS Process to Enabling PPP Policy

4.1 Introduction

In the previous chapter, the basics of applying the CLIOS process to PPP Policy were laid out. This chapter explores the CLIOS process' application for developing Enabling PPP Policy in more depth, going step-by-step through the process for a generic nation. The goal is to learn where certain decisions will most likely be made during the development of the overall toll road PPP program, how the Enabling PPP Policy may affect the PPP Project Deployment process, and to accelerate the development process when applied to an actual area.

There are several basic assumptions about the regions. First, they have a democratic government. Elected officials will pursue policies that benefit their constituencies, which may include businesses as well as people, and that supporting policies too detrimental to their constituencies will lead to their ouster. A second assumption is that the stakeholders are similar to the ones described Appendix I.4A.2. This will allow a more realistic outcome than just assuming that the stakeholders are working cooperatively on all aspects of the policy. Third, the government supports a toll road PPP program that will be ongoing into the foreseeable future. This assumption will also ease any doubts the private sector may have about participating in projects.

4.2 Stage 1: Representation

4.2.1 Step 1: Describe System: Issue Checklist and Initial Goal Identification

A fundamental part of the CLIOS process is to first understand why it is being undertaken. What is the policy issue that requires an in-depth investigation of the system? For Nation A, the policy issue is that there are growing transportation needs with limited government funds to meet them. PPPs are a potential alternative to resolve this problem. Nation A is limited in its ability to plan for and deploy all possible PPPs at once since individual projects will be proposed and deployed separately over a number of years so it must develop an overarching policy, Enabling PPP Policy, to guide the individual PPP Project Deployments. To do this, it must take into account the aggregate effects of the toll road PPP program.

Next, system boundaries must be drawn to accommodate understanding and dealing with the policy issue. What is causing the growing transportation needs and the fund limitation? Transportation needs may be increasing due to improving economic conditions allowing people to spend more on transportation, especially automobiles. Changing land use may be driving people toward automobiles as other forms of transportation become less competitive. Factories could be shifting to Just-in-Time (JIT) manufacturing principles to drive down inventory costs, increasing the number of freight shipments, although the quantity of each individual shipment may be lower. Transportation funds may be growing but relative to the growth of those transportation needs -- and total construction, operations, and maintenance costs to meet them -- funding may not be growing fast enough. The government may also be pursuing a program to cut spending. Per unit construction costs may be increasing due to changes in the world
economy. For instance, booming construction in China has driven the costs of oil and materials up. Even if budgets remain stable, purchasing power is decreasing.

The effects that a toll road PPP program may have on the rest of Nation A’s transportation system should remain within system boundaries. More roads improve the attractiveness of the automobile as it will be able to access more locations. Greater automobile use does have environmental consequences, though. There is a direct effect on air quality and a secondary effect by enabling low-density land use where it is difficult to support transit. A well-designed road could also increase the reliability of travel, a boon to travelers and freight, and improve the economic competitiveness of the region. Relative to other ways of delivering and operating a road, a toll road PPP may have reduced consequences since travelers will change their behavior if faced with a toll. The change in behavior could be driving less often, using transit, and living closer to work. A change that could be negative is drivers using local streets rather than the toll road which will have impacts on the local street system and increase gas consumption and air pollution.

For Nation A, the system boundaries would include the transportation system for the entire nation, the nation’s economy, and the nation’s environment. Nation A’s geographic boundaries will also define the system boundaries since Nation A’s government may have little power to act on international issues, like oil prices. These issues may be included in the representation on an individual basis as an exogenous factor. For a specific implementation, components external to Nation A’s geographic boundaries may be included if there is a close relationship with other nations.

From this, a checklist of important issues to be considered during the analysis is developed. “As the CLIOS representation is developed, one can return to this checklist to identify any major issues that have been omitted from the representation.” (Dodder et al., 8) A checklist for the Enabling PPP Policy of a generic region is presented in no particular order:

- Growing transportation needs are beyond the government’s ability to provide for them.
- An incomplete national network needs to be completed to continue development.
- The government has limited ability to raise funds through taxes or bonds.
- Shippers desire a reliable transportation system for their supply chain.
- An increasing automobile fleet is reducing air quality.
- The most financially desirable routes are through urban areas where the project may be contentious.
- Routes for future needs may not have enough traffic in the early years to financially support a toll road PPP.
- Toll road PPPs could have significant market power in certain corridors.
- The potential for monopoly power will lead to lobbying by toll road companies which could lead to suboptimal project arrangements from a consumer point of view.

From the checklist and system bounding, initial goals can be identified, also in no particular order:

- Meet national transportation needs with minimal impact on government funds.
- Promote the national economy.
4.2.2 **Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere**

The transportation system has many effects outside its own technical domain. Economic transactions in the form of goods exchange cannot take place if the goods cannot get to their destination, necessitating the inclusion of the economy as a subsystem. Vehicle emissions are a major contributor to air pollution and the form of the transportation system can also affect habitats, leading to the addition of the environment as a subsystem. There are many specialized issues for toll road PPPs that may complicate the representation of the transportation subsystem if included so that will be separated into its own subsystem. In summary, the major subsystems in this physical domain are:

- Transportation
- Economy
- Environment
- Toll Road Public-Private Partnerships

The major actor groups are:

- The government
- Private Sector
- Citizen groups

4.2.3 **Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram**

Developing the initial CLIOS diagrams is not a simple task. The complexity can quickly grow due to numerous components and links, making a diagrammatic representation difficult to understand. An alternate method for representing the system is explored by Sgouridis. This method results in a “link matrix” that is based on the Design Structure Matrix from the product design and system analysis field (Sgouridis, 87-94). Each component is assigned to both a row and column and an X placed where appropriate to show that one component influences another. Consider the example shown in Table 4-1.
Table 4-1 - Simple Link Matrix Example

<table>
<thead>
<tr>
<th>Component Interactions</th>
<th>Monetary Policy</th>
<th>Interest Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influences --&gt;</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Monetary Policy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest Rates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The column elements influence the row elements in this particular matrix setup. For this example, the X indicates that Monetary Policy influences Interest Rates.

Sgouridis uses one link matrix to represent the whole system. For this thesis, each subsystem was developed independently so there are separate link matrices for each subsystem. Some components are part of multiple subsystems which is shown in an extension to the matrix.

One advantage that the author found while using the link matrix approach is that it permitted a systematic approach to analyzing links. One can go row by row, quickly considering if that row element influences a column element. A follow-on technique would be to then go column by column, only considering where X’s are at, and reconsider if that influence is a direct influence, in which case the X can stay, or whether the influencing component actually acts on some other component which then influences the current column element.

A disadvantage of the link matrix is that paths and feedback loops are difficult to spot. The difficulty is partially created by the components appearing in two places. The analyst would have to start with a specific interaction, look up at the column header for the component, and go to the row element to find what components it influences. This process would have to be repeated until a feedback loop is stumbled on. A well-designed visual representation can quickly impart this information.

A problem found when creating the diagrams is that there are a large number of links and little space to organize them coherently. In Microsoft Visio, there are a limited number of points on a circle to connect to, making it difficult sometimes to figure out all the components that are influencing or are influenced by a particular component. The notation used, shown in
Figure 4-1, is one way to clarify the diagrams. Each line is a one-way line. In the example, Component A influences Components C and D. Component B, whose link touches the one between A and D, also influences D. By having the links touch where they do means that the influence from B does not run upstream to also influence C.

Figure 4-1 - Simple CLIOS Diagram Example

What follows are the link matrices and diagrammatic representations of the four subsystems for Enabling PPP Policy. Included at the bottom of the matrix are entries to show the other subsystems that the component appears in. The use of boldface type and italics will be discussed later in this chapter.

Ideally, the diagrams would be created with the participation of a variety of actors representing different technical disciplines, government agencies, businesses, and citizen groups. Mostashari and Sussman offer one method based on system dynamics to achieve this goal. The diagrams used in this chapter are based on representations developed for the ESD.10 Technology and Policy class at MIT by the author's group\(^5\) for the air quality problem in the Mexico City Metropolitan Area. These representations were targeted for a specific region rather than a generic nation so they have been modified to reflect the different concerns that occur at the national level.

\(^5\) The members of the group were Tom Curry, Denis de Graeve, Jinyoung Kim, Kate Martin, Isabel Neto, and John Ward
Table 4-2 – Generic Enabling PPP Policy Transportation Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From ↓ / To →</th>
<th>GDP Per Capita</th>
<th>Travel Cost</th>
<th>Transportation Investment Policy</th>
<th>Safety</th>
<th>Security</th>
<th>Intermodal Efficiency</th>
<th>Transportation Funding/Subsidies</th>
<th>Network Completeness</th>
<th>Network Robustness</th>
<th>Mobility</th>
<th>Accessibility</th>
<th>Equitable Access for Sensitive Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Use</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermodal Efficiency</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Funding/Subsidies</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Completeness</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Robustness</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equitable Access for Sensitive Populations</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Drivers</td>
<td>Also in Economy Subsystem</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Also in PPP Subsystem</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Also in Environment Subsystem</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Figure 4-2- Generic Enabling PPP Policy Transportation Subsystem Diagram
<table>
<thead>
<tr>
<th>Components</th>
<th>From / To</th>
<th>Freight Use</th>
<th>Worker Productivity</th>
<th>Innovation</th>
<th>National Industrial Policy</th>
<th>National Environmental Policy</th>
<th>GDP Per Capita</th>
<th>National Economic Growth</th>
<th>Exchange Rate</th>
<th>Employment</th>
<th>Transportation Investment Policy</th>
<th>Fiscal Policy</th>
<th>Monetary Policy</th>
<th>Trade Policy</th>
<th>Trade Balance</th>
<th>Foreign Investment</th>
<th>International Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Use</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Industrial Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Environmental Policy</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Economic Growth</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiscal Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monetary Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade Balance</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Investment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Competitive Advantage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Drivers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in Transportation Subsystem</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in PPP Subsystem</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in Environment Subsystem</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-3 - Generic Enabling PPP Policy Economy Subsystem Link Matrix
Figure 4-3 – Generic Enabling PPP Policy Economy Subsystem
Table 4-4 – Generic Enabling PPP Policy PPP Subsystem Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price Sensitivity</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Investment</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Financial Support</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Allocation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Road</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncertainty of Traffic Projections</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term Political Support</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Reaction</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposal Process</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Common Drivers
- Also in Economy Subsystem X X X X X
- Also in Transportation Subsystem X X X
- Also in Environment Subsystem X X
Figure 4-4 – Generic Enabling PPP Policy PPP Subsystem Diagram
Table 4-5 – Generic Enabling PPP Policy Environment Subsystem Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion &amp; Deforestation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Generation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Economic Growth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation &amp; Investment Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Environmental Policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulatory Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Common Drivers:
- Also in Economy Subsystem: X X X X X
- Also in Transportation Subsystem: X
- Also in PPP Subsystem: X
Figure 4-5 – Generic Enabling PPP Policy Environment Subsystem Diagram
Chapter 4

John L. Ward

The final part of this step is to flatten the institutional sphere. This is more difficult to do for a generic region than the technical subsystems but at the national level there are many common institutions.

Nation A’s government actors include the Department of Transportation (DOT), a chief executive such as a president or governor, a legislature, an environmental protection department, a treasury department, and an economic development agency. The level of detail may vary in specific situations since some places may allow agencies from lower organizations to be influential during the process. For example, Nation A’s DOT may permit significant input from Region B’s DOT in developing Enabling PPP Policy. They would need to be included as government actors in these situations but for the generic Nation A, they will be ignored.

Quasi-governmental actors also exist in the form of lobbying agencies for government agencies and officials from the regions in Nation A. US examples include the American Association of State Highway and Transportation Officials (AASHTO) and the American Public Transportation Association (APTA). Like the lower hierarchy government actors, these organizations will be ignored in the generic Nation A.

The private business group has four important actor subgroups: concessionaires, financial lenders, carriers, and shippers. The first two are the most influential in regards to toll road PPPs. Larger businesses may directly attempt to influence policy but they may also rely on trade associations or industry groups to promote their goals at this level.

Citizen groups can represent a wide range of interests but they are more active at the PPP Project Deployment level. There will be public interest advocates who are concerned with the environmental and social effects of a toll road PPP program. Organizations like the American Automobile Association may also promote certain objectives like low cost roads. Citizen groups concerned with taxes may also be active if the alternative to a toll road PPP program are higher taxes to fund transportation needs. Given the financial impacts of a toll road PPP program, government watchdog groups will have an interest in these matters.

86
4.2.4 Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere

The link matrices have been extended from the example in Sgouridis to provide greater descriptions of the components. In Table 4-2, Table 4-3, Table 4-4, and Table 4-5, policy levers are denoted by using a bold font. For example, for the transportation subsystem of Table 4-2,
Transportation Investment Policy and Transportation Funding/Subsidies are two policy levers for that subsystem. A policy lever is a component that can be driven by an organization on the institutional sphere. The bottom three rows show which components are shared with other subsystems. These components are called common drivers.

4.2.5 Step 4B: Describe Links Among Components and Organizations

Given the number of links, the descriptions will be limited to those that the author considers important or useful for illustrative purposes. Class 1 links, those links between components in the physical system, will be considered first by subsystem. Class 2 links, those between the physical system and institutional sphere, and Class 3 links, ones between actors on the institutional sphere will follow. Not all link characteristics will be described. Some characteristics include functional form (linear, nonlinear) and magnitude which require more information than available for a generic system. Analysis of the links to that depth is beyond the scope of this thesis. The directional characteristic is readily apparent, especially in the link matrices.

Class 1 Links
Transportation Subsystem
GDP per capita has a strong influence on transportation funding. The transportation system requires a significant amount of money to build and operate and the capacity of the population to pay for it is important.

Travel cost is an important consideration for carriers and shippers. If highway travel becomes more expensive relative to other modes, its share of freight will drop, all else equal. There will be short and long term effects since companies may not be able to shift modes for short term changes in travel cost but will build up the capacity if the new costs are expected to last.

In the post-9/11 world, freight security has grown in political importance. The effectiveness of security measures are dependent on how the freight system is used. It makes no sense to invest billions in air security if the threat from cargo ships is much greater.

The Transportation Investment Policy is the lynchpin of the transportation subsystem. It influences and is influenced by nearly every other component in the subsystem. This may indicate a need to expand the component. For the timeframe of the policy's influence on components, the key determinant is how quickly something can be physically built. This will change as operations becomes more important and the policy is less dependent on physical construction. The influence may also include several ways to approach the problem. Transportation Investment Policy can influence safety through physical design which may take years to trickle through the system while more immediate measures would include funding more highway patrols.

Security has an important effect on intermodal efficiency. If time-consuming measures are used between two particular modes, shippers may shift to other modes. For example, the government could impose stricter security standards on a truck/rail intermodal transfer point. The resulting delay will reduce intermodalism as relying on truck only or rail only becomes more efficient relative to the intermodal solution.
Funding availability and subsidies have a strong effect on travel cost and transportation investment policy. A common tactic in regional long range transportation plans in the United States is to prepare one financially constrained plan and a “wish-list” transportation plan. Ideally, the region would have several freeways, ITS systems, and a strong public transit system but due to funding constraints, some highways may be widened, some ITS installed, and a Bus Rapid Transit or light rail line proposed.

Subsidies are provided to public transportation systems in the United States since farebox recovery is insufficient and many people in low income groups depend on public transportation. Certain groups such as the disabled require very specialized transportation services where subsidies are necessary, as well. These subsidies may also be used for toll road to meet social needs or entice investment.

Economy Subsystem
The most important links in this subsystem with regard to toll road PPPs are ones that involve foreign investment and the cost of money. For a toll road to be financially feasible, the expected revenues must exceed the expected cost. Interest rates will drive that expected cost and the exchange rate coupled with foreign investment will drive the risk in that cost.

Interest rates are strongly driven by the interest rates set by the central bank through its monetary policy. In the United States, this is called the prime rate and some loans will have adjustable interest rates that are some set level above the prime rate. The timeframe for this link is very short, measured in days and weeks.

Exchange rates are not as straightforward as the interest rate. In general, the exchange rate is based on expectations of future economic growth along with some policies set by the government. The timeframe for the effect between government policies and exchange rates is a bit longer than with interest rates, maybe on the order of months, and is more difficult to control. In some cases, the exchange rate is pegged to a stable currency like the US dollar.

Foreign investment in the local economy is driven by the attractiveness of local investment and government policies. Malaysia has a policy where entities in the process of being privatized can only have 30% of their equity owned by foreigners, limiting foreign investment. The government can affect the attractiveness of local investment by reducing risks while maintaining returns. Exchange rate and loan guarantees for local companies are a couple of ways to do this.

Transportation needs are also a function of economic growth. As the economy grows, shippers will require more transportation services for the increased output and an increase in workers will lead to transportation needs for them.

PPP Subsystem
PPP Project Feasibility is the main concern in the PPP subsystem and this is determined by the expected revenue and costs.
Travel cost (which includes tolls) and price sensitivity are the key revenue drivers. It will be difficult to recoup costs if travelers are very sensitive to the necessary tolls. Price sensitivity is driven by GDP per capita. Tolls are strongly determined by the cost of the road but the concession period can be used to spread this cost out over time. Tolls can also be reduced if the government subsidizes the project, which may be done for political rather than economic reasons.

The project costs are mostly the cost of constructing the physical road plus additional costs due to risk allocation and the proposal process. An open and competitive proposal process will reduce costs in comparison to a sole-source process as the bidding concessionaires are driven to reduce their own costs to win the concession. The involvement of the public and the role of environmental assessment within the proposal process could have significant effects on costs if significant design changes are needed or if the costs of time delays from these are borne by the concessionaire. One of the goals of the toll road PPP program is to place each risk on the partner expected to best manage it. This is hard to define for many risks but if poorly placed, costs may skyrocket. The French example of concession companies who required little equity investment from construction companies leading to high construction costs and contributing to their bankruptcy is an example of poorly designed risk allocation (Gomez-Ibanez and Meyer, 143). The construction companies had little incentive to contain costs since construction is where their profit from the project came from, not from the efficient construction and operation of the toll road.

Two other important components in this subsystem are public reaction and long-term political support. The public will react negatively if the tolls are very high or if they have not been included in the process. Other public concerns may be government subsidies that reduce tolls but may be considered as payoffs to the private sector and the involvement of foreign investors which can be a sensitive topic in developing countries. Public reaction is an important driver of the long-term political support for the program. The amount of financial support given by the government is also important since it can fuel the perception that the nation is better off building the roads itself instead of providing significant subsidies to the private sector. Changes in political support will slowly change the transportation policy and the willingness of government to provide financial support.

Environment Subsystem
Transportation is an important driver of air quality. Large numbers of single-occupant vehicles with poor emissions control devices will have extremely detrimental effects on air quality. Changing transportation policies and environmental policies can control the effects but they take a long time for the benefits to filter through the system. For example, the nation may require more stringent emission control devices on new vehicles. These could have a significant impact but the current polluting fleet will take several years to replace. Investing in more public transportation or allowing operations measures that would reduce the number of single-occupant vehicles are other ways of improving air quality but it may take years to realize the benefits if it requires the installation of new systems or infrastructure construction.
Class 2 Links
While the institutional map has been developed, the links between it and the physical system have not been described. The projections from the institutional sphere to the physical system are concentrated on the policy levers, which have been defined earlier. The institutional sphere and the policy levers can be combined into a new link matrix, as shown below. Policy levers do not necessarily have to be a policy; they can be leverage points, as well. Class 2 links can also be two way as they may come from the physical system to the institutional sphere.

Table 4-6 - Generic Enabling PPP Policy Class 2 and Class 3 Links

<table>
<thead>
<tr>
<th>From</th>
<th>Chief Executive</th>
<th>Transportation Department</th>
<th>Environmental Protection Department</th>
<th>Treasury Department</th>
<th>Economic Development Agency</th>
<th>Concessionaire</th>
<th>Financial Lenders</th>
<th>Carriers</th>
<th>Social Advocates</th>
<th>Environmental Advocates</th>
<th>Government Groups</th>
<th>GDP Per Capita</th>
<th>State Economic Growth</th>
<th>Employment</th>
<th>Travel Cost</th>
<th>Safety</th>
<th>Equitable Access</th>
<th>Project Financial Feasibility</th>
<th>Public Reaction</th>
<th>Biodiversity</th>
<th>Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Executive</td>
<td>X X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legislature</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Department</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Protection Department</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treasury Department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Development Agency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concessionaire</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Lenders</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shippers</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carriers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Advocates</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Advocates</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Government Groups</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automobile Associations</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Economic Growth</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equitable Access</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Financial Feasibility</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Reaction</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If the physical system is performing atrociously, the institutional sphere will be affected as the threat of being voted out exists. Assuming officials wish to keep their jobs, they will adjust policy levers in response to signals they receive from the physical system. Businesses and citizen groups will also respond to the signals important to their missions.

Table 4-6 displays both types of projections. The projections from the institutional sphere onto the physical system are shown in the upper right area while the projections from the physical system to the institutional sphere are shown in the bottom area. Class 3 Links, discussed later, are in the upper left hand square consisting entirely of organizations.
As a class, citizen groups often have mild influence on policies. Businesses will have a little more and may have significantly more under certain circumstances. Citizen groups represent diffuse interests which can be difficult to organize in order to provide an influential voice. The much greater direct impact of policies on business will lead them to be more involved in the system to mitigate negative consequences or to promote beneficial policies.

The government controls the policy levers in this particular system. The legislature and chief executive obviously influence all policies but their influence has different timeframes. The legislature's influence is long-term through its legislation although in politically sensitive cases it can act in a short timeframe. The chief executive will take this legislation and set general policy directives. The executive may also provide more direct leadership on important issues. The timeframe is more in the medium-term of several years but it could also be very short-term as well as long-term.

The individual departments are responsible for handling the day-to-day implementation of laws and policies. Its influence on policies is very direct and concentrated on shorter timeframes compared to the chief executive and legislature. The department's policies and processes could have long-lasting effects, though, if it becomes very difficult to make changes to them.

Class 3 Links
The institutional sphere can be treated as another subsystem in terms of Class 3 links with a link matrix created. In the representation for this system in the upper left area of Table 4-6, it is assumed that the legislature does not directly affect the individual departments; the legislature can enact laws that affect the chief executive who then affects the departments. Likewise, businesses and citizen groups do not directly affect the internal affairs of the departments but they can elect or fund the campaigns for new legislators or a chief executive that will carry out their wishes.

4.2.6 Step 5: Seek Insight About System Behavior
This step has been dubbed “the mystical step” by Professor Joseph Sussman since there is not a rigorous approach to gaining insight about system behavior. Dodder et al. provides some ideas to think about when studying the system but they are no guarantee for achieving a good understanding of system behavior. The approach concentrates on each class of links and directs the analyst to consider a few questions when investigating that class of links.

Class 1 Links
Are there strong interactions within or between subsystems?
The strongest interactions are between the PPP and economy subsystems. It is a mostly unidirectional; the PPP subsystem is driven to a much greater extent by the economy subsystem than vice-versa. An important component in the PPP subsystem is the financial feasibility of a project and that will be driven by the cost of money, represented by interest rates, and the availability of funds, which foreign investment may be a key part of.
Are there chains of links with fast-moving, high-influence interactions?
Perhaps the component that is the center of any fast-moving, high-influence interactions in this system is the exchange rate. A key part of the Asian financial crisis in 1997 was the devaluation in several of the region's currencies. There were many reasons for this devaluation to have taken place and a portion of the change in exchange rates were symptomatic of other economic issues but a significant devaluation caused a vicious circle effect where the devalued currency worsened the problems, leading to further devaluation. Borrowing money from foreign investors becomes more difficult and may stall toll road PPP programs as riskier roads are unable to receive financing. Existing roads may also run into problems if they have a high risk exposure to the exchange rate, weakening the existing concessionaire industry. The economy in general may have its growth stunted and it may possibly enter a recession.

A second chain of links involves the public reaction component. An external action, such as a financial crisis or political scandal, could trigger severe public protests. Politicians will react to this although it cannot be predicted what the reaction will be. One extreme possibility if the public reaction is bad enough is to nationalize the toll road system and abolish tolls. Less extreme possibilities include reducing tolls and reforming the proposal process.

Are some of the paths of links non-linear and/or irreversible in their impact?
The only link that the author would characterize as irreversible is not very relevant to transportation. It is the link between national environmental policy and biodiversity; a weak policy could lead to the extinction of a species. Some of the paths may have effects that are difficult to manage or take a long time to reverse other than the biodiversity case but it is possible to change things.

Class 2 Links
Are the organizations pushing the system in the same direction, or is there competition among organizations in the direction of influence?
Within the government sector, there may be competition between the legislature and chief executive as to the direction of a particular policy. Another possible competition exists between the transportation and treasury departments over transportation funding. The transportation department will want as much infrastructure as possible while the treasury department will be more concerned with the costs of the infrastructure.

Businesses and citizen groups will have competing interests. Concessionaires will want policies that maximize profit which will include significant subsidies, toll rate flexibility, and few environmental restrictions. Good government and low tax groups will want to reduce subsidies while shippers and carriers will want low costs. Environmental advocates will want strong environmental standards with a rigorous approval process before a project is permitted. Social advocates will want minimal impacts on neighborhoods and low costs to low income groups.

Are there organizations on the institutional sphere that have an influence on many components within the physical system?
As discussed earlier, the legislature and chief executive have an influence on many components although that influence may have different timeframes for actions and effects. The chief
executive is usually able to act more quickly on an issue than the legislature, which is part of the reason for having a chief executive.

Class 3 Links

Are the relationships between organizations characterized by conflict or cooperation?

This chapter discusses a hypothetical region so it is difficult to tell without a specific institutional context. The legislature and chief executive may be controlled by opposing parties or even opposing factions within the same party. If the political system is parliamentary, then the legislature and prime minister should get along to a much greater degree since the prime minister is selected by the ruling coalition. Relations between the government and other organizations are similarly difficult to predict in a generic nation. Environmental groups may support the government if it has strong environmental policies or disagree with it if environmental policies are weak.

The relationship between concessionaires and the social and environmental advocates is likely to be contentious. Concessionaires want to maximize profit while social and environmental advocates will want measures that mitigate impacts, often increasing costs, or low tolls so certain groups are not disadvantaged by the toll road.

Are there any high-influence interactions, or particularly strong organizations, that have direct impacts on many other organizations within the institutional sphere?

The legislature and chief executive have strong impacts on government departments. The legislature can devise laws that affect the department and it can also create and eliminate departments. The chief executive may appoint senior officials in each department and set general policies for the departments.

What is the hierarchical structure of the institutional sphere and are there strong command and control relations among the organizations?

Government departments fall under the control of the chief executive but the legislature can influence them as well. Businesses and citizen groups are independent of each other.

Are there any links between organizations that act via a physical system (e.g. an organization has a projection to a physical component and this physical component has an impact on another organization)?

The main component through which these links are channeled is the public reaction component. The government agencies could affect the policy levers in ways that elicit praise or criticism from the public. Elected officials will take advantage of this reaction to improve their standings, either taking credit for the successes or deflecting blame for the failures. Some of the paths may act through performance measures, designated in the next step. For example, the transportation department may choose to increase the speed limit. Environmental groups will criticize the higher speed limit as increasing fuel consumption and pollution. Social advocates may criticize it as a step that will increase the number of deaths on the nation's highways.
4.3 Stage 2: Design, Selection, and Evaluation

4.3.1 Step 6: Identify Performance Measures, Refine System Goals, and Build Quantitative Model

The initial goals identified in step 1 are:

- Meet national transportation needs with minimal impact on government funds.
- Promote the national economy.
- Ensure that environmental and social needs are taken into account when deciding on whether to use a toll road PPP to meet a transportation need.
- Ensure projects are selected in a transparent manner and involving the public so stakeholder influences are clear.
- Prevent distortion of the financial markets by structuring PPPs so that the expected return is commensurate with the risk.

The italicized components of Table 4-2, Table 4-3, Table 4-4, and Table 4-5 indicate the performance measures selected for the system. These measures were selected since they are quantifiable and support the initial goals in some manner. They are:

- GDP Per Capita
- Travel Cost
- Safety
- Employment
- Trade Balance
- Foreign Investment
- Project Financial Feasibility
- Cost of Road
- Air Quality

There may be multiple ways to define each measure and it may be advisable to use multiple submeasures to fully capture the performance measure. For example, safety can be measured in total deaths, deaths per capita, deaths per vehicle-miles traveled, injury rates, and hospital costs for people injured in traffic accidents as examples of a few possible measures. Each possible measure has strengths and weaknesses. Using the safety example, total deaths has the advantage of being a clear and precise measure. A weakness is that total deaths do not capture the full safety picture since there are many accidents where people are injured or there is just vehicle damage.

One problem is that performance measures may not exist for some goals. Goals like social goals are not easy to quantitatively measure. Perhaps devising a mobility measure for certain groups or neighborhoods would be a useful proxy for access to a variety of jobs. Employment by group or neighborhood could also be used although it does not address the variety of opportunities. A measure of the effect of a toll road PPP on the social fabric is much more multidimensional than just jobs. Ensuring projects are selected in a transparent manner is also impossible to do on some absolute, quantitative scale. The danger of not coming up with a measure is that the goal will be ignored. Some of these areas will just have to be evaluated using qualitative methods.
Another issue to consider with these performance measures is that good performance is not always easy to define. Having fewer deaths is clearly a safety improvement. On the other hand, less foreign investment is not necessarily good or bad. To understand the significance of foreign investment, the process must consider who is doing the investment and the risks that accompany it as well as the benefits created by that investment.

These performance measures above serve as a first cut and they still need development to use in a real application. Development does require understanding the local context which is absent in this generic case.

The initial goals from Step 1 are sufficient for the system goals. They can be refined in a specific context but without this context it is difficult to refine goals beyond this.

Building a quantitative model for this step is beyond the scope of this thesis. It will be assumed that one is developed for Nation A's system.

4.3.2 Step 7: Identify and Design Strategic Alternatives for System Performance

Strategic alternatives for Enabling PPP Policy focus in two directions: providing guidance for PPP Project Deployment and modifying the process for developing the Enabling PPP Policy, in effect reinventing the process that this chapter covers. During this iteration of developing Enabling PPP Policy, people may realize a useful stakeholder has been left out or better evaluation tools were available but it may be too late to make changes. The reinvention of the CLIOS process as applied to Enabling PPP Policy could take these into account. For this particular process, guidance for PPP Project Deployment will be considered separately from the reinvention of the process to develop the next Enabling PPP Policy.

The first step is to list strategic alternatives for each of the questions regarding the Enabling PPP Policy that apply to PPP Project Deployment guidance.

When is it appropriate to use a PPP rather than government provision of infrastructure? This is a policy question first and foremost that should be answered in step 6 of the CLIOS process. If a government wishes to have a widespread toll road PPP program or if it wants a limited toll road program, it must define this goal independent of the workings of the transportation system. This process will take into account the effect of the alternatives in reaching the goal.

For example, the government may want a toll road PPP program that is widespread but does not prove onerous to the consumer. The government could design alternatives that allow toll roads only when tolls do not exceed a certain level, that subsidize all toll roads so that tolls can be held down, or that subsidize select groups of consumers.

How may PPPs be proposed? Do they come from government master plans, private sector proposals, or both? Especially of concern for private sector-initiated proposals, how may the bid be handled? Will they have exclusive negotiation rights? The proposal process will have a significant effect on the final cost through toll determination and risk allocation. Because of this, the public will have concerns about how the process is
handled. One alternative is to have all toll road PPPs come from government master plans and put out for bid. Another alternative is to have the government choose a concessionaire for a project without a competition and deal solely with them. This option could be reversed by having concessionaires propose the projects. If the government feels that it is a worthwhile project, it could grant sole negotiation rights to the concessionaire. These alternatives could be combined so that projects proposed by the private sector must meet specific criteria for sole negotiation rights; in all other cases, there is an open competition.

What range of PPP arrangements can be used to deliver infrastructure (DBFO, Design-Build, Operations and Maintenance, etc.)?

There are a spectrum of strategic alternatives that can be proposed, from mandating a specific arrangement, such as only allowing DBFO, to leaving it up to the region to determine which PPP arrangement will best suit their needs. A mixed alternative approach would allow certain arrangements in certain situations. Perhaps the government will permit Operations and Maintenance concessions for existing toll roads but forbid these concessions on existing untolled roads if adding a toll would be required.

Who is responsible in the government for the different phases of the project and what powers and responsibilities do they have for oversight?

This question is regarding the institutional architecture that must be developed for PPP Project Deployment. There are three basic phases: proposal and concession agreement negotiation, construction, and operations and maintenance. Alternatives include having one agency manage all three phases or different agencies manage different phases.

Powers include the ability to approve the contract, developing standards that the concessionaire must meet, and taking action if standards are violated. For this first power, the agency that handled the negotiations could have approval power or it could be sent to another agency or the chief executive. For developing standards, this could be part of the negotiation process or there could be universal standards developed by a government agency. In handling violations, the inspecting agency can use arbitration procedures outlined in the concession agreement or take the concessionaire to court on its own or it could hand off the violations to some other agency such as a justice department to handle.

Who can participate in selecting the winner and what criteria can the government use in bidder preselection and the award of the contract?

To elaborate more on this question, the core issue could be “who selects the criteria?” Assuming a fair process, the winner will be strongly dependent on the criteria used. Certain agencies will promote the use of one criterion or another and the role of those agencies in the process will determine the importance of their favorite criteria.

Like many of the other questions, the alternatives range from the Enabling PPP Policy designating a specific agency to develop the criteria to requiring a multi-agency process with public involvement to select the criteria and the eventual winner. Selecting alternatives for the other aspects of the Enabling PPP Policy, particularly the ones on the institutional architecture and PPP Project Deployment process mandates, will narrow down the feasible alternatives in criteria selection.
Which stakeholders should be involved in the different phases of PPP deployment (decision to pursue a PPP versus another solution, project specifications, bids, alignments, etc.) and what requirements should there be on the level of participation of these stakeholders? The range of alternatives includes the Enabling PPP Policy mandate for well-defined roles for specific stakeholders to leaving it up to the region on how they want to handle this. Other possibilities include requiring the involvement of certain stakeholders, such as the public, but leaving it up to the region to define how that exactly happens.

The choice of alternative will depend on the power of the government and public reaction to PPP Project Deployments. A strong, centralized government may not feel the need for the rigorous involvement of a variety of stakeholders and prefer the involvement of favored stakeholders. A less centralized government will prefer giving the regions more flexibility. Severe public criticism could lead to stricter and well-defined requirements for the roles of stakeholders in the process rather than vague definitions giving freedom to the regions.

Should there be requirements to investigate alternatives to the toll road and if so, what should those requirements be (no build, differing alignments, or public transit options investigated)? The first possibility is to not consider alternatives to the project. If the project as proposed meets government criteria, it is built, otherwise it is not. Another possibility is to specify the project alternatives that must be considered. For instance, the government could mandate that no-build and public transit alternatives be considered. A third possibility would be to require alternatives to be investigated but not provide guidance on which ones.

What are the limits on the financial structuring of a project such as minimum or maximum debt-to-equity ratios, foreign equity requirements, or debt repayment periods? The government could decide to leave that to the private sector as one strategic alternative. If the project fails, it is the investors who lose and they are the ones responsible for ensuring that their money is invested wisely, considering the risks of poor project deployment, exchange rate fluctuations, and the ability to repay loans over the desired time periods.

Each part of the question could be spun off into its own strategic alternative. The government could have specified debt-to-equity ratios, foreign equity investment may be capped to a certain percentage of the total equity, foreign debt could also be capped, and debt could be required to be repaid in a certain time period.

What are the types of instruments that government can use to support a project like soft loans, minimum traffic guarantees, bankruptcy protections, government equity investment, or assumption of exchange-rate risk? When should the government use them? This question provides an overview of the variety of financial instruments available. The strategic alternatives come in deciding when they may be used. One alternative is to just not provide support. Other alternatives could be that support is limited to a certain percentage of the total cost or that multiple instruments can only be used in some combinations such as forbidding bankruptcy protection if the government is providing minimum traffic guarantees. Another alternative is to cap the total annual support available to all toll roads; generous support to one road will be to the detriment of others.
Government financial support could be used to reduce risks. The levels of foreign investment and the exchange rate risk could have significant effects on the financial outcome of the program. Limiting foreign investment or providing government loans in lieu of foreign investment are alternatives that can reduce the overall risk although raising the cost to government. When applied to the whole toll road PPP industry, the result could be greater industry stability.

How should tolls be determined and what factors can be used to calculate them? Should the public participate and should equity concerns be addressed? Is government approval required to raise tolls? Is congestion pricing permitted?

The typical alternative is to propose base technical specifications and a concession period and the private sector bidders determine the tolls in their bids. Another alternative would be for the toll to be fixed by the government, taking into account concerns about equity, with the private sector submitting the shortest concession period that they think would provide investors with an adequate rate of return. A third alternative is to have the lowest bid win the award with the toll set to the second lowest bid. This strategy is often used in auctions in the hopes of bidders providing their true cost to the auctioneer rather than a value based on the bids of others that may not provide the best value to the auctioneer (Pindyck and Rubinfeld, 492-494).

Concerns about public participation and equity are considered in the other questions covered in this step.

Toll increases could require the approval of a government department, chief executive, or legislature. Another alternative is to set the rate of toll increases in the concession agreement. This presents the possibility for further alternatives for concession agreement renegotiations. A third alternative is to let the concessionaire set the toll at whatever level it wants. The downside of this alternative is the likely poor public approval and possible diversion of a significant number of vehicles to local roads, worsening congestion rather than improving it.

As far as congestion pricing goes, the government could forbid it, allow it with no regulation, allow it with price caps, or leave it to the agency running the PPP Project Deployment Process to decide.

What requirements are there for an environmental assessment of a PPP? At what point should one be done (before or after private sector involvement)? Should the process differ from the process for non-PPP roads?

The choice of alternative here will influence the risk allocation and is dependent on where the proposals come from. If all proposals come from government plans, the environmental assessment could take place before the proposal is put out for bid so when the bid takes place, the private sector does not have to face the risks involved in an assessment, which will reduce their costs. The government could also perform the assessment after the concession is awarded when more technical details are known at its own or the concessionaire's expense.

If there are private sector proposals, the private sector could be required to perform an assessment before making the proposal, perhaps not too rigorous of an assessment otherwise
proposal costs will become prohibitive, or the proposal could be made and then an assessment carried out before negotiations are entered. If the assessment process is lengthy, this latter alternative has the downside that projections and financial feasibility will change by the time the assessment is finished, requiring changes to the proposal.

Another alternative is a mixed approach where a “quick and dirty” assessment is performed before a request for proposals is made or a private sector proposal is accepted. Later in the process, an in-depth assessment is performed.

Whether the assessment process should differ from non-PPP roads depends on where the burden is placed and what the long-term goals of the system are. If there is a rigorous assessment process for non-PPP roads and it is applied to toll road PPPs, they will take longer to deploy and be more expensive. If the government prefers a quick deployment process, it may choose an alternative that can achieve roughly the same amount of environmental protection but has less impact. Too lax a process will lead to greater environmental damage and raise the ire of people living near the toll road.

*What government powers are available for right-of-way acquisition? If the government can use eminent domain powers, is one party required to pay the costs or is it a negotiable part of the concession agreement?*

There are three basic alternatives: the private sector is fully responsible for right-of-way acquisition, the government is fully responsible, and the government uses eminent domain to get the land rights while the private sector provides the compensation to the land owner.

*What other requirements does the PPP have to meet? Minimum content from disadvantaged ethnic groups? Access to the facility by low income or disadvantaged groups? Maximum limits on the impact a PPP can have on a neighborhood?*

It is difficult to determine what other requirements there will be for a generic nation. This question is focused on context specific issues.

For the ethnic or low income group issue, some alternatives include requiring a certain percentage of contracts to go to specific groups or subsidizing tolls for some groups. The choice of alternative will be driven by the expected reactions of the groups to the outcome. They could also include the groups in the process so their needs are met better.

There were a couple questions that focused on the reinvention of the process for the next revision of Enabling PPP Policy. The general idea, though, is to consider process reinvention possibilities as strategic alternatives. While the core process is expected to be the CLIOS process, how it is handled is important. There will be choices as to who can participate, what tools are used, and how the final decisions are made.

*Who develops Enabling PPP Policy? Can different portions be developed by different departments or regional levels?*

This is an institutional question so the alternatives will deal with different institutional architectures. The policy can be developed by one agency such as the transportation department
or different aspects can be developed by different agencies. Technical aspects could be handled by the transportation department, environmental aspects by the environmental protection department, and financial aspects by the treasury department. Further alternatives are created by considering how these agencies coordinate their efforts. They could sit as equal partners on a coordination team or one agency could have the lead while the others provide expertise in their respective areas.

Involving regional agencies along with national agencies will further increase the number of alternatives. A couple possibilities could be to have the national transportation department be responsible for gathering input from the regional transportation departments, and likewise for the other departments, or to have the regional agencies could sit as junior members on the committee that develops Enabling PPP Policy.

**How is the Enabling PPP Policy created? How can it be changed?**

The Enabling PPP Policy is created using the CLIOS process and it is changed by not only considering the guidance provided by Enabling PPP Policy on PPP Project Deployment but also by examining itself and exploring ways to improve how the CLIOS process is conducted for developing new policy.

The interplay with legislation and executive policy decisions does need to be included in the analysis. The outcome of the process for creating Enabling PPP Policy could be recommendations for legislation. Legislation could also be created independently that will affect how the CLIOS process is used. Executive policies have similar properties.

4.3.3 **Step 8: Flag Important Areas of Uncertainty**

This step would include an identification of uncertain data and uncertain system behavior. For the generic Nation A, there is no data to be uncertain about but some general areas can be identified. Uncertain system behavior is best identified by having a group of people with diverse backgrounds examine the system representation.

The most common data uncertainty is that the data may not be accurate or it may be difficult to forecast from the gathered data. If toll roads are new to a region, planners will need to take stated preference surveys to determine how sensitive people are to prices. Stated preference can be misleading. The results of the stated preference survey could show that a road could generate enough traffic at a certain toll level to provide an adequate return but in operation, many fewer people use the road than expected.

Data uncertainty could also be due to imperfect measures; even if the data is accurate, it may not fully provide the desired information. Measuring accessibility accurately would require an extensive and costly data gathering step. Proxy measures may be used but there will be uncertainty as to whether an improvement in the measure accurately reflects real world improvement. Using an example from Chapter 2, Los Angeles uses a very simple measure of accessibility: the percentage of people who live within a 45 minute commute from work to home during the PM peak period, for both car and transit (SCAG, 159). This does not capture the whole picture of accessibility which would include trips for social events, recreation, shopping, etc. It gives a rough approximation that can be gathered much less expensively, though.
As most of this representation comes from the author’s understanding of the system, there is considerable system uncertainty. One assumption in developing the transportation subsystem is that Nation A is not too concerned with the day-to-day problems with the transportation system. It may drive some of the policy decisions but the nation will also be concerned with having a complete, robust network. This assumption could be wrong with components like congestion, travel time, and reliability of much greater concern at the national level.

The system representation has been developed with some of this uncertainty in mind. Especially given the generic status of Nation A, the details of component relationships has not been explored. Relationships between components and the importance of certain components may be different between nations.

4.3.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties

The evaluation of many strategic alternatives, especially ones regarding institutional change, is dependent on the specific nation. Some alternatives can be evaluated independently of the region. Going back to our goals from step 6, what strategic alternatives support the goals? Since a range of possibilities for PPP Project Deployment is being defined, the intention is to remove possibilities that are clearly unsupportive. The evaluation will be performed by using the goals from step 6 and detailing the alternatives that support or do not support the goal.

**Meet national transportation needs with minimal impact on government funds.** Transportation needs can be met with a variety of arrangements such as DBFO toll roads or operations and maintenance leases. The PPP Project Deployment process should have the flexibility to use whatever arrangement can meet transportation needs along with the other system goals. The desired strategic alternative is to not limit the arrangements that can be used.

While the ideal is financially self-sustaining toll roads, there may be instances where the government believes a toll road PPP will be beneficial despite not being financially self-sustaining. Other cases where government funds may be desired are when there is significant risk that can be reduced with the wise application of funds and when a secondary goal is boosted by the government funding, such as reducing inequities caused by the tolling. As a strategic alternative, government funding should be permitted but there must be a demonstrated need. For example, if a road is critical to an agricultural region but the forecasted revenues are not enough to cover the costs of the road, a subsidy could be provided. The form of support will depend on the particular project and should be left to the PPP Project Deployment phase to decide.

**Promote the national economy.** The stakeholder involvement process should include representation from shippers and carriers. A competitive advantage can be derived through efficient freight operations. The views of relevant organizations should be sought to ensure that the projects support economic activity.
Ensure that environmental and social needs are taken into account when deciding on whether to use a toll road PPP to meet a transportation need.

There should be a required environmental assessment process that is more than just a rubber stamp for a government supported process. Ignoring environmental needs could lead to lower health and worker productivity, decrease biodiversity if sensitive habitats are destroyed, and reduce public support if the public is concerned about the environment. Where the assessment is placed in the process and who faces the financial burden will affect the financial outcome. The assessment process should be uniform for all toll road PPPs and not vary between regions.

Social needs depend on the nation and region but the public involvement process should help meet them.

An alternative that can help meet both is an investigation of alternatives to the toll road PPP although it is difficult in the Enabling PPP Policy to define the scope of the investigation. Comparing the toll road PPP against the no-build option on transportation, environmental, and social measures is a good minimum requirement.

Ensure projects are selected in a transparent manner and involving the public so stakeholder influences are clear.

The Enabling PPP Policy should mandate public involvement at some level of the PPP Project Deployment Process and in the process to develop Enabling PPP Policy. Low public support will reduce the long-term political support, damaging the prospects for the program. The possible reactions of the public will help narrow the prospective alternatives for public involvement.

Selection in a transparent manner demands that the criteria used for selection are known to all parties. This will improve public faith in the process and it is a desirable attribute for the private sector and investors as well. An additional part of this alternative is that there must be some way to verify that the criteria are being followed and in this part there is room for flexibility. The government could release only the information from each bid relating to the selection criteria or it could open up the entirety of every bid for scrutiny. A uniform requirement is desirable in this case rather than allowing the regions to develop their own policies so people will have uniform access to the data. Considerations for the choice include the impact on the concession industry of having bid information in the open and how the public would react to open versus more limited information.

Private sector proposals throw a wrinkle into this. While the easiest path may be to simply exclude them, there are times when the private sector can provide an innovative solution. There is no clear test for innovation but a standard toll road is not innovative and mild extensions of current technology also should not be considered innovative. Completely new ways of constructing or operating the road are innovative.

If the government agency feels the proposal is innovative, it must release enough details to convince the public, competing companies, and other parts of government that the proposal is worth the sole negotiation rights that will be granted. This will maintain the long-term public and political support for the program and encourage the private sector to explore innovative new
ways to meet transportation needs. Since the details that make it innovative are project specific, the PPP Project Deployment agency should determine what information will be released.

**Prevent distortion of the financial markets by structuring PPPs so that the expected return is commensurate with the risk.**

Transparency and flexibility will help reach this goal but there is no strategic alternative that can directly lead to a desirable risk allocation. The best approach is to try to achieve a good allocation on each individual risk: revenue, construction, political, and financial. For example the involvement of the public and other stakeholders can reduce political risks and justifying financial support can help ensure that not too much financial risk is shifted to the government. There will be times when the risk allocation may be suboptimal. There may be valid reasons for this and is acceptable as long as it is understood. Presumably other factors can override this need to allocate risk optimally.

To recap the strategic alternatives chosen or discarded for Nation A’s Enabling PPP Policy, the following alternatives are available during the PPP Project Deployment process:

- Any project arrangement (DBFO, Operations and Maintenance lease, etc.) is permitted
- Government financial support is permitted but the reasons for the support must be defensible
- Private sector and citizen group stakeholders should be involved in the process
- An environmental assessment process is required. Projects that do not meet standards will not be approved until they are modified to meet them.
- At least a no-build alternative must be investigated using transportation, environmental, and social measures
- Selection criteria will be defined and open to the public. The details of bids that apply to the selection criteria will be released.
- Private sector proposals will be accepted for innovative proposals. A justification process is necessary to show that the proposal is innovative.
- The decision to clearly move away from a desirable risk allocation should be justified.

This selection of alternatives will provide flexibility for the PPP Project Deployment process, increasing its robustness in the face of uncertain conditions. A few of the alternatives are more rigid in that the agency performing PPP Project Deployment only has the choice of one alternative but these rigid alternatives should help support the goals of the program no matter what the future scenario. For example, publicizing the selection criteria could be construed as a rigid alternative but it will reduce the perception of government favoritism towards politically-connected companies and increase public support for extensive toll road PPP programs or limited programs in good economic times or recessions.

As part of step 7, alternatives for the reinvention of the process for developing Enabling PPP Policy were considered. The selection of these alternatives will be left for step 12. The performance of the current process should be known before it is reinvented and that will require some results at the PPP Project Deployment level.
4.4 Stage 3: Implementation

4.4.1 Step 10: Design Strategies for Implementation in the Physical Domain and Implement

The implementation strategy will depend on the relationship between the agencies that develop the Enabling PPP Policy and the ones that manage the PPP Project Deployment process. If there is a significant overlap between the two groups, then the strategic alternatives will be readily accepted. For example, the treasury department should adopt the government financial support recommendations if it helped draft them. If there is a strong hierarchical relationship, the Enabling PPP Policy could come down as a mandate to the PPP Project Deployment agencies to follow.

A more complex case is if the PPP Project Deployment agencies had limited or perhaps no involvement in developing the Enabling PPP Policy and there is not a strong hierarchical relationship. The PPP Project Deployment agencies may not want to use the alternatives in the Enabling PPP Policy. The most direct method to implementing Enabling PPP Policy is to create laws for it. This method is time-consuming, requires politicking to convince legislators of the need to pass it, and cannot be easily changed. If there are general policies or alternatives that will be maintained over the years, such as a public involvement requirement, then the legislative solution would be useful. A second method is to tie general transportation funding to following the dictates of Enabling PPP Policy. The effectiveness will depend on how much the regions depend on funding from the nation.

Some strategies will be targeted towards the private sector partners like concessionaires and financial lenders. One alternative is to grant tax-free status to toll road PPP bonds. The financial sector should be consulted for the effects of this alternative. There may also be policies on concession company structures or who can bid on toll roads. To support long-term project financial feasibility, the Enabling PPP Policy could mandate a certain level of equity investment in the concessionaire by the construction company, otherwise construction costs may be driven up to the detriment of the concessionaire and consumers but to the benefit of the construction firm. While the government could just mandate these requirements, there may be legal issues involved. The implementation strategy would have to take this into account with the possible introduction of more legislation as a way to implement them.

4.4.2 Step 11: Design Strategies for Implementation in the Institutional Sphere and Implement

The institutional architecture is examined in this step. PPP Project Deployment requires knowledge of the nuances of toll roads and skills in allocating risk efficiently. Having the Enabling PPP Policy place responsibility for PPP Project Deployment onto organizations that do not have these skills and knowledge will lead to poor outcomes.

If the knowledge and skills are not in place, a central toll road agency could be created. It may act as the depot for all toll road issues, managing the entire PPP Project Deployment process with significant support from the regions to account for regional needs. It could also be used as a consulting agency for toll road specific issues while the regions manage the PPP Project
Deployment process. Another alternative that does not require as much institutional change is to augment the staff in the relevant agencies with dedicated toll road personnel.

If the knowledge and skills do exist, then the responsibility can be placed on the regional agencies. How the regional agencies handle this internally is more of a question for PPP Project Deployment than Enabling PPP Policy.

The relationships between the private sector and the government are also considered as part of the institutional architecture. In the context of the Enabling PPP Policy, the relationship includes the ability of the government sector to regulate the private sector and the rights of the private sector in dealing with the government. These are higher level considerations compared to the issues dealt with in step 10. An alternative to limit the investment in a concession by foreigners requires the government to have the ability to regulate. The strategy for implementation must ensure that the institutional architecture can support these actions.

Another concern is the influence of the private sector on the government. Influence can be reduced by limiting the ability of officials to accept gifts or to invest in companies that they deal with. The strategy for implementation will depend on the severity of the problem. Internal policies can be created but the penalties for policy violation may be limited to losing a job. If there is a significant problem with corruption, legislation should be introduced that would carry more severe penalties.

4.4.3 Step 12: Post-implementation Evaluation and Modification

The performance of the individual PPP Project Deployments is monitored to check if the Enabling PPP Policy is meeting the goal of guiding the projects to socially beneficial outcomes. Financial, transportation, and environmental methods are used and they can be compared to the results of similar roads that are untolled or a simulated untolled road if a good comparison is not available.

If the results are different than expected, the system representation must be reexamined. The root cause of the results must be analyzed to determine where the error in the system representation lies. Perhaps a link has been characterized incorrectly such as the effect of one component on another occurring much faster than expected or a feedback loop was missed that has a substantial effect on the system. Another problem with the links is that they may not be where the analyst thinks they are. In the PPP subsystem representation, Project Financial Feasibility is influenced directly by risk allocation. Changing the risk allocation is expected to have a significant impact on feasibility. This could be wrong, though. Perhaps in deploying the PPP projects, the nation learns that risk allocation does not directly affect the financial feasibility; it acts on feasibility through the intermediary of the cost of the road. Instead of an analyst expecting that a strategic alternative may impact feasibility by changing the risk allocation with all else, including road cost, remaining equal, the analyst must consider first how the risk reallocation changes the road cost and then how the road cost changes the feasibility.

Another problem is that the representation may have missed components. Car ownership rates could significantly influence the system and to achieve the desired results, alternatives that change the incentives for car ownership could be considered.
The actions of organizations must be investigated as part of the process. Are there changes in the relationships between organizations that affect the system understanding? Perhaps one agency that used to be part of a larger department has been spun off into its own domain with specific roles and responsibilities.

Going back to step 9, strategic alternatives for changing the Enabling PPP Policy were delayed to this step. With an understanding of what the results were, the influence of the process for developing Enabling PPP Policy can now be examined with alternatives chosen that will improve the process itself. New stakeholders could be involved. New institutions could be created to manage the process if the stakeholders found the process to be too fragmented. The roles in the process may also be modified if one stakeholder has too much or too little influence.

4.5 Conclusion

The CLIOS process as applied to developing Enabling PPP Policy for a generic nation has led to a greater appreciation for a variety of issues. As the process moves from representation to implementation, it becomes much more difficult to develop the policy for a generic nation. Strategic alternatives depend on the existing performance of the system and institutional structures. Despite this, some clarity has been achieved regarding a very basic package of alternatives that can be applied anywhere and the issues to be considered when creating the strategy for implementation.

Now we go to applying the CLIOS process to PPP Project Deployment which will be embedded in the regional strategic transportation planning process. The next chapter will also consider the effect of the Enabling PPP Policy on the PPP Project Deployment process and how innovative toll roads may be considered outside the regional strategic transportation planning process but still support regional goals.
5 A Generic Application of the CLIOS Process to PPP Project Deployment

5.1 Introduction

This chapter will consider the treatment of both innovative and non-innovative toll road PPPs for a region using the RSTP as CLIOS process (henceforth referred to simply as RSTP) and how the Enabling PPP Policy influences this process. For the case of non-innovative toll road PPPs, it will be accenting how the toll road PPP would be considered during the execution of RSTP. For the innovative toll road PPP, the issues will become how it is integrated into the existing plan and what adjustments will need to be made. The assumption for innovative toll roads is that a run-through of the RSTP process will be made but using the goals, representations, and evaluations of the previous RSTP process rather than starting fresh. The reader is referred to Section 3.3 and Sussman, Sgouridis, and Ward (2005) for complete descriptions of RSTP as CLIOS.

The regional transportation planning agency managing RSTP may exist solely at the regional level or it could be a function of an agency at another level, such as a state or national department of transportation. There are no assumptions made about the political or legal power of the planning agency compared to other organizations. It may have a command and control relationship or it may just serve as a coordinating organization for the stakeholders.

A difficult part of PPP Project Deployment is determining how it fits into RSTP. A simple method would be to consider toll road PPPs as just another alternative for meeting transportation needs. This would provide the best match of regional needs with how the toll road PPP is selected and deployed but it has some downsides. Innovative solutions may be shut out if companies feel they will not receive any advantage in the process from proposing an interesting idea. If the planning process is performed every few years, then there may be a significant delay from when a potential innovative toll road PPP is thought of and when it is deployed, losing the benefits of innovation to other regions who move more quickly.

One possibility is to develop all toll road PPP projects outside of the regional transportation planning process. Is there a need to integrate the two? This separation would improve the benefits of the toll road PPP program but the toll roads will not be as well integrated with the regional transportation system. Toll road PPPs selected for construction may be used in place of better alternatives for the region since they will not be compared at the same time as would occur during RSTP.

Another possibility is to develop a hybrid system. The idea behind considering toll road PPPs outside of RSTP is to harness innovation benefits by providing a mechanism where toll road companies that make innovative proposals can receive benefits for their unique efforts. In this possibility, only toll road PPPs that are considered truly innovative will be accepted. They must clearly meet some need that cannot be met some other way or provide a significant advance in construction techniques or operational technology operation. Proposals that are not innovative will be rejected but may be considered again during the normal planning process. The HOT
lanes of California Route 91 would be considered innovative when they were proposed because no one had ever placed the concept into operation. The I-15 HOT lanes would not be since it was no longer innovative when proposed with the concept proved by California Route 91. The proposing company faces the risk that their proposal will be rejected, wasting the money and effort placed into the proposal. In principle, this will act as a quality control mechanism. The committee that selects projects should involve all of the relevant stakeholders so consensus can be reached that the project is innovative. Such proposals will also be evaluated against the existing regional transportation plan. How does it meet regional goals or perform on the performance measures?

This second possibility is the one that will be used in this chapter. For each step in the CLIOS process, how standard toll roads fit into the normal RSTP process will be investigated. For innovative toll roads, the results of the previous execution of RSTP will provide a road map for applying the CLIOS process to these single projects. The agency evaluating the toll road proposal will take the results and then consider the innovative toll road as if it were being done during the full RSTP process. The modifications needed to do this will be provided for each step.

The influence of the Enabling PPP Policy on the RSTP process is included for each step. While it mostly applies to toll road PPPs, it can also influence RSTP in general. This will strengthen the knowledge on how these two policies may interact in reality when the two CLIOS processes are separated.

5.2 The Representation Phase

5.2.1 Step 1: Describe System: Issue Checklist and Initial Goal Identification

The initial goal identification for RSTP should not change with the introduction of toll road PPPs; they are a means to an end, not ends unto themselves. The issue checklist may change, reflecting circumstances that would make the use of toll road PPPs a potential strategic alternative. Possible issues include:

- Growing automobile ownership rates
- Significant government transportation funding shortfalls
- Expanding freight sector requiring greater system reliability
- Desire for greater innovation in constructing and operating the transportation system

The following generic statement of goals for regional transportation planning was adapted by Sussman, Sgouridis, and Ward from Hall and Sussman: “A regional strategic transportation plan should ensure (i) an adequate, efficiently operated, robust, and secure transportation network based on (ii) a regulatory framework that in coordination aim to maximize total societal benefits within a sustainable framework.”

Enabling PPP Policy Effects

Issues that would cause a need for an Enabling PPP Policy will be present for most regions so some checklist issues will be shared. Initial regional goals should be created independently of the Enabling PPP Policy goals although there may be similarities in the results.
Innovative Toll Roads
For innovative toll roads, the planning agency should check how the proposed toll road PPP performs with respect to the initial goals identified and the issue checklist. This step will not act as a decision point since the full effect of the toll road PPP may not be apparent until placed in the greater system representation. It is more to get a quick idea on the existence of red flags that the toll road PPP will raise and that should be investigated in more detail later in the process.

5.2.2 Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere
Using the model from Dodder et al., the four subsystems are transportation, land use, environment, and economy. These subsystems are at Region B’s level rather than Nation A’s. They are not the same although many components may be shared.

The major actor groups are government, business, and citizen groups.

Enabling PPP Policy Effects
None

Innovative Toll Roads
There are no changes necessary for innovative toll roads.

5.2.3 Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram
The conventions used for the diagrams and matrices are the same as the previous chapter. These are based on diagrams developed for the Mexico City Metropolitan Area for a course at MIT by Tom Curry, Denis de Graeve, Jinyoung Kim, Kate Martin, Isabel Neto, and John Ward although they have been updated to represent a generic region and with better knowledge of how a regional transportation system works.
Table 5-1 – Generic PPP Project Deployment Transportation Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From ↓ / To -&gt;</th>
<th>GDP Per Capita</th>
<th>Travel Cost</th>
<th>Freight Use</th>
<th>Transportation Investment Policy</th>
<th>Mode Choice</th>
<th>System Operations</th>
<th>Transportation Infrastructure</th>
<th>Congestion</th>
<th>Regional Population Growth</th>
<th>Travel Time Reliability</th>
<th>Travel Time</th>
<th>Urban Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode Choice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Operations</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Infrastructure</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Population Growth</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Time Reliability</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Time</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Also in Economy Subsystem | X | X | X | X | Also in Land Use Subsystem | X | X | X | X | Also in Environment Subsystem | X | X |
Figure 5-1 – Generic PPP Project Deployment Transportation Subsystem Diagram
<table>
<thead>
<tr>
<th>From ↓ / To -&gt;</th>
<th>Freight Use</th>
<th>Worker Productivity</th>
<th>Innovation</th>
<th>Industrial Policy</th>
<th>Education</th>
<th>Air Quality</th>
<th>Environmental Policy</th>
<th>GDP Per Capita</th>
<th>Regional Economic Growth</th>
<th>Interest Rates</th>
<th>Exchange Rate</th>
<th>Employment</th>
<th>Private Sector Capital Investment</th>
<th>Regional Competitiveness Advantage</th>
<th>Congestion</th>
<th>Transportation Investment Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Use</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X X X X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Policy</td>
<td>X X</td>
<td></td>
<td>X</td>
<td></td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X X X X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Policy</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X X X X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Economic Growth</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X X X X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest Rates</td>
<td>X X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Sector Capital Investment</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Competitiveness Advantage</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X X</td>
<td></td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Also in Transportation Subsystem

Also in Land Use Subsystem

Also in Environment Subsystem
Figure 5-2 – Generic PPP Project Deployment Economy Subsystem Diagram
Table 5-3 – Generic PPP Project Deployment Land Use Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From ↓ / To →</th>
<th>Regional Population Growth</th>
<th>GDP Per Capita</th>
<th>Population Density</th>
<th>Residential Development</th>
<th>Employment</th>
<th>Urban Planning</th>
<th>Transportation Investment Policy</th>
<th>Industry Placement</th>
<th>Commercial Service Placement</th>
<th>Transportation Infrastructure</th>
<th>Congestion</th>
<th>Quality of Life</th>
<th>Freight Use</th>
<th>Regional Competitive Advantage</th>
<th>Environmental Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Population Growth</td>
<td>X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population Density</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry Placement</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Service Placement</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Infrastructure</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Use</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Competitive Advantage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Policy</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Also in Economy Subsystem | X X X | X X X | X X X | X X X |
Also in Transportation Subsystem | X X | X X | X X | X X |
Also in Environment Subsystem | X | X | X | X |

116
Figure 5-3 – Generic PPP Project Deployment Land Use Subsystem Diagram
Table 5-4 – Generic PPP Project Deployment Environment Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From ↓ / To -&gt;</th>
<th>Water Supply</th>
<th>Agriculture</th>
<th>Biodiversity</th>
<th>Air Quality</th>
<th>Innovation</th>
<th>Soil Erosion &amp; Deforestation</th>
<th>Quality of Life</th>
<th>Power Generation</th>
<th>Residential Development</th>
<th>Regional Economic Growth</th>
<th>Urbanization</th>
<th>Congestion</th>
<th>Inaccessible Settlement</th>
<th>Regional Population Growth</th>
<th>Environmental Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion &amp; Deforestation</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Generation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Economic Growth</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inaccessible Settlement</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Population Growth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Also in Economy Subsystem
Also in Transportation Subsystem
Also in Land Use Subsystem
Figure 5-4 – Generic PPP Project Deployment Environment Subsystem Diagram

Water Supply → Agriculture → Biodiversity

Air Quality → Innovation → Soil Erosion and Deforestation

Quality of Life → Power Generation → Residential Development

Congestion → Urbanization → Regional Economic Growth

Inaccessible Settlement → Regional Population Growth → Environmental Policy
Figure 5-5 – Generic PPP Project Deployment Institutional Map
We assume that Region B is a metropolitan region with a single core city and numerous suburbs. The city and suburbs have their own city councils, city executives, and transportation departments, all of whom may have different agendas. The generic term 'city executive' is used to denote the person in charge of the daily affairs of the government. Three common forms of city executives are the city manager hired by the council to perform daily management, an elected mayor who performs in the role of city manager as well as executes duties as a member of the city council, and a city council that retains strong authority over the daily affairs of the city.

While the planning agency has regional goals in mind, it must balance these with the political concerns of the cities and suburbs. Public transit organizations will also play a role in the RSTP process.

Nation A retains direct influence on Region B's activities beyond what the Enabling PPP Policy does. Nation A's transportation department will certainly have a role in the development of the regional highway system, especially in how it integrates with the nationwide highway system. There may not be an environmental protection department for Region B so the nation's agency would provide much of the oversight. The treasury department will be important for funding issues such as issuing bonds.

The same private business groups from Enabling PPP Policy will be represented at the regional level: concessionaires, financial lenders, shippers, and carriers. The roles do change as toll road PPPs are no longer the focus of the process. The impact of RSTP on shippers and carriers is more direct than with Enabling PPP Policy so it is expected that they would take a more active role, either directly or through organizations like a chamber of commerce.

Citizen groups are also the same as in the previous chapter: social advocates, environmental advocates, good government groups, and automobile associations like the AAA. A change may be that local organizations would be active at this level versus national organizations for Enabling PPP Policy.

**Enabling PPP Policy Effects**

The representation developed for Enabling PPP Policy can inform the development of the regional transportation system representation. Some components and relationships that exist at the national level may also exist at the regional level.

**Innovative Toll Roads**

The RSTP-developed representation would be used for evaluating innovative toll roads although there may be a desire to update it based on recent information. Updating the representation will take time and must be done carefully. Without a clear reason for a change, it is not worth the effort to make minor process changes for one project.
5.2.4 Step 4A: Describe Components on the Physical Domain and Organizations on the Institutional Sphere

Policy levers are denoted with a bold font in Table 5-1, Table 5-2, Table 5-3, and Table 5-4. While some may have the same names as policy levers for Nation A, they have a different scope. Environmental Policy for Nation A encompasses setting general policy and mandating standards. Region B’s Environmental Policy will encompass how to best meet those standards given the alternatives that the Nation A’s policies and laws give it. Region B’s transportation investment policy is focused on regional needs while Nation A’s considers national needs, although there will be an overlap.

Shared components between subsystems, called common drivers, are indicated in the bottom three rows of the tables where an X indicates that the component appears in the particular subsystem.

Enabling PPP Policy Effects
The system representation developed for Enabling PPP Policy will continue to serve as a source of information for the regional transportation system representation.

Innovative Toll Roads
There may be mild updates since organizations may reorganize themselves or new laws passed. A refresh may be warranted but only for significant changes.

5.2.5 Step 4B: Describe Links Among Components and Organizations

Given the use of a generic region and subsequent lack of quantitative data, link description will not be performed in depth. This section will briefly touch on the links expected to be most important. Class 1 links, by subsystem, will be covered first and followed by Classes 2 and 3.

Class 1 Links
Transportation Subsystem
This subsystem seeks to represent how components affect the level-of-service for transportation consumers. Since the nation does not run the day-to-day operations or, at least in this scenario, plan the entire transportation infrastructure, it does not deal as directly with the consumer so their concerns will not be as important. The direct connection between transportation decisions and consumers will cause the consumers’ concerns about level-of-service to be elevated in the regional system representation. Level-of-service is represented by travel cost, travel time, and travel time reliability. Other variables may include comfort, convenience, etc.

Two of the important drivers for the level-of-service measures are system operations and congestion. Higher congestion will lead to increased travel times and lower reliability. As the system is operated closer to its capacity, incidents will be more disruptive, causing lower reliability. System operations will reduce congestion and the impact of incidents. Common methods are signal timing, traveler information, ramp metering, and organizational coordination. Another way this can be done via operations is through congestion pricing, if this is available for certain roads. System operations and congestion operate on short time scales. Operations is real-time and each day is different from the operator’s perspective. Congestion is also variable throughout the day.
The transportation investment policy will drive the level-of-service but it operates on a much longer timeframe. High travel times and low reliability over several years will lead to proposals to relieve congestion. It will take some time to agree to a specific solution and if it is major infrastructure like a road or rail system, it may take several years to build.

Travel cost will influence traveler decision-making. As costs increase, people may choose other routes, shift to other modes, take fewer trips, or move closer to the places they want to go. These options are in order of the timeframe for travel cost's influence on the action, from shortest to longest. Freight shippers and carriers will also adjust their activities to changing travel costs. Travel costs will play a role in transportation investment decisions. Politicians and planners will face pressure to lower costs for the consumer while also finding a source of transportation funding. The timeframe of influence for travel cost on transportation investment decisions is much longer than traveler decision-making, taking years.

Travel time and travel time reliability will affect mode choice and future transportation investments. Travelers and shippers prefer low, reliable travel times, all else equal. Reducing travel time and increasing reliability is also a potent political issue as many voters wish for congestion relief.

Mode choice feeds back into the system by driving the level of congestion, especially from day-to-day where travel and living patterns are about the same. Congestion will then affect operations, travel time, reliability, and maybe even costs if value pricing is allowed.

**Economy Subsystem**

While there are some similarities between this subsystem and the economy subsystem for Enabling PPP Policy, a key difference is the lack of control over interest and exchange rates. Region B has to take this as a given from Nation A when creating its regional transportation plan. For example, Nation A will have the power to grant tax-exempt status to bonds, reducing the interest rate those bonds need to provide. This might be done if lower tolls are desirable and toll revenues are more spread out through time since needed bonds could be issued at lower interest rates. Region B cannot make this choice. If the bonds are not tax-exempt and Region B desires a certain toll, it will have to make tradeoffs elsewhere.

An important concept at the regional level is that of a regional competitive advantage, which is a foundation for regional economic growth. Some ways to achieve this advantage are by improving freight and worker productivity, encouraging innovation, and making the region a desirable place to live for workers through measures like environmental protection. These influences are slow-moving, taking place over a period of years.

**Land Use Subsystem**

Transportation and land use are intimately linked. Choices made during the urban planning process will drive the spatial layout of the region as well as mobility and accessibility. To meet these needs, transportation investment choices will be made with some alternatives more viable than others based on land use. Planning for high density development without an accompanying transit system is as poor an idea as planning for low density development with a light rail line.
Urban planning will react in part to the transportation system in place. If there is not enough transportation capacity to support the expected travel patterns of a proposed development scheme, decision-makers will need greater persuasion to support the plan. Future land use is also a function of current land use. People living in low density housing may object to higher density residential development or industrial development near them. Manufacturing plants will be hesitant to support nearby residential development. The author was in a meeting where one manufacturer did not want housing nearby because they had late night operations, including deliveries by rail. The fear was that the new tenants would object to the noise and force the manufacturer to change how it operates, placing it at a competitive disadvantage despite having been at that location long before the residents.

The interactions occur over long periods of time and are slow in their action. For instance, transit-oriented development (TOD) will require several years to have plans approved, buildings constructed, and the appropriate transit support in place at just a few stations. A larger effect on land use will take decades as people consider the desirability of existing TOD and either want more of it, leading to a further wait for construction, or try to prevent it, requiring years before the developments are replaced with new land use and buildings.

Environment Subsystem
The transportation system has a strong impact on the environment. In 2003 in the United States, highway vehicles contributed to 28% of volatile organic compounds (VOCs), 36% of nitrous oxides (NOX), and 55% of carbon monoxide (CO) emissions. Air quality is also affected by other sources. Power plants are a major source of emissions. Industrial emissions can also be significant and as the economy grows, all else equal, industrial emissions will increase along with production.

Innovative technology and environmental policy are useful tools in reducing air pollution. According to the EPA, several major pollutants such as VOCs, NOX, and CO have dropped by around 50% since 1970 with lead pollution a mere 1.5% of what it once was. Some of this drop is due to new technology like the catalytic converter or various pollution control equipment at fixed site pollution sources. Environmental policy has also contributed to emissions reductions with some of the policies being technology-forcing requirements. A key policy was the elimination of leaded gasoline. According to the EPA, vehicles produced 172 of the 221 thousand tons of lead pollution in 1970 but in 1998, vehicles produced 0.2 out of 4 thousand tons with the EPA reporting 0 tons from vehicles the following year.

Air quality in turn drives the quality of life in an area. High pollution will lead to health issues, lower worker productivity, and less desirability to live in an area for people who have a choice of places to live. This may lead to changes in environmental policy as the government searches for ways to please the people and improve the region’s competitiveness.

---

6 From the Environmental Protection Agency’s Air Emissions Trends spreadsheet at http://www.epa.gov/airtrends/pdfs/detailedtable.xls, last accessed 26 April 2005
Regional environmental policies are expected to have a much lower impact than the national environmental policy. Many environmental policy decisions are made at the national level. The key levers at the regional level are approving or denying permission to build somewhere. The region could also use behavior-modifying policies such as not permitting driving on certain days.

The interactions could happen relatively quickly and have long lasting effects. Some regulations could be the addition of a pollution control technology to a vehicle which will take several years for the majority of effects to be felt due to fleet turnover. Other regulations could be quicker such as gas formulation requirements. The effects on human health could be long lasting and it may take years for them to show up but severe pollution will have immediate effects on vulnerable populations like the young and the elderly.

Class 2 Links
Class 2 links, also called projections, from the institutional sphere to the physical system are concentrated on the policy levers available to the institutions, as shown in the upper right of Table 5-5. An important thing to note is that due to the fragmented nature of the regional institutional environment, there may be numerous similar policy levers. In Table 5-5, only one transportation investment policy component is listed which is affected by numerous organizations. In reality, one city will invest in its own transportation system while another city creates its investment priorities with a degree of independence from the first city. The policy levers are not completely independent, though. The regional transportation planning agency will attempt to coordinate all the priorities and plans throughout the region so that regional as well as local goals are met.

Elected officials will be affected by components in the system through the voting process. If a city’s economy is growing strongly and the quality of life is good, the mayor and city council will likely be reelected. Government departments could also be affected by the actions of the physical system. The shift in focus to transportation operations can be seen as an organizational response to constraints imposed by the physical transportation system. Businesses and citizen groups will change their behavior as the physical system changes. These Class 2 links are summarized in the bottom area of Table 5-5.
Table 5-5 - PPP Project Deployment Class 2 and Class 3 Links

<table>
<thead>
<tr>
<th>From</th>
<th>Core City Executive</th>
<th>Core City Council</th>
<th>Core City Transportation Department</th>
<th>Suburb Executives</th>
<th>Suburb Transportation Departments</th>
<th>Regional Council of Governments</th>
<th>Regional Transportation Planning Agency</th>
<th>Environmental Protection Department</th>
<th>National Department of Transportation</th>
<th>Treasury Department</th>
<th>Public Transit Operators</th>
<th>Concessionaires</th>
<th>Financial Lenders</th>
<th>Shippers</th>
<th>Carriers</th>
<th>Social Advocates</th>
<th>Environmental Advocates</th>
<th>Good Government Groups</th>
<th>Automobile Associations</th>
<th>GDP Per Capita</th>
<th>Congestion</th>
<th>Air Quality</th>
<th>Regional Economic Growth</th>
<th>Employment</th>
<th>Quality of Life</th>
<th>Urban Planning</th>
<th>Travel Cost</th>
<th>Travel Time</th>
<th>Travel Time Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core City Executive</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core City Council</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core City Transportation Department</td>
<td>X X X</td>
<td>X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburb Executives</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburb Transportation Departments</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Council of Governments</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Transportation Planning Agency</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Protection Department</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Department of Transportation</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treasury Department</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Transit Operators</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concessionaires</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Lenders</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shippers</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carriers</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Advocates</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Advocates</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good Government Groups</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automobile Associations</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Economic Growth</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td>X X X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Time</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Time Reliability</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class 3 Links
The Class 3 Links shown in the center area of Table 5-5 include formal links, like those between the city executive and city departments, and informal links such as between departments of transportation for two cities where a formal coordination agreement may not exist. While some relationships exist through regional agencies, there may be direct links between two cities in the region through bilateral agreements.

Enabling PPP Policy Effects
The system representation developed for Enabling PPP Policy may inform the regional transportation system representation. Similar component relationships may exist at both levels.

126
Innovative Toll Roads
These link descriptions as developed during RSTP will be used during the innovative toll road approval process. It could be updated if there is a clear reason to believe that the representation is wrong.

5.2.6 Step 5: Seek Insights About System Behavior
Like with Enabling PPP Policy, the questions used in Dodder et al. will provide the basis for this section (Dodder et al., 16). These should not be the only questions considered when RSTP is performed but they provide a solid base.

Class 1 Links
Are there strong interactions within or between subsystems?
Transportation and land use subsystems have many strong interactions. A region’s spatial layout will drive the need for transportation services. Existing travel patterns will also affect the decisions for land use since planners will need strong justification to approve a residential or industrial development if the transportation system cannot support it.

The transportation system also has significant impacts on the environment, especially air quality, as discussed earlier.

Transportation and land use interact with the economy but perhaps not as strongly as the other interactions. As people become wealthier, they want larger homes which can lead to low density land uses. Automobile use also increases with wealth, often with a mode shift from transit to car as people are now able to afford it. With increasing wealth, people can afford to drive more often and on longer trips. Some of the wealth increase will be spent on travel comfort rather than these other items. A person may buy a car with technological features to make current trips more comfortable or safer.

Are there chains of links with fast-moving, high-influence interactions?
The interactions between system operations and travel time, travel time reliability, travel cost, and congestion overall are fast-moving, occurring in the span of minutes.

For the economy subsystem, interest and exchange rates can have a relatively quick impact on regional economic growth. It could take a few days or weeks to go from a stable economy to one in serious financial trouble, as was seen with the Asian financial crisis in 1997.

There are no fast-moving interactions in the land use or environment subsystems. These interactions take years.

Are some of the paths of links non-linear and/or irreversible in their impact?
There are nonlinearities in the relationship between volume, as represented here by congestion, and two of the level-of-service components: travel time and travel time reliability. This relationship is described as the "hockey stick" phenomenon (Sussman, 2000, 67).

There are a few environmental effects that are irreversible or very difficult to repair. A reduction in biodiversity through extinction is irreversible. Some health effects that impact worker
productivity are irreversible while others may be very expensive to fix. The impacts from soil erosion and deforestation are difficult to reverse. The habitat will never be quite the same even if a project is undertaken to restore the area.

Innovation impacts could be nonlinear. Using patents as a proxy for innovation, a 10% increase in patents in a particular research area could allow it to leapfrog other regions into becoming a leader in the field.

Land use operates on such a slow scale that it is difficult to determine if a link is irreversible or just has a long timeframe of action. Building a freeway is irreversible for most practical purposes. Changing zoning is not as irreversible. It is much easier to incrementally change zoning than the alignment of a road but it may still take years or decades for a significant effect.

Can strong positive or negative feedback loops be identified?

System operations operates in a negative feedback loop with congestion. As congestion increases, operators will take more active measures to reduce the effects of congestion. Even active measures may not move the system towards a stable equilibrium (although complete gridlock may be considered a stable yet undesirable state) but they will reduce the severity of conditions.

In a subset of operations, stability could be reached in part of the system through negative feedback mechanisms like congestion pricing. One of the goals of HOT lanes is to set a price that supports high flow and high revenue. If there are too many vehicles in the lanes, prices increase in response until the desired flow is reached. Pricing only covers part of the system and vehicles priced off the lanes have to go somewhere which will degrade performance on that part of the system.

In the economic subsystem, there is a positive feedback loop between regional economic growth and regional competitive advantage. As a greater advantage is nurtured, the economy will grow. The growth will permit greater investment in education, infrastructure, and other items that can further increase the region’s competitive advantage.

The land use subsystem has a positive feedback loop between urban planning and transportation planning. Developing low density land use provides an advantage to automobiles versus other forms of transportation. As more people want to drive, high density land use becomes more difficult to sustain. People will move farther from the core city, causing further low density land use. In practice, this loop is asymmetric. Increasing the amount of mass transit or making non-motorized travel more pleasant may have little influence on increasing the amount of high density land use. Unilaterally increasing high density land use may lead to greater transit service to that area but it may not encourage further high density land development elsewhere.

Class 2 Links

Are they pushing the system in the same direction, or is there competition among organizations in the direction of influence?

There is certainly competition between business interests and those of the social and environmental advocates. Businesses want to maximize profits which may involve high tolls and
low cost construction for concessionaires and frequent shipment operations like JIT manufacturing for shippers and carriers. Social and environmental advocates will want to reduce impacts in their respective spheres which results in stringent design standards or more locally-friendly business operations.

Even within the major actor groups there will be differences. Among the business actors, shippers and carriers will want low tolls while concessionaires want tolls that maximize revenues. For citizen groups, the social and environmental advocates may diverge over tolls. Social advocates will want low tolls for low income groups. Environmental advocates would prefer higher tolls if the expected environmental damage would be lower.

The core city and suburbs will often push in different directions. Low-density suburbs dependent on the automobile will want low cost roads while the core city will prefer relatively greater investment in public transit, as would public transit agencies. Both will push for transportation solutions to meet local needs while the regional transportation planning agency will promote regional solutions that may help some municipalities more than others.

The interactions between the government and the business and citizen groups will depend on the political power of those groups. For example, an area may have a populace with greater concerns over the environment which will be reflected in the actions of elected officials. Even if there are similar goals between the government and a particular actor, there may still be some competition as the business or citizen groups advocate for an even more favorable policy than even elected officials are comfortable with.

Are there organizations on the institutional sphere that have an influence on many components within the physical system?
The city and suburban governments both influence several components. Like at the national level, the timeframes of influence are different between the branches of government. Actions by the executive can be accomplished faster than the council due to its direct oversight of city departments. A regional council of governments is expected to act even more slowly than the city and suburb councils and its powers are often relatively weak.

Environmental advocates will try to influence an array of components but often they only have mild influence overall.

Class 3 Links
Are the relationships between organizations characterized by conflict or cooperation?
The relationship between the core city and the suburbs is characterized by both. The municipalities will compete for resources, especially transportation funding. They will not agree to policies that are viewed as bad for their constituents. Cooperation is possible if all parties can win but even then there are problems. Some municipalities will think they are not receiving their share of the benefits and will be uncooperative until a compromise is reached. Cooperation may also be possible for deals with higher levels of government and needs to present a unified front.
Business groups and citizen groups are often in conflict. Social and environmental advocates will want significant consideration of their needs while concessionaires will think that this will add to their costs and projected tolls, which could have a negative effect on profit.

*Are there any high-influence interactions, or particularly strong organizations that have direct impacts on many other organizations within the institutional sphere?*

In the regional case, there are no high-influence interactions that span many organizations. There are many fiefdoms within the region and the regional agencies do not typically have strong powers over the municipalities, Portland, Oregon being one exception. While the core city will be the most important in the region, it is also expected to have limited influence over the suburbs. Residents of the suburbs may have chosen to live there due to the lifestyle and will not elect city councils who sacrifice their interests for those of the core city.

*What is the hierarchical structure of the institutional sphere, and are there strong command and control relations among the organizations?*

Again, there are no strong command and control relations between cities in the region; they are equals in a sense. A suburb may be dependent on a core city for its economic livelihood but there is no requirement to do what the core city wants.

There is a hierarchical relationship between a city’s executive and its transportation department. There is some variability in the relationship between the city council and the city executive. These relationships are duplicated in the suburbs. In a city manager system, the manager would report to the council and can be fired by the council while a system with a strong mayor will display less of a command and control relationship between council and executive. The mayor will have to follow the policies approved by the council but the council cannot fire the mayor if there are disagreements.

There are no other strong command and control relations among the organizations. There are coordinating relationships, such as those between the regional transportation planning agency and local transportation departments. There are also regulatory relationships that will exist such as between the regional transportation planning agency and concessionaires.

*Are there any links between organizations that act via a physical system (e.g. an organization has a projection to a physical component and this physical component has an impact on another organization)?*

The development of the regional transportation system by the regional transportation planning agency and local departments of transportation will affect elections. New transportation facilities are often a plank in a candidate’s platform. The agencies’ plan will also affect shippers and carriers. A decision to increase tolls along a major freight corridor will hurt those carriers who are operating on razor-thin profits and who cannot pass the additional costs on to the shipper. Some costs will be borne by the shipper which may exceed the benefits received by the tolled infrastructure.
Enabling PPP Policy Effects
Interactions between the national economy and the nationwide transportation system may have some effect on regional transportation that should also be considered. Like earlier steps, the results of this step in the development of Enabling PPP Policy would shed light on RSTP.

Innovative Toll Roads
The insights gained from the RSTP process plus any new ones from the operation of existing toll roads can be used to better understand the impact of the proposed toll road on the system.

5.3 Stage 2: Design, Selection, and Evaluation

5.3.1 Step 6: Identify Performance Measures and Refine System Goals, and Build Quantitative Model
The following performance measures have been identified that are relevant to each subsystem:

- GDP Per Capita
- Travel Cost
- Travel Time
- Travel Time Reliability
- Congestion
- Worker Productivity
- Air Quality
- Regional Economic Growth
- Employment
- Quality of Life

To echo Dodder et al., stakeholders will view performance differently, a phenomenon known as evaluative complexity. Groups will differ in the importance they give different measures even if they agree that all the measures are valid. They can also disagree about what constitutes good performance on each measure. An environmental group will place great weight on air quality performance and if it requires much higher tolls, so be it. The concessionaire may view good air quality performance as a desirable goal but if the higher tolls lead to lower revenue due to high price elasticity, the concessionaire will pollute.

The original goals are:
"A regional strategic transportation plan should ensure (i) an adequate, efficiently operated, robust, and secure transportation network based on (ii) a regulatory framework that in coordination aim to maximize total societal benefits within a sustainable framework."

The performance measures can be matched up with the goals in the statement:

- Adequate
  - Travel Time
  - Travel Cost
- Efficiently operated
  - Travel Time
  - Travel Time Reliability
- Robust
  - Travel Time Reliability
- Secure
  - Travel Time Reliability
- Societal Benefit Maximization
  - GDP Per Capita
  - Regional Economic Growth
  - Worker Productivity
  - Employment
  - Quality of Life
- Sustainability
  - Air Quality
  - Employment
  - Quality of Life

For some goals, the performance measure weakly supports the goal. Security is probably the one in the greatest need of updating. A measure based on travel time reliability could be used as a measure of security in the sense that the network could bounce back from an attack but this applies to robustness, as well, and does not capture all of the parts of security. Social benefit maximization and sustainability could also use more refined measures. This could indicate a need to refine the system representation, the goals, or the performance measures.

The performance measures provide the benefit of enabling stakeholders to understand their goals better. The goal statement leaves it quite open as to what an ‘adequate’ transportation network would be. A more refined goal can be created using the performance measures where an adequate network is one that provides travelers with a desired level of service in terms of travel time and cost.

**Enabling PPP Policy Effects**

Enabling PPP Policy should have no effect on regional performance measures and goals. The goals for the nationwide toll road PPP program are separate from those of a regional transportation system.

**Innovative Toll Roads**

These goals and measures would be used in the innovative toll road approval process with no change.

**5.3.2 Step 7: Identify and Design Strategic Alternatives for Performance Improvements**

While numerous alternatives can be identified for RSTP in general, the focus for this chapter is on the alternatives applicable to toll road PPPs. A strategic alternative can be built up from the choices available for different toll road attributes. These attributes include physical design, operational, and financial attributes. The availability of these attributes will be shaped by Enabling PPP Policy.
Physical Design
Not all toll road PPPs have the same physical design. There are several design choices available to the planner. First, the whole road does not need to be tolled. Alternatives could be used where only a few lanes are tolled, like the HOT lanes of California Route 91. This alternative is most useful for adding capacity to an existing road but perhaps it could be part of a larger package with the tolls paying for a portion of the free lanes. Another alternative is the tolling technology used. Toronto’s 407 ETR does not have toll booths but instead relies on video cameras and ETC to capture the vehicles using its roads. This will reduce the amount of land needed for toll plazas or complicated interchanges.

Operation
A few alternatives are available in how the toll road is operated. Congestion charging is one way to promote more efficient road use but in private sector hands, there may be the perception that the concessionaire is taking advantage of its monopoly position. Even if congestion charging is approved, there are additional alternatives; an example is the choice of a maximum toll that can be charged in the presence of congestion or just allowing the toll to go as high as needed to have the desired effect.

The transportation system must be operated as an integrated network to maximize efficiency so the level of integration of the toll road PPP with the operations of the full network needs to be addressed. One possibility is that the toll road PPP is operated separately from the rest of the network. Another possibility is that the toll road PPP shares its data with other agencies but it retains the power to make decisions on how to operate the toll road. A third possibility is to hand over operational decisions to the government. Given the impact on revenue, the possibility option would be difficult to achieve.

Support from public safety agencies could also be a possibility when identifying alternatives. The government could leave the responsibility for incident management and safety enforcement to the concessionaire or it could perform the services itself. The choice in this possibility can be dependent on who operates the road. If the concessionaire has complete control over operational decisions, it could be in both parties’ interests to have the concessionaire handle these tasks. The concessionaire’s revenues rely on efficient operation and that efficiency will depend in part on the ability to reduce non-recurring congestion.

One possibility is that if the government is performing these tasks, it may be performing them below a level that maximizes profit; the concessionaire will be interested in having them done better. In this case, the concessionaire should perform the tasks to achieve maximum profit.

Another possibility is that the government is providing a very effective service that the concessionaire does not have to pay for. The concessionaire may then try to more aggressively operate the road since it will be the government that bears a disproportionate share of the burden. In this case, the government should not perform the tasks since it is bearing the brunt of the cost but few of the benefits.

133
Finance

Financial possibilities are available for strategic alternatives. Some possibilities will be related to how the toll road PPP financially supports itself while others may be financial support from the government to ensure that the toll road PPP is built.

A toll road PPP ideally supports itself from tolls but traffic projections may not show enough traffic to generate the needed revenue. An additional source of revenue is land development. This may be in the form of service areas along the toll road where travelers can stop for food and gas or it may be in larger chunks of real estate for development. The government may also consider this alternative even if traffic projections are sufficient so tolls could be reduced to a more politically desirable level. Right-of-way along the road could be leased by the concessionaire to utilities to run their lines down as well.

The government has the option of providing direct financial support. This is useful if there are considerable risks that the financial industry is hesitant about but the government is willing to take on for the project or if the government wants to meet other goals beyond capacity provision. These goals may include mitigating environmental damage or having a toll more acceptable to low income groups. Low interest loans, loan guarantees, exchange rate risk assumption, and minimum traffic guarantees are a few forms of support that can be extended to the concessionaire.

Another set of alternatives deals with the contract structure. The government could use a fixed concession period with concessionaires bidding on the toll. The government could fix the toll with the selection criteria being shortest concession period. Another alternative is for concessionaires to bid on the least present value they would accept to build it. A toll is agreed to and the concession period will change depending on the traffic conditions. High traffic will lead to a shorter concession period while low traffic will lengthen it.

Toll road PPPs have flexibility about when they can be built, from the government’s perspective. For a government-built road, funding needs to be found through the budgeting process and a variety of design and construction competitions held. It may be some time before ground is broken. The private sector can obtain funding more quickly for a toll road PPP, which also creates incentives to complete design and construction quickly. This should allow a road to be opened sooner and gives the public sector flexibility on when the road should open.

These choices can be gathered up and a variety of strategic alternatives constructed from them. These should provide a guide for step 10 in selecting alternatives for a robust bundle. This does not mean that the choices on the alternative are fixed for all time. Maybe the originally designed alternative has no congestion charging but the government would provide some land for real estate development. Later in the process, it may be learned that congestion charging may result in greater support of transportation goals or has greater public support than the real estate development. In such a case, the alternative can be changed.

A danger in developing the strategic alternative is overspecifying it. Cost savings can be created by giving concessionaires some flexibility in their designs. Too detailed specifications may end up making the later competition for the concession pointless since either all proposals will be
about the same or the specification favors one particular concessionaire with little room for other concessionaires to compete. Not every choice needs to be made in developing the alternative but enough choices should be made so that multiple alternatives do have meaningful differences for the evaluation in step 9.

**Enabling PPP Policy Effects**
The Enabling PPP Policy has a significant effect on this step. A major portion of the policy was to define the alternatives available for PPP Project Deployment and even the combinations they may be used in if desired. This defines a good fraction of the universe of available strategic alternatives with regard to toll road PPPs.

**Innovative Toll Roads**
Since the innovative toll road is proposed by the private sector, the alternatives are very limited. The two basic alternatives are to accept or to reject the proposal. There may be some flexibility such as approving the proposal if the concessionaire agrees to some changes that do not affect the core design.

### 5.3.3 Step 8: Flag Important Areas of Uncertainty

The comments about data uncertainty from the Enabling PPP Policy discussion in Section 4.3.3 apply here as well. A key part of deploying a toll road PPP is the future traffic uncertainty and this task is notoriously difficult since even with high quality data, forecasting is a difficult task.

In regards to the system representation, keep in mind that it would ideally developed by people with varied backgrounds rather than one graduate student basing it on group work done for a class. The author’s own opinion on the subsystem representation uncertainty, going from least uncertain to most uncertain, are: transportation, land use, economy, environment.

One uncertainty in the transportation subsystem that has effects throughout the whole system is how transportation problems are perceived. In this representation, congestion is the prism through which problems are seen. The system user may hold the opinion that bumper-to-bumper traffic is leading to a long commute which the user would like to reduce. The transportation professional will deconstruct congestion, considering travel time, travel cost, and travel time reliability among other measures of system performance and develop appropriate measures. Politicians may straddle these two views, having a better idea of how congestion interacts with the rest of the transportation system but not a more comprehensive understanding like the transportation professional. Their recommendations may still be oriented towards reducing congestion but with a greater understanding of what congestion reduction entails.

This representation could be wrong. Users may have a deeper view of the transportation system than that. Targeting alternatives to improve performance on a specific measure may be understood by the public at a level deeper than expected. Alternatives to improve travel time reliability may fall into this category.

These are both simplifications, though. Some of the population will have a greater understanding of how the transportation system works than others. Developing both these
concepts in one representation would require extreme care since the complexity can quickly expand beyond the analyst’s ability to comprehend it.

**Enabling PPP Policy Effects**
The specific uncertainties (not just the general categories) encountered in Step 8 of the Enabling PPP Policy in Section 4.3.3 may be applicable here.

**Innovative Toll Roads**
This step would remain unchanged for innovative toll road proposals unless more is known about the uncertainty.

### 5.3.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties

In choosing strategic alternatives, ones that best support the region’s goals in a robust manner should be selected. If a dense urban area is best served by a mass transit rail line, then that is what the region should try to build, not a highway just because someone else will be paying for it. Of course finances do play an important role in decision making and if the funding for a mass transit line is not in the cards for the next several decades, perhaps a toll road PPP could contribute with some support for bus rapid transit.

While general principles could be developed for Enabling PPP Policy, choosing strategic alternatives is far more specific to the region and there are no recommendations on choices for alternatives beyond the advice given in the previous paragraph.

**Enabling PPP Policy Effects**
Evaluation criteria or alternatives that must be considered in comparison with the potential toll road PPP could be required by Enabling PPP Policy. The Enabling PPP Policy may require that a no-build scenario be considered along with the toll road PPP. For RSTP, this may result in the planning agency developing a robust bundle and if it has a toll road PPP, it must then evaluate the same robust bundle with the toll road PPP removed.

**Innovative Toll Roads**
Innovative toll roads would be evaluated just like any other strategic alternative, with the difference being that it is evaluated by itself rather than formally against other alternatives. If the outcome supports the regional goals and there are no glaring problems or readily apparent superior alternatives and its innovative nature has been established, then the proposal should be approved.

### 5.4 Stage 3: Implementation

In RSTP, stage 3 includes the development of the regional infrastructure network, regional planning architecture, and regional operating architecture. These plans are developed in coordination with each other. Toll road PPPs are expected to be included in this part as a strategic alternative. With the plans completed, they are then implemented. This section of the chapter focuses on implementation of toll road PPPs where there is the greatest need for clarification. This concept is show in Figure 5-6 where the ‘Implement’ half of step 10 for RSTP is expanded into strategy design and implementation for PPP Project Deployment.
5.4.1 Step 10: Design Strategies for Implementation in the Physical Domain and Implement

For toll road PPPs, this step in RSTP consists of several PPP Project Deployment steps from making a request for proposals to placing it in operation. Enabling PPP Policy has a major impact on this step as it may place several procedural requirements on PPP Project Deployment. What will be focused on in this step is the procedure for designing the implementation strategy for the physical design and implementing it. The development of the strategic alternative will provide the general scope of the PPP which will be refined in this step.

In Step 9, the toll road PPP was chosen as a strategic alternative in a robust bundle. Several more hurdles have to be passed to implement it. The bid process must be developed. This includes deciding if it will be an open bid or if a specific concessionaire will be used. If there is a competition, selection criteria must be chosen.

With a concessionaire selected, the concession agreement must be negotiated. This agreement may include greater design specifications than those in the bid. Tolls, concession periods, and financial support will all be considered during this negotiation.

An environmental approval process may be an important part of the process. The strategy for implementation will include when and how the process is carried out. There may be a regional or national requirement to be met before the project is put for bid or there may be requirements to be met after the concession award but before construction starts.
The toll road PPP design will have major impacts on portions of the public. Residents adjacent to the road will be subjected to air and noise pollution. Travelers may have a new, more convenient road but it will cost them more than a free road. Businesses could benefit from improved travel times and travel time reliability but it will come at a cost which they will want to minimize. These stakeholders should be an integral part of the implementation process but the planning agency will need to devise how best to integrate them.

**Enabling PPP Policy Effects**

The most important effects of Enabling PPP Policy on PPP Project Deployment may be on its requirements for this step. It may require a certain level of public involvement, specify the environmental approval process, require open competition, and mandate transparency measures. These will have significant impacts on the eventual PPP Project Deployment. In some cases such as high environmental standards with a strong approval process, the toll road PPP project could even be prevented from ever moving forward.

**Innovative Toll Roads**

The process for evaluating and deploying innovative toll roads would follow the same procedures as above.

5.4.2 **Step 11: Design Strategies for Implementation in the Institutional Sphere and Implement**

Part of this is driven by the Enabling PPP Policy and the other part through concession agreement negotiations. Since the Enabling PPP Policy will be discussed shortly, implementation through concession agreement negotiations will be the focus here.

In the absence of guidance from Enabling PPP Policy, which has the potential to be quite influential, there are several institutional relationships that have to be defined. These include:

- Who handles concession agreement negotiations? The regional transportation planning agency could or it may be a state or national agency.
- Who is responsible for construction inspections? The regional transportation planning agency may do this if they have the capabilities or it could hire an independent contractor for these duties. The municipalities could inspect the sections running through their areas. The national transportation department could also perform this task.
- What is the relationship between the government and concessionaire for operations and maintenance? How does the concessionaire interact with other transportation system operators? The coordination could run the spectrum of the concession being handled solely by the concessionaire and completely independent of the operations for the rest of the system to fully integrated with the operations for the rest of the system with the toll road under government control. This last option is probably the least likely since effective operation of the road, not necessarily the system, will increase the concessionaire’s profits. Government operation will have the system in mind, not the concessionaire’s interests. A complex operating agreement would result, complicating system operation. An information sharing agreement may be more realistic. The government can use the concessionaire’s information to operate its part of the system better while the concessionaires can use the traffic information to better predict what
future traffic conditions will be and adjust its own operations. Simulations would be needed to determine if this is better than independent operation.

- Who resolves disputes between the government and the concessionaire? Resolution dispute could be done through an independent arbitrator agreed to by the parties, a national agency could resolve disputes, or the legal system may be used. Some combination could also be created with certain disputes resolved through arbitration and others through the courts.

The regional transportation planning agency should consider a consistent standard for the government-concessionaire relationship for all toll road PPPs in its jurisdiction. This should speed up concession agreement negotiations and toll road companies can use this information in developing their proposals to more accurately predict revenue and costs. This standard could be developed as part of the regional planning architecture and regional operating architecture part of RSTP.

**Enabling PPP Policy Effects**

The Enabling PPP Policy could designate certain agencies as responsible for different things during PPP Project Deployment. For example, the national transportation department may have the legal responsibility to oversee construction and maintenance matters as a result of the Enabling PPP Policy.

The most important responsibility is with the concession agreement negotiations. During the Enabling PPP Policy CLIOS process, it may be determined that the regions do not have the resources to undertake effective concession agreement negotiations and that this responsibility should be vested with a national agency. This will complicate RSTP since the regional planning agency would create a strategic alternative then have to work with the national agency to bring it to fruition.

**Innovative Toll Roads**

This step is the same for both innovative toll roads and standard toll roads.

5.4.3 **Step 12: Post-implementation Evaluation and Modification**

The regional transportation planning agency will evaluate the performance of toll road PPPs in the region to improve their system representation and modify the process. It may turn out that travelers are more sensitive about price than expected, which may lead to longer concession periods with lower tolls. A result could also be that people do not mind toll roads as much as expected and that more can be built without much public ire, resulting in a more aggressive use of toll road PPPs as strategic alternatives.

**Enabling PPP Policy Effects**

The Enabling PPP Policy could require the region to report toll road PPP results to the nation.

**Innovative Toll Roads**

The results from innovative toll roads would be rolled into the normal step 12 for the rest of the process.
5.5 Conclusion

This chapter has explored how toll road PPPs fit into the regional strategic transportation planning process. The PPP Project Deployment process for a generic region in conjunction with Enabling PPP Policy does not provide all the answers but it helps the analyst identify what questions need to be asked and when. Important in this process is how the Enabling PPP Policy from the previous chapter affects the RSTP process in general and the development of toll road PPP strategic alternatives specifically. Toll roads with significant innovation where special rights are desirable are separated from the RSTP process and can be considered at any time but they will rely on the goals, representations, and performance measures developed during RSTP.

With a generic process developed for toll road PPPs, from general government policies to the deployment of a project, we can proceed to its application to a specific area. In this case it is Malaysia which has an extensive toll road PPP program. Before the CLIOS process can be applied to Malaysia Enabling PPP Policy and PPP Project Deployment process, the current state of toll road PPPs in Malaysia will be investigated. What are its strengths and weaknesses and what institutional issues exist? Who are the stakeholders and how do they interact? With answers to these questions provided in Chapter 6 and a better idea of the Malaysian institutional interests, the CLIOS process can be applied in a manner that would better reflect reality.
6 The Toll Road PPP Program in Malaysia

6.1 Introduction
Is there a need to apply the CLIOS process to the Malaysian toll road PPP program? At the end of this chapter, it should be clear that there are several weaknesses in the Malaysia PPP program and that something should be done to improve the effectiveness of the program. Transparency in the program is poor and public involvement is practically nil, leading to protests over toll rate increases and accusations that the program is fraught with cronyism. The program does have its positives. The government led by former Prime Minister Mahathir has stood strongly behind the program, providing a good institutional atmosphere for investment. The private sector is rewarded for identifying prospective projects and developing proposals, perhaps more than socially desirable. There is also a high level of flexibility in the relationship between the government and private sector that is useful when conditions change, as they did in the Asian financial crisis of 1997, exemplifying the partnership aspects of PPP.

The first part of this chapter introduces the history of the privatization program and development policies in Malaysia. While many privatization programs are created solely for economic efficiency reasons, Malaysia added a strong ethnic element in its goals that has remained in the program for over twenty years.

Sections 6.3 and 6.4 investigate the extent of toll road use in Malaysia, the requirements and boundaries developed for the PPP program in the Enabling PPP Policy, and the process for creating and deploying a toll road PPP. The overall process is fairly clear but many of the details can be difficult to determine. Part of the difficulty derives from the high degree of flexibility that the government enjoys with the toll road PPP program while another part comes from the low level of transparency of the process.

Section 6.5 discusses the outcomes of the program. First, the division of risk between the government and private sector is investigated using the framework of Section 2.3.3. The effects of low transparency and public involvement are tackled in the final two parts of the section. These two issues are interrelated and they have made it difficult for the government to adhere to the concession agreements at times. This has often led to renegotiations with considerable compensation paid to the private sector. Renegotiations can be avoided with better transparency and relations with the public but this is uncommon in the PPP process.

6.2 History of Privatization and PPP’s in Malaysia
The Malaysian government under Prime Minister Mahathir bin Mohammed has promoted privatization since 1983 as a tool for economic development. This policy has led to privatizations in a variety of industries such as manufacturing, telecommunications, transportation to include roads and ports, and electric utilities which had been state-owned under previous economic development policies. Between 1983 and the end of 2003, 474 projects were privatized according to the Prime Minister’s Economic Planning Unit (EPU), the lead agency in the privatization program (EPU, “History of Privatization Programme” website).
6.2.1 The New Economic Policy

The privatization program appeared to be a significant shift in policy from those of the 1970s which encouraged state-owned enterprises (SOEs) but a closer examination reveals that while they may appear different on the surface, the privatization program maintains the purpose of the New Economic Policy (NEP). The NEP was instituted in 1971 in response to the race riots of 1969. These riots were caused by the economic imbalance between ethnic Malays, commonly referred to as Bumiputera, who held 4% of corporate assets in 1970 and ethnic Chinese who owned the majority of the 34% of assets held by non-Bumiputera Malaysians (Adam and Cavendish, 14). This is in contrast to the population; Bumiputera currently make up 58% of the population while the Chinese make up 24% (CIA Factbook).

The NEP is aimed to reduce future ethnic strife. The EPU even claims “the overriding goal was national unity.” (EPU, 2004, 18) To achieve this goal, the government pursued two strategies: raising the living standards of all Malaysians regardless of ethnicity and shifting the economic balance to better reflect the ethnic balance. The goal set for this latter strategy was to achieve 30% equity ownership by Bumiputera, 40% by other Malaysians, and 30% by foreigners by 1990 (Adam and Cavendish, 14).

At the time of the NEP’s initiation, shifting the economic balance consisted of developing SOEs where Bumiputera would be given preferential access to jobs. The government assumed that the lack of entrepreneurial skills or investment capital in the Bumiputera community would prevent a rapid shifting of the economic balance as the Chinese would maintain preferential access to investment opportunities and investment capital. By using SOEs, the government could provide protection for the Bumiputera as they developed their managerial and entrepreneurial skills. The SOEs would also act as an investment trust for the Bumiputera in general.

Several trends caused the shift to the privatization policy. Managerial and entrepreneurial skills were growing among the Bumiputera, thanks to the SOE strategy. The downsides of the SOE strategy are the large public sector resources needed to run it and the lack of competitive discipline. “Huge losses incurred by some of the public enterprises and worsening fiscal and debt conditions, especially in the mid-1980s became too burdensome for the government’s finances.” (Mohamed, 68) With greater confidence in the capabilities of the Bumiputera community, the government felt that it was safer to expose the SOEs to the free market.

6.2.2 Malaysia Incorporated

The government launched the Malaysia Incorporated policy in 1983. “Both the public and private sectors adopt the idea that the nation is a corporate or business entity, jointly owned by both sectors and working together in pursuit of a common mission of the nation.” (EPU “Malaysia Incorporated Policy” website) One of the key policies of Malaysia Incorporated is the privatization policy which was influenced by similar policies in the UK. To make the policy operational, the EPU issued the Guidelines on Privatization in 1985.

The Guidelines list five objectives for the privatization policy (Jomo, Adam, and Cavendish, 84):

1. Reduction of the financial and administrative burden of the government
2. Promotion of competition and increased productivity of SOEs
3. Stimulation of private entrepreneurship, investment, and growth

142
4. Reduction in the role of the state  
5. Promotion of the objectives of the NEP through increasing the supply of private equity

This last goal has been very influential in the selection of who would receive equity in the SOEs upon privatization. Rather than have Bumiputera compete with Chinese and foreign investors for limited existing equity, new equity would be dropped onto the market with the Bumiputera having preferential access to it, easing the way to a 30% share.

Initial privatization was based on a “first-come, first-served” policy. The private sector could submit a proposal which would be evaluated on the following criteria (Jomo, Adam, and Cavendish, 84):
- The privatization has to be potentially profitable and viable.
- Social objectives of the SOE had to be continued.
- Employees are not disadvantaged by privatization.
- The privatization directly addresses the goals of the NEP.

This last criterion could be met by having a minimum of 30% equity ownership by Bumiputera, a maximum of 30% by foreign investors, and the remaining amount by any Malaysian. If the government concluded that the proposal was satisfactory, the group that proposed it would then enter into negotiations for the details of the privatization arrangement without having to compete with others. Some projects and SOEs were privatized using a more traditional tender process which did introduce competition among private sector suitors but these were in the minority.

The body responsible for proposal evaluation and managing the privatization process was, and remains, the Privatization Committee of the EPU which includes members of other ministries and is supported by a technical staff. When a proposal is received, it is sent to the appropriate technical committees in the EPU to analyze. If the proposal passes the technical tests, the Privatization Committee will then consider the proposal with the proposal sponsors providing evidence to support it. If the committee recommends the proposal, it is sent to the Cabinet for approval. Once the Cabinet approves it, the EPU coordinates with the sponsor, relevant ministries, and other private sector companies to implement the privatization.

The privatization process has not been without criticism. Jomo, Adam, and Cavendish provide three main criticisms of the approach under the Guidelines for Privatization (85-87). First, process transparency was considered very poor. The “first-come, first-served” approach led to charges that awards were based on political ties and not economic considerations. The Official Secrets Act of 1986 contributed to this as it allowed the government considerable latitude in classifying documents including as proposals or bids, permitting the documents to remain classified after the privatization had taken place, and forbidding any legal challenges to document classification (Jomo, 57-58). A second concern with the process is that the lack of transparency allows opportunities for those in the bureaucracy opposed to privatization to prevent privatizations that may be beneficial to society or to bend the proposals to their own agenda. Their final criticism of the policy is that support among the civil service seemed weak and that the policy required considerable effort by Prime Minister Mahathir to implement. These added concerns necessitated additional support by the government to entice investment and establish a reputation as a country that supported its private sector.
6.2.3 The Privatization Master Plan

The government issued the Privatization Master Plan (PMP) in 1991 to provide a greater degree of transparency and predictability in the process. It also constituted a shift from the “first-come, first-served” policy to a planned process where privatizations would occur in a specific order although the PMP still allowed for private sector-initiated privatizations. The government-led privatizations are put out for bid and the EPU must choose among the bidders. The ethnic equity requirement is still in place with the PMP as the 30% ownership goal in 1990 for Bumiputera was not met, although it still reached an impressive 20.3% after only 20 years (Jomo, 43). The PMP is supported by the Privatization Action Plan (PAP) which focuses on planned privatizations in the next two years. The PAP is updated every year.

The PMP is not perfect, of course. Jomo, Adam, and Cavendish list several concerns with the early implementation of the PMP (Jomo, Adam, and Cavendish, 95). While it should provide a roadmap for future privatizations through the use of the PAP, the PAP that accompanied the introduction of the PMP was not followed. When Jomo, Adam, and Cavendish wrote their article, the first PAP was the only one available to comment on so the government may adhere to the recent PAPs more than the first one. The PMP does little for transparency or addressing the post-privatization state of the company such as the need for regulatory structures and how they will be implemented. The PMP also puts little weight on various tradeoffs between economic factors and non-economic factors like equity. Many of the concerns stem from the perception in the PMP that privatization is a worthy goal in and of itself and not a means to an end that should be considered along with other policies to meet the problems facing the public sector.

6.2.4 Other Economic Development Plans

Malaysia continues to produce several other economic plans and policies that influence the direction of privatization but focus on different timeframes. The long-term vision is driven by Vision 2020. Outline Perspective Plans cover a ten year timeframe for implementing the long-term vision. Five year plans are medium term plans that provide greater detail on the projects and policies of the Outline Perspective Plans. The government considers the annual budgets as its short-term plans.

Vision 2020 is the successor to the NEP and was unveiled along with the Privatization Master Plan in 1991 as the overarching vision for all government economic development plans. The goal of Vision 2020 is to achieve developed nation status by 2020 which was calculated to require a 7% economic growth rate. “[Vision 2020] contained several shifts in policy to provide new dimensions to the development efforts in bringing about a more balanced development while maintaining the basic policies of the NEP.” (EPU “Vision 2020” website) Greater economic development of the Bumiputera is still a concern and other issues include different emphases in poverty reduction, new goals for “moral development”, and the shift towards a common culture rather than one of conflicting ethnic groups. With regard to privatization, Vision 2020 does not seem to have caused much change from existing policies.

Outline Perspective Plans (OPP) are long-term plans that accompany general policy statements like the NEP. These plans provide greater detail on policy implementation. The first OPP supported the NEP and lasted from 1971 to 1990 but in retrospect it was considered too long a time to adequately plan for. The second OPP reduced the time frame to ten years and it
supported the National Development Policy. The third OPP unveiled in 2001 will guide the implementation of the National Vision Policy until 2010 and places greater emphasis on education and high-technology in comparison to the National Development Policy. Both the second and third OPPs and their accompanying policies support Vision 2020.

The Five Year Malaysia Plans are medium-term plans to implement the OPPs. "They set out the macroeconomic growth targets as well as the size and allocation of the public sector development programme. In addition, they provide the direction with respect to promoted sectors, thereby giving guidance to the private sector in determining their own investment policies." (EPU, 2004, 8) The plans have a mid-term review to appraise the results and adjust course if necessary.

In the most recent plan, the Eighth Malaysia Plan, the chapter on privatization included the results of the previous plan as well as the proposals for the next five years. The results were stated in terms of number of companies privatized by sector, change in productivity from the pre- to post- privatization states, and the equity ownership of different groups. The proposals included streamlining the privatization process, strengthening the regulatory framework, enhancing Bumiputera participation, and promoting wider public participation in the capital market (EPU, 2001, 197-201). Several prospective projects for privatization were listed but the plan noted that the PAP is the primary vehicle for near-term project identification.

6.3 The Extent of Private Toll Roads in Malaysia

A key part of the privatization and economic development strategy has been the use of private toll roads. The first major privatization of toll roads occurred with the award of the North Klang Straits Bypass in March 1983. The Malaysia Highway Authority (MHA) website lists 21 toll road concessions that have been built or are planned for consisting of nearly 1800 kilometers of road. This is not an exhaustive list, either, as the Eighth Malaysia Plan lists a few roads not on the MHA website and there exists even more not included on either list such as the Penang Outer Ring Road (PORR). A list of as many toll roads as could be found is provided in Table 6-1.

The roads are of several different kinds and are not all situated around Kuala Lumpur. Many are interurban expressways linking two major cities. Other toll roads service a single urban area, connecting a city center with its suburbs or connecting the city to a nearby airport or port. As can be seen in Table 6-1, few of them are very long with the North-South Expressway and East Coast Highway being notable exceptions.

The concessionaires themselves are mixed in their organization as well. Some are consortiums created specifically for that concession with a few other companies such as construction and financial companies being the major shareholders. In other cases, the road is just one asset in the concessionaire’s portfolio. An example of this latter case is PLUS Expressways which is the sole owner of seven toll road concessions comprising 966.5 kilometers of expressways and bridges (PLUS “Highways and Expressways” website).
<table>
<thead>
<tr>
<th>Toll Road</th>
<th>Concession Company</th>
<th>Location</th>
<th>Length, kms</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>North-South Expressway</td>
<td>Projek Lebuhraya Utara-Selatan Sdn Bhd (PLUS)</td>
<td>Western coast of Peninsula</td>
<td>848</td>
<td>1994</td>
</tr>
<tr>
<td>Kuala Lumpur-Karak Highway</td>
<td>MTD InfraPerdana Sdn Bhd</td>
<td>East from Kuala Lumpur into State of Pahang</td>
<td>60</td>
<td>1994</td>
</tr>
<tr>
<td>Penang Bridge</td>
<td>Penang Bridge Sdn Bhd (Owned by PLUS)</td>
<td>Northwest Malaysia</td>
<td>13.5</td>
<td>1985</td>
</tr>
<tr>
<td>Shah Alam Expressway</td>
<td>Konsortium Expressway Shah Alam Selangor Sdn Bhd (KESAS BHD)</td>
<td>Port Klang to south of Kuala Lumpur</td>
<td>34.5</td>
<td>1998</td>
</tr>
<tr>
<td>North-South Expressway Central Link</td>
<td>ELITE Sdn Bhd (Now owned by PLUS)</td>
<td>West and South of Kuala Lumpur</td>
<td>48</td>
<td>1996</td>
</tr>
<tr>
<td>Seremban-Port Dickson Expressway</td>
<td>SPDH Sdn Bhd</td>
<td>About 50 km south of Kuala Lumpur</td>
<td>23</td>
<td>1997</td>
</tr>
<tr>
<td>Malaysia-Singapore Second Crossing Expressway</td>
<td>Linkedua Sdn Bhd (Owned by PLUS)</td>
<td>Malaysia-Singapore border</td>
<td>44</td>
<td>1998</td>
</tr>
<tr>
<td>Sungai Besi Expressway</td>
<td>Syarikat Besraya Sdn Bhd</td>
<td>Just south of Kuala Lumpur</td>
<td>16</td>
<td>1999</td>
</tr>
<tr>
<td>Cheras-Kajang Expressway</td>
<td>Grand Saga Sdn Bhd</td>
<td>Southeast Kuala Lumpur to Kajang</td>
<td>11.7</td>
<td>1999</td>
</tr>
<tr>
<td>Damansara Puchong Expressway</td>
<td>Litrak Sdn Bhd</td>
<td>West and Southwest of Kuala Lumpur</td>
<td>40</td>
<td>1999</td>
</tr>
<tr>
<td>Ampang Elevated Highway</td>
<td>Projek Lintasan Kota Sdn Bhd</td>
<td>Kuala Lumpur City Center east to Ampang</td>
<td>7</td>
<td>2001</td>
</tr>
<tr>
<td>Western Kuala Lumpur Traffic Dispersal Scheme</td>
<td>Sistem Penyuraian Trafik KI Barat (Sprint) Sdn Bhd</td>
<td>West of Kuala Lumpur</td>
<td>26</td>
<td>2001</td>
</tr>
<tr>
<td>Kajang Traffic Dispersal Ring Road</td>
<td>Sistem Lingkaran Lebuhraya Kajang Sdn Bhd</td>
<td>South of Kuala Lumpur</td>
<td>37</td>
<td>Under Construction</td>
</tr>
<tr>
<td>East Coast Highway</td>
<td>MTD InfraPerdana Bhd</td>
<td>East from Kuala Lumpur to the coast</td>
<td>338</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Butterworth Outer Ring Road</td>
<td>Lingkaran Luar Butterworth Sdn Bhd</td>
<td>West and South of Butterworth in Northwest Malaysia</td>
<td>12.1</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Project Name</td>
<td>Contractor</td>
<td>Location</td>
<td>Mileage</td>
<td>Status</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------------------------------------</td>
<td>--------------------------------------</td>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Kajang-Seremban Highway</td>
<td>Kaseh Lebuhraya Sdn Bhd</td>
<td>South of Kuala Lumpur</td>
<td>48.5</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Assam Jawa-Taman Rimba Templer</td>
<td>Lebuhraya Assam Jawa Taman Rimba Bhd (LATAR)</td>
<td>West of Kuala Lumpur</td>
<td>31</td>
<td>Concession Signed</td>
</tr>
<tr>
<td>Expressway</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KL-KLIA Dedicated Highway</td>
<td>Konsortium Lapangan Terjaya Sdn Bhd</td>
<td>Kuala Lumpur City Center South to KLIA</td>
<td>42</td>
<td>Concession Signed</td>
</tr>
<tr>
<td>Ipoh-Lumut Highway</td>
<td></td>
<td>North of Kuala Lumpur in state of Perak</td>
<td>70</td>
<td>Ceased/On Hold</td>
</tr>
<tr>
<td>Guthrie Corridor Expressway</td>
<td>Guthrie Corridor Expressway Sdn Bhd</td>
<td>West of Kuala Lumpur</td>
<td>25</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Stormwater Management and Road</td>
<td>Syarikat Mengurus Air Banjir &amp; Terowong Sdn Bhd</td>
<td>South of Kuala Lumpur and north of Kajang</td>
<td>3 for road section</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Tunnel (SMART)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penang Outer Ring Road</td>
<td>Peninsular Metroworks Sdn Bhd</td>
<td>Penang region</td>
<td>17</td>
<td>Concession Signed</td>
</tr>
</tbody>
</table>
Ownership can be difficult to determine in many cases due to the extent that the government is involved in the economy. For instance, 46% of PLUS Expressways is owned by the United Engineers Malaysia (UEM) Group, who is also wholly-owned by Khazanah Nasional Berhad, the national government’s investment holding arm. Khazanah separately owns 20.9% of PLUS Expressways (Khazanah Nasional Berhad Website). The high government ownership in this case was part of a bailout of the previous owner of UEM, Renong.

Construction on many highways was delayed during the Asian financial crisis of 1997. Project economics were adversely affected. Some concessionaires that had signed concession agreements at that time, such as for the Kajang-Seremban Highway and Butterworth Outer Ring Road, are only now nearing completion. The government also encouraged greater use of building the roads in stages to spread out the need for financing over time to a greater degree. While the ideal is that the problems are borne by the private sector, the extent of the crisis threatened the entire industry. The financial collapse of a few concessionaires could exacerbate the problems the government was trying to ameliorate. In this case, government action is understandable.

6.4 The Policies and Processes of Toll Road Public-Private Partnerships in Malaysia

Using the framework of the previous two chapters, both Enabling PPP Policy and PPP Project Deployment are conducted at the national level by the Prime Minister’s Economic Planning Unit (EPU) which can make it difficult to separate the aspects of the Enabling PPP Policy from PPP Project Deployment. Since projects are selected by a national agency, the goals for toll road projects appear focused on national economic development over regional concerns. This is not too detrimental since many of the toll road concessions are in the Kuala Lumpur region, the primary engine of national growth; the national goals and regional goals are mutually supportive. The apparent involvement of regional officials from Kuala Lumpur in the process also reduces the downsides of the national focus. Overall, the Enabling PPP Policy is adequate on paper but its implementation in the PPP Project Deployment phase has been poor.

6.4.1 Enabling PPP Policy

The Enabling PPP Policy has been developed over the last twenty years as part of the privatization policy begun in 1983 by Prime Minister Mahathir. Perhaps the best way to understand the Enabling PPP Policy in Malaysia is to answer the questions regarding Enabling PPP Policy in Section 3.4.1 and finding the range of alternatives allowed by the government. The goals are to find what the alternatives or boundaries are for agencies who manage PPPs, who makes those boundaries, and how. Issues related to the division of risk between the government and private sector are discussed further in Section 6.5.1.

Who develops Enabling PPP Policy? Can different portions be developed by different departments or regional levels?

The federal government develops the Enabling PPP Policy. The lead agency is the EPU. Privatization decisions are made by the EPU’s Privatization Committee so there is little reason for state or local governments to create their own policies.
How is the Enabling PPP Policy created? How can it be changed?
The Enabling PPP Policy is set by the Prime Minister and the EPU with enabling legislation approved by the legislature. Based on the results of the toll road PPP program, the law appears to be very broad, giving the Prime Minister great latitude in developing the policy. This flexibility allows the policy to be adapted in response to political or public pressures.

When is it appropriate to use a PPP rather than government provision of infrastructure?
The government is willing to use toll road PPPs wherever possible, as demonstrated by Table 6-1. It is legally supported by the Federal Roads (Private Management) Act of 1984 allowing private companies to collect and retain tolls on federal roads. Financial feasibility is not a strict criterion as financially-viable projects have received various forms of financial support.

How may PPPs be proposed? Do they come from government master plans, private sector proposals, or both? Especially of concern for private sector proposals, how may the bid be handled? Will they have exclusive negotiation?
PPPs may be proposed by both the government and the private sector. When the private sector proposes a project, it receives exclusive negotiation rights. For government proposals, there is a competition but it does not always appear fair thanks to the use of the Official Secrets Act to limit access to bid documents.

What range of PPP arrangements can be used to deliver infrastructure (DBFO, Design-Build, Operations and Maintenance, etc.)?
Malaysia focuses on DBFO but other arrangements may be possible.

Who is responsible in the government for the different phases of the project and what powers and responsibilities do they have for oversight?
EPU is responsible for the project conception and bidding phases. Once a bid is awarded, the MHA oversees the rest of the process to ensure a well-built and maintained road.

What are the guidelines on the process used to choose a private sector partner?
There is usually a competition but due to the low transparency of the selection process, it does not always appear that the most competitive bid wins, as discussed in section 6.5.2 regarding the North-South Expressway. There does not seem to be much legal recourse if someone disputes the outcome but it provides the political opposition an opportunity to criticize the ruling party, United Malays National Organization (UMNO), over these problems.

Who can participate in selecting the winner and what criteria can the government use in bidder preselection and the award of the contract?
EPU is in charge of recommending a winner with the cabinet having approval authority. The EPU Privatization Committee does include representation from other federal departments and the state and local levels but it is unknown how much influence these representatives wield. There is not a specific set of criteria that must be used such as the lowest toll rate or shortest concession period. The government is free to use whatever criteria seem appropriate for the specific project.
Which stakeholders should be involved in the different phases of PPP deployment (decision to pursue a PPP versus other solution, project specifications, bids, alignments, etc.) and what requirements should there be on the level of participation of these stakeholders?
The EPU and MHA are the only agencies who have a formal role. Other government agencies like state or local governments, departments of public works, and finance departments will also assist the process depending on the nature of the project. There is no requirement for public involvement.

Should there be requirements to investigate alternatives and if so, what should those requirements be (no build, differing alignments, or public transit options investigated)?
It is unclear if there is a requirement to investigate other alternatives. The initial Environmental Impact Assessment for the proposed Penang Outer Ring Road (PORR) toll road PPP from 1996 investigates 13 different alignments and a no-build scenario. It does not appear that public transportation alternatives were considered as part of this assessment although a Halcrow consultant report released two years later advocated public transport as well as additional roads as required to meet Penang's transportation needs.

What are the limits on the financial structuring of a project such as minimum or maximum debt-to-equity ratios, foreign equity requirements, or debt repayment periods?
The only financial requirement discovered is on the equity structure of toll road projects. A minimum of 30% of the equity must be owned by Bumiputera. There is a maximum foreign ownership limit of 30%. It is unknown if this applies to debt.

What are the types of instruments that government can use to support a project like soft loans, minimum traffic guarantees, bankruptcy protections, government equity investment, or assumption of exchange-rate risk? When can the government use them?
There does not appear to be any laws restricting the support that can be used or under what conditions it can be used. The government has used minimum traffic guarantees although they are trying to move away from them and other forms of support as the toll road market matures. Soft loans are common and the government provides favorable bankruptcy protection. The government has also taken an equity stake in some roads.

How should tolls be determined and what factors can be used to calculate them? Should the public participate and should equity concerns be addressed? Is government approval required to raise tolls? Is congestion pricing permitted?
There are no restrictions on how tolls are set but it is usually spelled out in the contract. Regardless of what is said in the contract, the federal government must still approve any toll increases. If there are deviations from the concession agreement, the government has a policy to compensate the concessionaire for the foregone revenue. Congestion pricing is not used but it does not seem to be illegal, either, so it may be possible for the government to negotiate a contract that would allow it.
What government powers are available for right-of-way acquisition? If the government can use eminent domain powers, is one party required to pay the costs or is it a negotiable part of the concession agreement?

The government may acquire the right-of-way. Depending on the project, compensation to landowners may come from the government or the concessionaire.

What requirements are there for an environmental assessment of a PPP? At what point should one be done (before or after private sector involvement)? Should the process differ from the process for non-PPP roads?

There is a requirement for an environmental impact assessment to be made but it may come after an agreement is signed. It does not appear to be much of a roadblock to building a toll road like in the United States. In the case of PORR, its main purpose was to choose the alignment that had low environmental and social impacts.

6.4.2 PPP Project Deployment – The Process

PPP Project Deployment is procedurally oriented and is best understood by describing the process from a project’s conception to the operations and maintenance phase. Like the Enabling PPP Policy, the lead agency for the government is the EPU. National goals as well as regional goals are important in evaluating PPPs. An overview of the PPP Project Deployment process is shown in Figure 6-1.

Projects come from two avenues: the government can select a project from one of its plans and put it out to bid or it may receive proposals from the private sector. In the former case, the government will select a project from Highway Network Development Plan or other master plan for a region’s highways (Padeco, III-85-86). In the latter case, the company may even receive the right to negotiate a contract without having to go through a bidding process. These private sector initiated projects may also be drawn from a government plan or it could purely be a private sector initiative. Whoever is proposing a PPP must submit the proposal to the EPU.

Unfortunately, one thing that is not clear is what parts of government can initiate projects. Can only the federal government formally initiate PPPs or do state and local governments have formal powers to propose projects? Within the levels of government, which departments can make the proposals on behalf of the government? The literature has not been clear on this subject.

In the early phases of the national privatization program, the private sector proposals were predominant for all industries. The government has moved away from reliance on this “first-come, first-served” policy which led to critics’ contention of corruption to initiating proposals through such plans as the Highway Network Development Plan, Privatization Master Plan, Privatization Action Plan, and local transport strategies.

For government-proposed projects, the EPU will invite selected companies to bid on the concession. The EPU will then select the winner from these bids using the selection criteria for the project. The criteria for receiving an invitation to bid on the project or to win a project are not stated. The two main criteria for winning a bid appear to be some combination of low cost...
and desirable ethnic ownership makeup. Unfortunately, transparency is not a strong point of the bidding process.

Once the bid is awarded, the EPU Privatization Committee manages the concession negotiations which are handled by two subcommittees, one to handle the financial aspects of potential projects and private sector bidders while the other subcommittee handles the technical aspects such as traffic projections, integration into the national network, alignments, and interchanges. These subcommittees include representatives from the Ministries of Works and Treasury, MHA, state government, and local government. When an agreement is reached, the Secretary-General of the Ministry of Works will sign it on behalf of the Cabinet. The MHA is then responsible for oversight of the construction, operation, and maintenance phases.

Once the road is finished, the most troublesome point has been toll rate increases. While these are usually set out in the concession agreement, the government must approve the increases when the time comes. Especially since the Asian Financial Crisis in 1997, toll increases have often been reduced or cancelled with subsequent concession agreement renegotiations due to public pressure. If the toll rates are reduced from the amount in the concession agreement, the government must provide compensation, usually in the form of a direct monetary payment or extension of the concession period.

The financial crisis led to many renegotiations with concessionaires on other points. Construction delays, financial restructuring, and some mergers resulted as concessionaires waited for the markets to stabilize. Given the severity of the crisis, renegotiation was a useful tool to prevent extensive damage to the concession industry.
Figure 6-1 - The PPP Project Deployment Process

Private Sector Proposal

EPU Accepts/Rejects Project

Government Proposals

Government Proposals Put Out For Bid

Private Sector Proposals

Concession Agreement Negotiations Begin with EPU Privatization Committee

Negotiations with EPU Financial Subcommittee

Negotiations with EPU Technical Subcommittee

Agreement Approval by EPU Privatization Committee

Approved by Cabinet or a designated representative

MHA Monitors Construction, Operations, and Maintenance
6.5 The Outcomes of Toll Road Public-Private Partnerships in Malaysia

6.5.1 Division of Risk

Concessionaires have fared well under the favorable division of risk between the government and them, as well be demonstrated shortly. Minimum traffic guarantees, favorable loan rates, coverage to lenders in case of concessionaire bankruptcy, and low public accountability have all created a relatively low risk venture for concessionaires. The government has attempted to shift more of the burden to the private sector as the program has matured. Adam and Cavendish have posited that the government felt it necessary in the initial phase of the program to act favorably towards potential concessionaires. "The government’s concern over creating credibility for the program resulted in high degrees of underwriting of the private sector contractors..." (Adam and Cavendish, 113).

Revenue Risk

The Malaysian government has been generous in its division of revenue risk although it is trying to shift more to the private sector. The primary way that the government has shouldered the risk is in providing minimum traffic guarantees for roads, a method the government is using less as the private toll road market becomes more developed (Hassan, 6). The government has moved away from minimum traffic guarantees towards soft loans, as is the case with the Damansara-Puchong Highway (Abdul-Aziz). If the realized revenue exceeds the projected revenue, the government will receive a portion of the revenues that exceed projections. This arrangement was added to the agreement with PLUS during its negotiation with the government over toll rate increases in 1999.

A related revenue risk that the government has shouldered is compensation for the concessionaire when the government rolls back or does not approve contractually-permitted toll rate increases. Abdul-Aziz lists five cases where this compensation has been paid and it is not an exhaustive list. The government has used monetary payments, soft loans, and concession periods extensions as forms of compensation. PLUS received all three when its proposed toll rate increases were too politically contentious for the government. PLUS received an RM87 million ($22.9 million) payment, an RM220 million ($57.9 million) soft loan, and a fourteen year concession period extension. Another case is the reduction of the permitted toll rate increase on the Kuala Lumpur-Karak Highway in 2002. As compensation the government proposed to waive the government support loan (RM183.2 million/$48.2 million), provide cash compensation (RM97.1 million/$25.6 million), extend the concession period by 6 years, and give MTD Infraperdana the East Coast Highway, Phase I, concession for a period of 28 years (MTD website). The MTD website states that the negotiations have not finished so the total compensation could be more.

The government has shifted towards other ways to handle toll rate adjustments due to controversy over packages like the one PLUS received. One arrangement that the Malaysian government pursued after the Asian financial crisis in 1997 is similar to a method used in Hong Kong. If traffic exceeds projections, the government may defer the toll rate increase specified in the contract or allow it but at a reduced level. In the case of low traffic levels, the concessionaire can request that a scheduled toll rate increase be permitted sooner (Padeco, II-33-34). This
method has not replaced other support as discussed above with the Kuala Lumpur-Karak Highway.

Other subsidies are provided for roads with low expected traffic. Hassan comments on two examples of revenue subsidies (Hassan, 5). The Malaysia-Singapore Second Crossing Expressway included land grants in the area so the concessionaire could recoup some of its expenses through real estate development. The concessionaire for the Kulim-Butterworth Highway reached an agreement where part of the highway was awarded as a concession and part as a standard construction contract. The concessionaire could use a portion of its profits from the construction contract to subsidize the concession.

**Construction Risk**

Risks related to the construction phase are divided between the government and private sector. The arrangements in regards to construction risk are industry standard. Concessionaires are responsible for constructing the project on-time and under budget. The right-of-way risk is reasonably apportioned. The most questionable part is the responsibility for showing environmental compliance. While the arrangement appears to shift the burden to the government, not objectionable in and of itself, the assessment process is not very transparent, like many areas with the Malaysian government.

The government is responsible for obtaining the right-of-way although the concessionaire may provide the financial compensation to use it (Padeco, III-87). It does not appear that the concessionaire actually owns the land. The federal government will convert it to a federal reserve once obtained from the previous owners and it then gives the concessionaire a license to use it for the highway.

The concessionaire is responsible for risks for the actual construction of the road along with its maintenance. The MHA’s mission is to ensure that construction and maintenance quality is maintained by the concessionaire. This division of risk created enough incentive for PLUS to complete the North-South Expressway one year ahead of schedule.

The North-South Expressway provides an example of the construction risks that the concessionaire faces. During construction, material costs increased due to the impact of the Gulf War and high inflation. PLUS had to obtain an additional round of funding, some of which they consider government liabilities. They had still not received any compensation from the government for this as of 1999. Perhaps the government is holding the line on who is responsible for this risk. Maintenance issues have not cropped up as a major issue so the mechanism has operated adequately up to this point.

The government appears to be responsible for the environmental impact assessment (EIA). In the case of the Penang Outer Ring Road (PORR), the EIA considered 13 different alignments, including a No-Build option, and considered “topographic, geologic, economic and social-political factors.” (PORR Website) If PORR is assumed to be representative of the process, the creation of the EIA is a two-step process. A preliminary one is prepared to study different alignments and the final one is prepared when the alignment and design are completed. The process with PORR is less than fully transparent. Although a preliminary one had been prepared
in 1996 before the government decided to privatize the project, the state government which owns the report has only released bits and pieces in response to complaints.

**Political Risk**
The Malaysian government has shown that it shoulders the political risk. The concessionaire is rarely hurt by political action and if it plans to implement an unpopular toll rate increase, public anger is directed at the government to do something; this often involves compensation to the concessionaire for a lesser toll increase. A possible reason for the government bearing much of the burden of public anger is that many Malaysians distrust the methods that led to the selection of the concessionaire, believing it is a way for the government to enrich close associates. The concessionaire may be profiting from travelers but it was the government that willingly created the environment to permit this.

The government has developed a legal and institutional framework that is supportive of the toll road program. The Prime Minister Mahathir's long term in office was also a driving factor in the creation of this environment. With a good degree of legal and political stability, much of the political risk was removed. The tight relationship between the business community and UMNO also contributed to low political risk caused by government actions.

As mentioned earlier, concession agreements are favorable in their treatment of government actions that may reduce revenue. Monetary payments, soft loans, and concession extensions are common in Malaysia for restrictions or delays on toll rate increases. The government is trying to shift towards reducing the burden that this strategy inflicts on the government budget by linking its regulation of toll rates to a comparison of the actual traffic level on the toll road to the projected traffic level.

The government, through its non-transparent processes and low public involvement, bears the brunt of public support risk. The public often protests proposed toll rate increases or the projects themselves since they feel the projects may destroy their neighborhood or that the federal government is rewarding close associates of the party leadership. These issues are investigated in depth in 6.5.3.

**Financial Risk**
The government has taken on a great deal of the financial risk using several methods. The most common method has been soft loans where the government provides loan to the concessionaire with below-market interest rates or where repayment is deferred. The government has also reduced the danger of concessionaire bankruptcy by providing repayment guarantees if a concession is terminated (Hassan, 6). Exchange rate risk has also been assumed by the government in some cases (Naidu, 212). For the case of the North-South Expressway, PLUS covers the foreign exchange rate risk up to a point. Any further exchange rate losses beyond that point is covered by the government. PLUS had not required the use of this guarantee as of 1999 (Padeco, III-89 – 90).

While the government requires equity to meet certain ethnic distribution requirements, the author has not found corresponding debt requirements. If similar requirements did exist, it would reduce the danger of exchange rate fluctuations. In this case, the interest paid on domestic debt
would probably be higher to entice the necessary loan amounts, offsetting some of the exchange rate risk reduction. The government may be more lenient with regard to the level of foreign debt because debtors do not take an ownership stake in the company.

The author has not discovered any requirements on the equity structure within a concessionaire to ensure the interests of the investors, especially the construction companies, are aligned with the interests of the concessionaire as a whole. Favorable treatment of concessionaire in financial straits will encourage this moral hazard as costs can be shifted to taxpayers at large from the equity investors and loan companies.

6.5.2 Where Is The Transparency?
The Malaysian toll road PPP program, and the privatization program in general, are poor models for transparency. The World Bank targeted “the need for transparent tendering and evaluation procedures” as one of the major toll road issues for Malaysia (Padeco, III-93). The government’s propensity for classifying many documents related to project proposals and the limited public involvement are major reasons for the lack of transparency and it does nothing for the perception that awards are made to businesses politically-connected to the Prime Minister or other leaders of the UMNO party.

An early cause of many of the perception problems was the “first-come, first-served” policy that still exists to a degree in the privatization program. A direct impact is that the company that initiates the bid may not be the most effective. Higher toll rates or subsidies are more likely in comparison to an open bid procedure and social welfare will be lower. An example from PORR’s website for “50 Answers for 50 Reasons to Reject PORR” regarding the award of that concession is instructive:

1. *Peninsular Metroworks has been awarded the project without an open tender, drawing doubts if the offer from the contractor is the most cost effective one.*

Peninsular Metroworks Sdn Bhd was not awarded the tender for PORR through unusual means. Like any other tolled highway project, PMWSB had to submit a proposal to be evaluated by the Government. Since the project belongs to the Federal Government, the Malaysian Highway Authority will audit the proposal’s cost and technical data.

The award strictly follows guidelines set by the Federal Government

Once the final alignment is ready, the concessionaire’s financial model will be scrutinised by the Economic Planning Unit. This is part and parcel of the Governmental procedure. As a major infrastructure project for Penang Island, and Government will bear responsibility in ensuring its success. (emphasis in the original)

The website’s answer does not address the reason to reject PORR. Perhaps it is a viable project under Peninsular Metroworks but perhaps there are other companies that could perform a better job and this is not addressed. Apparently neither the government nor the contractor care too much about this concern.
While “first-come, first-served” should not be a universal policy, the author has suggested the position that not all projects should have open tenders in Section 2.3.2. As a way to encourage private sector initiative and innovation, companies that prepare proposals should have the exclusive right to negotiate a contract with the government in certain cases. These cases should not be for routine road-building projects or projects already on a long-range plan. Instead, innovation should be the key criterion for determining whether a project should be negotiated exclusively with the proposing party. The problem with this in Malaysia is that this right is extended to routine projects as well as innovative ones and that a lack of transparency reduces the credibility in the government’s ability to handle exclusive negotiations in a socially beneficial manner.

As mentioned in 6.2.2, the Malaysian government passed the Official Secrets Act in 1986, extending its power to classify bid-related documents. Even if a tender exercise is held, the government can make it difficult to learn the specifics of different bids and to determine if the government chooses the winner in an objective manner.

In early privatizations, the government made little effort to make it appear that the winners were objectively chosen, a case exemplified by the North-South Expressway and United Engineers Malaysia (UEM), the majority owner of PLUS. Gomez and Jomo describe the state of UEM when the contract was put out for bid in 1986 as “an ailing publicly-listed company with a dismal record in the construction industry and no experience in highway-building.” (Gomez and Jomo, 96). Not only was UEM not a well-qualified company but its bid was not the most competitive. It proposed a 7.5 sen per km toll compared to two other bids at 7 and 5 sen per km, a fact that the political opposition exposed during the controversy over the award of the concession (Kuppusamy, 178).

With little technical or financial reason to choose UEM, what was the reason for its selection? At the time, the majority shareholder of UEM was an UMNO holding company and UMNO was constructing a new headquarters building for which it needed some funding (Gomez and Jomo, 96-97). This claim is not a rumor as it was confirmed by Prime Minister Mahathir and the Minister of Youth and Sports (Kuppusamy, 178).

Some have hypothesized that an unstated goal of the privatization program is to strengthen UMNO, especially certain factions, by awarding privatized entities to favored businessmen. A lack of transparency can reduce public outrage at such actions as they are less likely to learn the details of the government’s actions but it can feed conspiracy theories.

An assumption made in this hypothesis is that politicians are power accumulators. Under this assumption, privatization does not appear to be a method for power accumulation but Milne notes that “for top politicians, with power to control the privatization process and select its beneficiaries, the cost-benefit calculations may be quite otherwise [retaining SOEs]; benefits which they enjoy from the continuance of state enterprises are vulnerable to fluctuations of political fortune, and, in particular, to changes of government or even changes of regime. On the other hand, if, through the exercise of state power, these enterprises can be transferred to firms in the private sector – with which these politicians are, or plan to be, associated – there may be better prospects of long-term gain, and possibly short-term payoffs as well.” (Milne, 8)
little transparency in the process and plenty of examples of companies privatized to close associates of the ruling party (Gomez, 87-90), the hypothesis appears to have some explanatory power.

More transparency could be achievable in the future. Prime Minister Mahathir recently stepped down and the new Prime Minister, Abdullah Badawi, is pushing for less corruption in the Malaysian government. A natural aid to this fight is introducing greater transparency to government processes. It will not be an easy task. Prime Minister Abdullah does not have the political strength that Mahathir did to push proposals through and he will have to negotiate with factions within UMNO for their passage.

6.5.3 Public Involvement in the Malaysian Toll Road Process

Public involvement and outreach regarding toll roads is very poor in Malaysia. The public has very little say in the selection of projects; their only recourse is at the ballot box where toll roads may only be a minor factor in voters' decision. The public has achieved some success in limiting toll increases through protests but this does not reflect favorably on the government. This has been changing recently as the public criticism of the program appears to be leading to greater public involvement but the government still has a long way to go.

Public involvement in the toll road process, whether Enabling PPP Policy or PPP Project Deployment, appears minimal. In response to a comment on the lack of public involvement with PORR, the Penang state government declared, “Unlike Structure Plans [local land use plans], there is no legal requirement to exhibit details on PORR, but this was organised by the State Government to create public awareness. This was the first time such an initiative was taken in the country, and the State Government had even convinced the Federal Authorities to extend the period of exhibition.” (emphasis added)(PORR website) It is unclear exactly when the state exhibited the project but it appears to have been in the 2002-2003 timeframe so this is a very recent development. From descriptions on the PORR website, the public was able to comment on and make requests for design issues such as the alignment or buffer zones. The public did not have a say on whether the project should be constructed or not. The federal and state governments decided that Penang needed an outer ring road, supported by reports from Halcrow Consultants and the Japan International Cooperation Agency.

Toll increases are not exactly welcomed in any country. The public may accept them if they view them as improving their level of service. When they do not perceive that they are benefiting, the public often lets their displeasure be known. The criticism may not be warranted but a public information campaign is needed to inform travelers what their tolls pay for.

Malaysia has not performed well in achieving the public’s buy-in for toll increases. Abdul-Aziz documents five cases from the late 1990s where public criticism caused toll increases to be deferred, implemented at a lower than desired rate, or allowed but with the agreement that there would be no further increases. In 2004, a toll plaza on the Senai-Johor Baru Highway, operated by PLUS, was abolished with a compensatory payment of RM331.68 million ($87.3 million) made to PLUS (PLUS, 2004, 74). The government even decided to investigate the fairness of tolls on the New Pantai Expressway after receiving a petition with 10,000 signatures in protest according to an article in the Malaysia newspaper *The Star.*
The high number of toll rate adjustments by the government is not conducive to a toll road program that supports both public and private sector goals. It could lead to an environment viewed as politically unreliable by the private sector. Companies will require a greater rate of return to compensate for the higher risk. The Malaysian government has dealt with this by providing compensation but the terms may reduce the risk more than desirable from a societal point of view. Rather than having a toll road program that shifts some of the risks, and profits, to the private sector, the program keeps many of the risks in the public sector while shifting profits to the private sector and costs from the users to society at large.

Public involvement can improve public support for projects and willingness to accept toll increases. It will have a salutary effect on transparency and reduce criticism that the toll road program enriches UMNO’s friends in the business community as the public learns the details needed to make a financially successful toll road possible. Politicians and business leaders may not want public involvement because it may interfere with sweetheart deals or because they genuinely feel that the demands made by the public will not be in the best interests of society. Project and political viability could be strongly affected if the general public perceives toll roads as a system to transfer wealth from them to politically-connected businesses with minimal benefits and if the public also makes unreasonable demands.

There are a few bright spots for public involvement. Recent public protests and pressure from opposition parties led to toll renegotiations, although the private sector received generous compensation for their foregone revenue. Increasing wealth and education should lead to a desire among the populace to have greater involvement in government decisions. As shown by PORR, the state government introduced a public comment phase to the project for the first time, hopefully a precedent that will be followed elsewhere.

6.6 Changes to the Toll Road PPP Program Evaluation Criteria
While a toll road PPP program has generic goals it should reach for to maximize value to society, there are also goals that are specific to the nation where it is being implemented. Society may be willing to sacrifice efficiency for other goals such as social equity. In Malaysia, there are two goals that were behind the creation of privatization: 1) increasing the status of Bumiputera in the economy and 2) reaching developed nation status by 2020. The following table is added to Table 2.5 which documents the initial set of evaluation criteria.

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaysia</td>
<td>Bumiputera Promotion</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
</tr>
</tbody>
</table>

Bumiputera promotion is achieved by creating economic opportunities for Bumiputera. Toll roads PPP provide these by being an investment opportunity for Bumiputera and by providing access to jobs. This latter point is already covered in the generic measures so Bumiputera promotion will consist of the investment opportunities created by the toll road PPP program. Promotion is aided by increasing the number of investment opportunities and increasing the
expected returns so that they perform better than existing investment opportunities that do not have the 30% Bumiputera investment requirement.

Reaching developed nation status by 2020 requires that smart investment choices be made and that they be made quickly. For a toll road PPP program, this requires toll road PPPs to be chosen on their economic benefits, that the project is built quickly so that a return on investment for investors and society is achieved quickly, and that the government and legal institutions are fair, comforting investors who may be wary about political risks in their investments in Malaysia.

Table 6-3 - Final Set of Evaluation Criteria

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>Enabling PPP Policy</th>
<th>PPP Project Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental and Social</td>
<td>Pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6-3 provides the final set of toll road PPP program evaluation criteria. The criteria will be evaluated for both Enabling PPP Policy and PPP Project Deployment. In evaluating programs, the analyst should avoid the double-counting of benefits and costs. This could occur by giving credit to a change to both Enabling PPP Policy and PPP Project deployment when only one should be given credit for it. In isolation, double-counting is not a critical error but it is problematic when comparing alternatives. Two alternatives may have similar outcomes but appear very different if one alternative has this double-counting and the other does not. It should be noted that this does not require a benefit to be assigned to only one of Enabling PPP Policy and PPP Project Deployment. If both contribute to the benefit, they both should be given credit.

For example, Enabling PPP Policy requires public involvement in the PPP Project Deployment process. The outcomes from this requirement are counted towards the positives and negatives of
PPP Project Deployment since they result from the implementation of public involvement at that level. If the process for revising the Enabling PPP Policy itself included public involvement, then the Enabling PPP Policy could receive credit for this. Correctly assigning the credit is a tricky task.

6.7 Conclusion
Malaysia has used toll road PPPs as a method of infrastructure delivery for over 20 years now. Overall, the program has been successful for the private sector thanks to the strong government support but there is little data on how effectively the program meets public sector goals. There are more roads than before and they have helped enable the strong economic growth of the past two decades so in that sense the program is a success but it needs to be evaluated against some metric such as a value-for-money approach or the use of a comparator like in the United Kingdom and the Netherlands (FHWA, 81-82). Under the current program, the economic efficiency is reduced with policies like the “first-come, first-served” policy being used for routine matters and not innovative projects. The low transparency and questionable awards of some projects raise further questions as to the whether the public at large and the travelers who will be served are getting the most value for the money.

In setting the stage for the next chapter, the observed strengths and weaknesses are listed below.

Strengths:
- Legal and institutional support for PPPs from conception through operations
- Government open to renegotiations when conditions adversely change
- Private sector proposals permitted
- High flexibility in developing the terms of PPPs
- Clearly delineated roles for the EPU and MHA in running the bid process and supervising PPPs.

Weaknesses:
- Low transparency throughout the process
- Minimal public involvement in decision-making
- Poorly-suited toll structure for congestion charging or other programs to encourage certain behavior like carpooling
- Greater importance placed on financial viability than integration into the regional transportation system
- Favorable outcomes from government negotiations for concessionaires at the expense of the public interest
- Low concerns for environmental and sustainability issues
- Unclear what the evaluation criteria are during the bid process
- No good measures on the effectiveness of the toll road program compared to other possible ways to provide infrastructure

The goal of the next three chapters will be to explore improving Malaysia’s toll road program through different processes such as the CLIOS Process and how well the alternative programs retain the strengths and reduce the weaknesses of the current program. The focus will be on a
qualitative analysis of the policies and process rather than a quantitative analysis due to the lack of good quantitative data.
7 Alternative 1: Applying the CLIOS Process to Malaysian Toll Road Public-Private Partnership Policies

7.1 Introduction
In Chapter 6, the history and current state of the Malaysian toll road public-private partnership (PPP) program was investigated. While the program has provided a significant share of new highways over the past two decades, it has not been an unqualified success. Transparency is low and public involvement is nonexistent, leading to a public perception of corruption. Competition is limited and the environmental approval process appears weak. When times are tough for concessionaires, the government has been willing to provide aid or help restructure the company so investors are not significantly hurt. While much of the evidence is qualitative rather than quantitative, the weight of the evidence is that Malaysia's toll road PPP program is not providing as much benefit to society as it could. Reinventing the program could reap additional benefits.

The first alternative to be evaluated for its expected performance against the current Malaysian process is the CLIOS process. This alternative will be based on the generic application explored in Chapter 4 and Chapter 5 for Enabling PPP Policy and PPP Project Deployment, respectively. The decisions made in this scenario will be based on the expected decisions that would be made in reality by stakeholders given what is known about their interests and motivation.

7.2 The Scenario
Here is a hypothetical scenario to aid our explanation. From here on, a hypothetical future is discussed along with possible strategies, decisions, and outcomes. With a scenario laid out, this chapter will try to create strategies, decisions, and outcomes consistent with the interests and powers of the stakeholders.

In this scenario, public criticism has grown over the administration of the toll road PPP program. Protests are more frequent and political opponents are exploiting the anger to weaken the Barisan Nasional coalition led by the UMNO political party which has ruled Malaysia since 1959. To stop the gains of his political opponents and to also increase control over his own party, Prime Minister Badawi has ordered the CLIOS process be adopted to handle two tasks. First, the CLIOS process will be applied to developing a new Enabling PPP Policy for Malaysia. Second, the CLIOS process will be applied to regional strategic transportation planning (RSTP) with toll road PPPs as an available strategic alternative at the regional level.

The adoption of the CLIOS process for the Enabling PPP Policy will be overseen by the Economic Planning Unit (EPU), which has managed the toll road PPP program up to this point. A few principles that the Prime Minister wishes the EPU to keep in mind for both Enabling PPP Policy and PPP Project Deployment is that they should:

- Increase public participation
- Ensure toll rates in the concession agreement have taken public concerns into account
- Improve the importance of the environmental assessment process
- Create a more transparent process
• Maintain financial viability for the overall toll road PPP sector so that it can be used as the primary means for providing highway infrastructure into the future

In this scenario, the EPU will involve other national agencies in the development of Enabling PPP Policy. These agencies will be the ones that are currently involved on the EPU's Privatization Committee. Businesses and citizen groups will not be formally involved although informal input from businesses will probably make its way into the development of the Enabling PPP Policy.

The most analogous process in Malaysia to RSTP is the development of the structure plan for a region that is approved by the State Planning Committee (SPC) for each state in Malaysia. Ideally, the plan is developed by local authorities but only 14 out of 77 local authorities have town planning departments which have many other duties (Zakaria, 2003, 23-24). In this scenario, the SPC will assume regional planning duties and use the RSTP process in place of the transportation elements of the structure plan. Toll road PPPs are permitted as strategic alternatives but they must follow the guidance of the Enabling PPP Policy.

7.3 **The New Malaysian Enabling PPP Policy**

Chapter 4, entitled “A Generic Application of the CLIOS Process to Enabling PPP Policy,” will be used as a template for this section. The focus will be on the changes necessary to apply it to Malaysia rather than to repeat all of the explanations in Chapter 4. Because of this, some explanations will be just a short summary with the reader directed to Chapter 4 for further explanation if there are no differences with the Enabling PPP Policy of the generic nation.

7.3.1 **Representation Stage**

7.3.1.1 **Step 1: Describe System: Issue Checklist and Goal Identification**

In Chapter 4, an initial step for this process is to state the reason for using the CLIOS process. Malaysia relies on a toll road PPP program to provide its important highway infrastructure as a means to reduce government spending and encourage private investment. With its current investment requirements, Malaysia also uses the program to promote the economic status of Bumiputera. With an extensive and efficient highway network, Malaysia hopes to maintain its growth rates and achieve developed nation status by 2020.

These are all good reasons to have a toll road PPP program and Malaysia has had one since 1983. Why the need for the CLIOS process to produce a new Enabling PPP Policy? By the end of Chapter 6, the need for new Enabling PPP Policy and PPP Project Deployments should be clear. Low transparency, little public involvement, and widespread criticism over suspected corruption are some of the reasons for reform.

Malaysia’s system boundaries are the same as in the generic nation of Chapter 4 and coincide with its geographic boundaries. The Enabling PPP Policy must consider the interactions between the national transportation system, the national economy, and the national environment. Malaysia is not a politically powerful nation so its effects on the international scene can be ignored in this analysis although there may be influence from the international arena in the form of trade or exchange rates.
Issue Checklist:

- Increasing automobile ownership and transportation needs
- Government desire to limit spending
- Goal of reaching developed nation status by 2020
- Public criticism of current process being a handout to politically-connected businessmen leading to government reduction of tolls and compensation for concessionaires
- Recent retirement of Prime Minister Mahathir who had run the country for over 20 years and initiated Malaysia’s privatization program
- Desire to promote the status of Bumiputera
- Exchange rate pegged to the US dollar
- ETC systems only recently unified with the Touch ‘n Go system after several years of competing standards
- Increased investment in ports to make them competitive in Southeast Asia

Initial Goals:

- Meet national transportation needs with minimal impacts on government funds
- Support economic development so developed nation status can be reached by 2020
- Reduce public criticism with a process that is more open and takes the public’s needs into account
- Promote social goals such as increasing Bumiputera status and national unity

7.3.1.2 Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere

The generic nation’s major subsystems and actor groups are sufficient for Malaysia.

Major Subsystems:

- Transportation
- Economy
- Environment
- Toll Road Public-Private Partnerships

Major Actor Groups:

- Government
- Private Sector
- Citizen Groups

7.3.1.3 Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram

The system representation is based on the Chapter 4 representation, using both the link matrix and a diagram based on the matrix. There are some differences, though, with new components, links, and shapes. The new components will be noted under each link matrix. The new links are discussed in greater detail in Section 7.3.1.5.
In the diagrams, square and diamond shapes have been added. Diamond shapes are the common drivers that appear in multiple subsystems. Squares indicate the policy levers connected to organizations on the institutional sphere. The notation is more consistent with the notation used in Dodder et al.

Table 7-1 - Malaysian Enabling PPP Policy Transportation Subsystem Link Matrix

<table>
<thead>
<tr>
<th>Components</th>
<th>GDP Per Capita</th>
<th>Travel Cost</th>
<th>Freight Use</th>
<th>Transportation Capacity Needs</th>
<th>Transportation Investment Policy</th>
<th>Safety</th>
<th>Intermodal Efficiency</th>
<th>Transportation Funding/Subsidies</th>
<th>Network Completeness</th>
<th>Network Robustness</th>
<th>Mobility</th>
<th>Accessibility</th>
<th>Transportation Technology Interoperability</th>
<th>Automobile Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Cost</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Use</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Capacity Needs</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermodal Efficiency</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Funding/Subsidies</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Completeness</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Robustness</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Technology Interoperability</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automobile Ownership</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Three components have been added to the transportation subsystem: Transportation Capacity Needs, Transportation Technology Interoperability, and Automobile Ownership. Equitable Access for Sensitive Populations has been removed.
Figure 7-1 - Malaysian Enabling PPP Policy Transportation Subsystem Diagram
Table 7-2 – Malaysian Enabling PPP Policy Economy Subsystem Link Matrix

<table>
<thead>
<tr>
<th>Components</th>
<th>Freight Use</th>
<th>Worker Productivity</th>
<th>Innovation</th>
<th>National Industrial Policy</th>
<th>National Environmental Policy</th>
<th>GDP per Capita</th>
<th>National Economic Growth</th>
<th>Exchange Rate</th>
<th>Employment</th>
<th>Transportation Capacity Needs</th>
<th>Fiscal Policy</th>
<th>Monetary Policy</th>
<th>Trade Policy</th>
<th>Trade Balance</th>
<th>Foreign Investment</th>
<th>Bumiputera Promotion</th>
<th>International Competitive Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Drivers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in Transportation Subsystem</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in PPP Subsystem</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Also in Environment Subsystem</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bumiputera Promotion has been added. It is akin to a replacement for Equitable Access for Sensitive Populations in the Transportation Subsystem but with a greater economic orientation. Transportation Capacity Needs has replaced Transportation Investment Policy.
Figure 7-2 - Malaysian Enabling PPP Policy Economy Subsystem Diagram
Table 7-3 - Malaysian Enabling PPP Policy PPP Subsystem Link Matrix

The PPP subsystem remains unchanged from the generic nation's PPP subsystem. There are differences but they are mainly in the internal workings of the components. For example, Transportation Investment Policy would have to be expanded to capture the greater emphasis on toll road PPPs in Malaysia but to keep the complexity manageable, it has been left as a single component. Transportation Capacity Needs could be considered a component that has been broken out for two other subsystems although it is not needed here.
Figure 7-3 - Malaysian Enabling PPP Policy PPP Subsystem Diagram
Table 7-4 - Malaysian Enabling PPP Policy Environment Subsystem Link Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion &amp; Deforestation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Generation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Economic Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Environmental Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulatory Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are no differences between the generic nation’s Environment subsystem and this one.
Figure 7-4 - Malaysian Enabling PPP Policy Environment Subsystem Diagram
While a generic nation’s physical system representation can serve as a strong core for the application to a specific nation, the generic institutional mapping is less useful. If there is more traffic and more congestion, travel time will increase and travel time reliability will decrease, no matter where in the world this occurs so there is a degree of reusability of the physical system representation in this instance. Different institutional arrangements could lead to much different outcomes and policy recommendations.

In Malaysia, the two principal government departments for the current Enabling PPP Policy are the EPU and the Malaysia Highway Authority (MHA). EPU has managed the toll road PPP program for two decades and will continue to be an influential agency. MHA has responsibilities in the construction, operations, and maintenance phases of toll road PPP projects. Two other departments that will be included are the Ministry of Finance and the Ministry of Natural Resources and Environment. There are several other government departments currently involved but their influence appears to be limited and they mainly serve as technical advisors for specific parts of the process.

The Prime Minister will set the general policy direction, much of which is laid out in the hypothetical scenario of 7.2. The Prime Minister must also remain aware of the pressures exerted in the legislature whose support he requires, the public who determines the long-term prospects for his governments, and businesses who drive economic growth and provide financial support for political campaigns.

The Malaysian legislature is expected to have limited influence on the process but they do pass laws which may be important for the Enabling PPP Policy. The legislature also faces many pressures from the public and businesses. While the Prime Minister’s policies should reflect the general policy directions of UMNO, the ruling party, UMNO is by no means a unified entity. There are different factions seeking power. There are also the normal tensions between parties especially as opposition parties have gained strength in recent years.

The centralized nature of the entire PPP program up to this point indicates a low degree of involvement for regional and local agencies. If they do have some influence over Enabling PPP Policy, it must come through informal channels. It will be assumed that they will not be involved in the process to update the Enabling PPP Policy, at least in this first iteration.

The four principal business groups remain the same: concessionaires, financial lenders, shippers, and carriers. As the current policies have treated them well, the concessionaires would like to retain the current program. If they cannot maintain the current program, the second best goal for them is to have a program that does not disrupt the existing concession industry structure. Shippers and carriers are assumed to support policies that will lower travel costs and travel time while increasing travel time reliability.

The attitudes of financial lenders towards a new Enabling PPP Policy are difficult to predict with the limited data gathered. In effect, the current policies have reduced the lenders’ risk since concessions that have been in financially difficult situations have received financial aid or other government support. The important question is whether the lenders have accounted for that risk reduction in their investment decisions. If they have, they may be indifferent to a new policy.
since they will adjust their decisions based on the new risks and returns. If they did not fully account for the risk reduction in their investment decisions and are receiving a more favorable risk-return ratio than a typical market situation, they may not like the changes to the situation.

It is difficult to discern the details of the citizen groups' portion of the institutional sphere. There is certainly criticism of the high tolls and the low transparency in the process but organized groups do not appear to play a major role. The public still has an interest in the different goals of the citizen groups. While there may not be formal groups, it will be assumed that the public voices its criticism along these interests and that structuring it as groups in the representation is a useful tool for understanding the influence of these interests.
7.3.1.4 Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere

The same conventions are used in Table 4-2 to Table 4-5; policy levers are denoted with a bold font and the bottom three rows show which components are the common drivers and which other subsystems they appear in.
7.3.1.5 Step 4B: Describe Links between Components in the Physical Domain and between Actors on the Institutional Sphere

Class 1 Links
Transportation Subsystem
According to the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the Malaysian automobile ownership rate is the highest in Southeast Asia and it has been an important driver in the need for more roads. The mix between automobiles and motorcycles or other two-wheeled vehicles will significantly affect safety. GDP per capita is the most important driver of automobile ownership. As people become wealthy, they have a strong tendency to buy cars. Automobile ownership takes several years to grow significantly and its effects on other components occur over this timeframe.

The period before the introduction of the Touch ‘n Go system displayed the problems with poor interoperability between toll roads. Drivers would need multiple devices to successfully navigate the toll road system using Electronic Toll Collection (ETC). Having interoperable technology will increase system efficiency. Travelers will be more hesitant to use a device if it works on only one road rather than several roads. The interactions between other components and Transportation Technology Interoperability will depend on how quickly standards can be developed and how long it takes to deploy the technology once the standards are agreed to.

Transportation Capacity Needs is a component that has been broken out from the Transportation Investment Policy component in Chapter 4. The demand for trip-making, as represented with GDP per capita and freight use, represents one side of the capacity needs. The current state of the network in terms of accessibility and robustness will also affect the need for more transportation capacity. The timeframe for the influence of the links around Transportation Capacity Needs ranges from few years to several decades.

Economy Subsystem
As noted previously, Bumiputera Promotion is added since it will affect the economy. The goals are mainly economic promotion and are driven by the 30% Bumiputera investment policy. The timeframe of influence on Bumiputera Promotion by GDP per capita, State Economic Growth, and Employment may run from about one year to several years as Bumiputera’s economic fortunes are linked to these components. The education component is another way to promote Bumiputera interests but it takes several years to two or three decades to be fully felt and it is not critical to this system.

Transportation Capacity Needs has replaced Transportation Investment Policy. Economic growth, leading to increased freight and more workers with transportation needs, drives much of the growth. The nation’s competitive advantage will decrease if the needs become much larger than the nation’s capability to meet them. The effects of other components on Transportation Capacity Needs can be felt within a few months if a recession or growth spurt occurs but it is more likely to occur over a few years.
### Class 2 Links

Table 7-5 - Malaysia Enabling PPP Policy Class 2 and 3 Links

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Minister</td>
<td>Legislation</td>
</tr>
<tr>
<td>Economic Planning Unit</td>
<td>Malaysia Highways Authority</td>
</tr>
<tr>
<td>Ministry of Natural Resources and Environment</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>Concessionaire</td>
<td>Financial Lenders</td>
</tr>
<tr>
<td>Shippers</td>
<td>Carriers</td>
</tr>
<tr>
<td>Social Advocates</td>
<td>Environmental Advocates</td>
</tr>
<tr>
<td>Good Government Groups</td>
<td>Automobile Associations</td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td>National Economic Growth</td>
</tr>
<tr>
<td>Employment</td>
<td>Travel Cost</td>
</tr>
<tr>
<td>Transportation Capacity Needs</td>
<td>Safety</td>
</tr>
<tr>
<td>Project Financial Feasibility</td>
<td>Public Reaction</td>
</tr>
<tr>
<td>Air Quality</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-5 includes both Class 2 links (also called projections) and Class 3 links. The upper left corner from Prime Minister to Automobile Associations is the area with Class 3 links. To the right of that area are projections from the institutional sphere onto the physical system. The area on the bottom left has the projections from the physical system onto the institutional sphere.

The Prime Minister and legislature's influence is expected to be the same in this representation as in the generic nation. The powers of the government departments do change with the EPU responsible for the transportation investment policy in the area of toll road PPPs. The MHA has little to do with the actual policy although it is responsible for ensuring that concessionaires follow it. The Ministry of Natural Resources and Environment and Ministry of Finance both play small roles but they are very important in their specialized fields to the toll road PPP program. Business and citizen group projections are about the same as in the generic nation representation.

The links from the physical system to institutional sphere are ones that the organizations find important to their own mission. Elected officials will adjust their actions based on reelection...
indicators. Government departments will change policies based on the changes in certain components related to their mission. Business will be concerned with components that affect their profits. Citizen groups will respond to components that deal with their particular interest area.

Class 3 Links
Like in the generic case, the assumption is that the legislature acts on government departments via the Prime Minister and that the departments are compartmentalized from each other. For example, the EPU and MHA will work together on projects but they cannot directly affect each other’s inner workings. Businesses and the citizen groups in the current system representation act on the government through the legislature and Prime Minister.

7.3.1.6 Step 5: Seek Insight about System Behavior
This step’s focus is to highlight any new system behavior caused by the introduction of new components and links.

Class 1 Links
Are there strong interactions within or between subsystems?
This is the same as in Chapter 4.

Are there chains of links with fast-moving, high-influence interactions?
The new components are not expected to add any fast-moving, high-influence interactions beyond those discussed in Chapter 4.

Are some of the paths of links non-linear and/or irreversible in their impact?
The paths that increase automobile ownership could be characterized as non-linear and almost irreversible. Once people become wealthy enough, they start buying cars. After a certain point, the growth of the automobile ownership rate as a function of income may slow as people pay more for comfort items in the car rather than additional cars. Once people own a car, it may take some time before they give it up, even if their income, as represented by GDP per capita, decreases.

The effects of Transportation Investment Policy, Security, or Intermodal Efficiency on Transportation Technology Interoperability could also be characterized as nonlinear with a degree of irreversibility. Once a standard is developed as a result of transportation policy or security concerns, it is very difficult to replace. There is the problem of legacy systems that would need to be upgraded and businesses may resist the change since it may benefit a specific competitor. Changes to the standard may be made at the margins but the core standard will remain.

Class 2 Links
Are the organizations pushing the system in the same direction, or is there competition among organizations in the direction of influence?
The Prime Minister, legislature, EPU, and MHA are expected to push the system in the same direction: reliance on toll road PPPs for major highway infrastructure. The Ministry of Natural
Resources and Environment may push the system in a different direction by promoting alternatives with less environmental damage but its role in the process is currently minor. Even if it had more power, there will be limits to its influence since the Prime Minister and legislature have some control over the Ministry and its policy direction. While an expectation is that the Ministry of Finance may work in the opposite direction of the Prime Minister, arguing against financially-infeasible projects, this may not be true. In the past, the Finance Minister has been a key proponent of privatization with financial feasibility not always an important consideration.

Businesses and citizen groups are expected to act the same as in the Chapter 4 description.

*Are there organizations on the institutional sphere that have an influence on many components within the physical system?*

The Prime Minister and legislature have an influence on many components, like in Chapter 4. As the manager for the toll road PPP program, the EPU influences many of the physical system components.

### Class 3 Links

*Are the relationships between organizations characterized by conflict or cooperation?*

The relationships within the government departments are cooperative based on the research for Chapter 6. This research only scratched the surface of the issue, though, and the relationships are certainly more complex than presented here.

Since the Malaysian government has a parliamentary system, the relationship between the Prime Minister and the legislature is mostly cooperative, otherwise Abdullah Badawi would not be the Prime Minister. However, this relationship is not always harmonious; factions exist within the ruling party that have their own political agendas. Prime Minister Badawi is relatively new to the job, replacing the long-serving Mahathir bin Mohammed in 2003. Prime Minister Badawi may not have achieved the influence of his predecessor in relations with the legislature and the government bureaucracy.

Government and businesses in Malaysia have a cooperative relationship. Chapter 6 detailed the flexible handling of concessions by the government that reduced losses in that industry. Edmund Terence Gomez provides greater detail on the cooperative relationship between the government and private sector in general, not just between government and the concession industry (Gomez, 82-113).

With regard to toll road PPPs, there is conflict between the citizen groups and government, as indicated by protests that led the government to reduce proposed toll increases. While the citizen groups and businesses will have conflicts over the implementation of toll road PPPs, Abdul-Aziz notes that "the public's anger over toll charges has been largely directed at the government rather than the private companies."
Are there any high-influence interactions, or particularly strong organizations that have direct impacts on many other organizations within the institutional sphere?

As in Chapter 4, the Prime Minister and the legislature have high influence over the government departments. The previous Prime Minister was very influential in the policies set for the departments and it is unclear if Prime Minister Badawi has reached this level of influence.

The interactions between elected officials and businesses are arguably high-influence. It will be assumed that input from businesses is an important but not controlling influence on the development of Enabling PPP Policy.

What is the hierarchical structure of the institutional sphere, and are there strong command and control relations among the organizations?

Like in Chapter 4, the government departments fall under the control of the chief executive but the legislature can influence them as well. In this representation, the departments do not have any command and control relations between each other. Businesses and citizen groups are independent of each other.

Are there any links between organizations that act via the physical system (e.g. an organization has a projection to a physical component and this physical component has an impact on another organization)?

Prime Minister Mahathir’s industrial policy has increased automobile ownership which has then driven the need for toll road PPPs and the missions of the EPU and MHA. An important economic development strategy for the former Prime Minister was creation of the national car. The automotive industry has many links to other industries and by creating a competitive car company, the expectation is that there would be development of these other industries. This has contributed to the high automobile ownership rate in Malaysia and the need to provide transportation capacity beyond the need of the government to fund it. The EPU has to consider this growing need in developing toll road policies. The MHA will also be affected by the changing needs for transportation infrastructure.

The EPU’s policies can improve the status of Bumiputera by offering them greater investment opportunities. By increasing Bumiputera economic status in society, the Bumiputera will support the government that brought about these policies. If opportunities are reduced by agency policies, the Bumiputera will be more likely to vote for someone who promotes policies that support them.

7.3.2 Design, Evaluation, and Selection Stage

7.3.2.1 Step 6: Identify Performance Measures, Refine System Goals and Build Quantitative Model

The performance measures, as designated by italics in Table 7-1, Table 7-2, Table 7-3, and Table 7-4 are:

- Travel cost
- Safety
- Automobile Ownership
- National Economic Growth
• Employment
• Foreign Investment
• Project Financial Feasibility
• Cost of Road
• Air Quality
• Regulatory Cost

Now, we map each of the performance measures to the initial goals listed below. This can serve as a tool for goal refinement.

• Meet national transportation needs with minimal impacts on government funds
  - Project financial feasibility
  - Cost of road
  - Travel cost
  - Safety

• Support economic development so developed nation status can be reached by 2020
  - National economic growth
  - Employment
  - Regulatory cost
  - Automobile ownership

• Reduce public criticism with a process that is more open and takes the public’s needs into account
  - None

• Promote social goals such as increasing Bumiputera status and national unity
  - Foreign investment
  - National economic growth
  - Employment

As a reminder, the performance measures will be more complex than the simple statements listed above. For example, employment would include employment by ethnic group which would be applicable to increasing Bumiputera status. Unfortunately, there are no performance measures that support an open and transparent process. Perhaps a checklist of qualities that a transparent process has would be more appropriate.

Here are a set of refined goals that keep with the scenario’s expectations that the government will continue to support the toll road PPP program:

• Meet national transportation needs with low cost and high safety to the consumer while relying on private sector investment through toll road concessions
• Sustain economic growth and employment for all groups through the effective provision of a national transportation system
• Increase national competitiveness in Southeast Asia through the efficient operation of the freight sector
• Improve stakeholder involvement and the transparency of the process
• Strengthen the environmental approval process so it better meets local needs while maintaining support for the overall toll road PPP program
- Promote the economic status of Bumiputera by increasing investment and business opportunities
- Ensure toll roads are technologically interoperable from the consumer point of view

These new goals contain several assumptions about the government’s course of action based on information gleaned from the system information. Transportation system operations increase in visibility due to recognition of the ETC confusion before the introduction of the Touch ‘n Go system. The government’s focus on economic development would lead it to a further breakdown of development into goals for growth, employment, and competitiveness. Finally, the environment would remain low priority for the government and an issue like sustainability would still not be considered. While the CLIOS process is a useful framework for tackling sustainability issues, it requires stakeholders willing to undertake the effort and it is unlikely that the Malaysian government is that willing at this time.

This step calls for the creation of a quantitative model but that is beyond the scope of this thesis.

### 7.3.2.2 Step 7: Identify and Design Strategic Alternatives for System Improvement

Many of the strategic alternatives were identified in Chapter 4. This section will focus on alternatives that are Malaysia-specific or where additional information is useful. Not all the questions listed in Chapter 4 are included.

**When is it appropriate to use a PPP rather than government provision of infrastructure?**

The Malaysia government is expected to continue to rely on toll road PPPs for major highway infrastructure.

**How may PPPs be proposed? Do they come from government master plans, private sector proposals, or both? Especially of concern for private sector-initiated proposals, how may the bid be handled? Will the private sector have exclusive negotiation rights?**

A major criticism of the current process is that most concessions come from private sector proposals or the government selects a concessionaire without a competition. The government will need to select alternatives for this question that address this criticism.

**Who is responsible in the government for the different phases of the project and what powers and responsibilities do they have for oversight?**

This is a critical question for Malaysia’s Enabling PPP Policy. Until now, the process has been centralized under federal agencies. A toll road PPP program with a local bent would include greater participation by local and regional agencies but these agencies are inexperienced in dealing with concessionaires.

**Who can participate in selecting the winner and what criteria can the government use in bidder preselection and the award of the contract?**

Improving transparency and stakeholder involvement will address this weak point in the current process.
Which stakeholders should be involved in the different phases of PPP deployment (decision to pursue a PPP versus other solution, project specifications, bids, alignments, etc.) and what requirements should there be on the level of participation of these stakeholders? The public has not been a major stakeholder in any phase since its participation is not required.

Should there be requirements to investigate alternatives to the toll road PPP and if so, what should those requirements be (for example, no build, differing alignments, or public transit options investigated)? Increased public involvement may increase pressure for greater consideration for toll road PPP alternatives.

Under what conditions should the government provide financial support? What are the types of instruments that government can use such as soft loans, minimum traffic guarantees, bankruptcy protections, government equity investment, or assumption of exchange-rate risk? This is another major issue for Enabling PPP Policy since some people perceive the toll road PPP program as a way to enrich politically-connected businessmen. Financial support is probably acceptable to the public but the current levels of compensation will have to be reduced.

How should tolls be determined and what factors can be used to calculate them? Should the public participate and should equity concerns be addressed? Is government approval required to raise tolls? Is congestion pricing permitted? The public has participated through protests but the goal should be for the public to participate in a more formal and cordial manner.

What requirements are there for an environmental assessment of a PPP? At what point should one be done (before or after private sector involvement)? Should the process differ from the process for non-PPP roads? The government is unlikely to give environmental assessment requirements a high priority since it will reduce the size of the program and increase the project deployment time.

An important part of the CLIOS process is Step 12 for post-implementation evaluation and modification. This also step also applies to improving how the CLIOS process was handled as well as the choices of strategic alternatives and their implementation. Although there is no formal requirement in the CLIOS process to consider this process reinvention in other steps, it may be useful to investigate alternatives during step 7. This process reinvention could involve keeping the core, 12 step CLIOS process while changing how it was executed, changing the participants in the process, or modifying the tools used for system representation and alternative evaluation. A more radical reinvention would be changing the CLIOS process itself for this application. The order of the steps could be changed, new steps introduced, or existing steps removed.

Who develops Enabling PPP Policy? Can different portions be developed by different departments or regional levels? The EPU has traditionally managed the process with input from other federal departments. State, regional, and local agencies do not appear to play a formal role although there are surely
informal channels, especially for agencies in the Kuala Lumpur Metropolitan Region. A greater role for these agencies may be considered.

Non-government stakeholders also appear to not have formal roles. Businesses have their informal connections with elected officials but these are not supportive of a transparent process. Citizen groups do not appear to have even informal links. Improving their participation in developing Enabling PPP Policy could be fruitful for ensuring the continuance of the toll road PPP program.

7.3.2.3 Step 8: Flag Important Areas of Uncertainty

The uncertainties from Section 4.3.3 remain. An additional source of uncertainty is in the representation of the institutional sphere. A basic understanding has been achieved for the organizations involved, their missions, and their formal relationships. An in-depth understanding of how those organizations operate, the informal lines of communication, and the unstated relationships between them is not included in this representation. The strength of the applicability of the evaluation and implementation of strategic alternatives to the real world rests on an accurate representation and the hope is that the data gathered has provided reasonable accuracy.

7.3.2.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties

In both Sections 4.3.2 and 7.3.2.2, a variety of alternatives have been identified. Now, the alternatives must be narrowed down into a cohesive, robust strategy to meet the Malaysian government’s goals. The approach for this step will involve listing each goal from Step 6 in Section 7.3.2.1 and selecting an appropriate range of alternatives that support the goal. An important point to remember about Enabling PPP Policy that it is focused on defining a range of alternatives for PPP Project Deployment and not on defining PPP Project Deployment to every last detail. This step is as much about removing bad alternatives as it is about including good ones.

Meet national transportation needs with low cost and high safety to the consumer while relying on private sector investment through toll road concessions

Relying on private sector investment requires the public sector to accommodate a variety of arrangements to access that capital. Any arrangement that provides the transportation service without excessive government funds will be permitted. Traditional design-build-finance-operate (DBFO) toll roads will continue to be principal arrangement but Operations and Maintenance leases or other arrangements will be permitted.

To be more precise about what we mean by excessive government funds, if the PPP project has the same benefits as a government facility would, any government financial contribution must be less than in the government-only case. If the PPP facility will bring in additional benefits compared to a government facility, the government may contribute more than it would for the government facility but less than the additional benefits. If the facility is scaled down, the reduction in the government contribution must exceed the reduction in benefits. This should not be an issue for most facilities since most of the financial burden is placed on the private sector. Any increases or decreases in benefits are more than offset by the size of the private sector.
investment. It must be clear, though, that the government can still contribute financially to a PPP, perhaps in exchange for supporting certain government goals that reduce financial feasibility, and that there should be a benefit to using a PPP as a project delivery method rather than traditional government methods.

Low cost to the consumer must be achieved while continuing to rely on private sector investment. Two principal ways to achieve this are open competition for concessions and government subsidies. This last option is undesirable since it provides less incentive to the concessionaire to operate efficiently and it spreads the cost of the toll road from the users to all of society. It also contributes to perceptions that the toll road PPP program benefits politically-connected businesses.

The upside of open competition is that it should reduce total costs to society whereas subsidies only change the distribution of costs. Open competition would aid process transparency and reduce public criticism. The downside is that open competition is more time-consuming. A request for proposals has to be made and the competition held.

Institutional resistance to open competition may develop. If the program has partially been in support of politically-connected businesses, these businesses may resist the call for an open competition through their ties in the legislature and Prime Minister’s office. Business resistance may not be too high, though. There are few Malaysian companies that can build and operate a toll road. The initial aid provided to these businesses in the first two decades of the program has contributed to an industry with a few established firms who would still win most of the concessions under the new arrangements. Their market share losses may be minor although the reduction in profitability is more difficult to determine. It will be assumed that open competition is chosen over the mild objections of the concession industry.

The option for innovative proposals will remain. The Malaysian definition of innovative will probably be broader than ones presented earlier in this thesis. This is not expected to become a major loophole that entrenched companies exploit. Again, the concession industry is more mature than it was ten or twenty years ago. The politically-connected businesses have established themselves in the industry and it will be difficult to dislodge them whether competition is open or not.

Improving safety is an important goal for Malaysia and can be problematic in a society where there is a mixture of vehicle types, especially motorcycles and mopeds where the traveler is at much higher risk of injury and fatality. Enabling PPP Policy is perhaps not the best place to address specific safety practices. The Ministry of Transport handles general safety regulations and more specific issues could be handled during PPP Project Deployment. The main input from Enabling PPP Policy is to require the concessionaires to follow the safety regulations of the government without financial compensation if there are mild effects on their profitability.
Sustain economic growth and employment for all groups through the effective provision of a national transportation system
Economic growth and employment will be sustained by effectively meeting the other goals.

Increase national competitiveness in Southeast Asia through the efficient operation of the freight sector
The government needs to know how shippers and carriers use the system rather than just providing capacity in order to operate it to more efficiently to meet their needs (Sgouridis, 117). This implies involving these interests in the PPP Project Deployment process.

A network view of the transportation system must also be considered by Enabling PPP Policy. How does the toll road PPP integrate operationally into the system? From the freight viewpoint, consistent policies, procedures, and technologies are desirable. ITS is an important part of efficient freight operation with Commercial Vehicle Operations (CVO) technologies an important subset of ITS for freight. The government should ensure that the technology interface between the carrier and the infrastructure is consistent nationally. This is linked into the goal for technological interoperability.

Improve stakeholder involvement and the transparency of the process
There are three important areas where stakeholders can be involved in the PPP Project Deployment which the Enabling PPP Policy can affect: selecting projects that will be toll road PPPs, determining the technical design of the project, and developing the financial portion of the partnership. In this scenario, PPP Project Deployment is a part of a larger regional strategic transportation planning process. Project selection will be handled in that process and stakeholder involvement will follow those rules. The Enabling PPP Policy will mandate that stakeholders from businesses and citizen groups be involved in the technical design phase. Financial information may be provided to the stakeholders to better guide their input but stakeholder involvement in the financial portion of the PPP Project Deployment process is optional.

An assumption has been made that if the ruling party was concerned about aiding its business associates in the past, the concession industry has reached a point where they do not need as much aid anymore. The government has more flexibility in operating out in the open and will not feel as much pressure to award concessions in a specific way. Because of this, the Enabling PPP Policy will require that the selection criteria be public information and that once the concession has been awarded, the related information from the bids, but not the whole bids, will also be made public. The choice of selection criteria will be left to the PPP Project Deployment phase.

Strengthen the environmental approval process so it better meets local needs while maintaining support for the overall toll road PPP program
The Malaysian government is unlikely to support a strong environmental approval process. If greater environmental protection is desired than would result from the environmental approval process, it would have to be expressed during stakeholder involvement. Because of this, we expect the greatest strides for the environment will be achieved during stakeholder involvement. This does not mean Malaysia will neglect the environmental approval process but a revamped one is still not expected to give priority to environmental concerns.
A hybrid approach could produce an improvement over the current process. A quick assessment is done before a concession can be put out for bid or an innovative proposal is made by the private sector. An in-depth investigation will be done during the negotiation phase for both government- and private sector-initiated projects. The quick assessment will ensure that the concession will not cause excessive environmental damage. It will also be compared to a no-build alternative. If the expected net benefits of the toll road are not expected to exceed those of the no-build alternative, the government will not continue in the process. This will probably occur very infrequently. The in-depth investigation will be similar to the current process of examining a variety of toll road designs and alignments and choosing one that meets financial, social, and environmental criteria.

**Promote the economic status of Bumiputera by increasing investment and business opportunities**

The 30% investment requirement has been an adequate device to date for improving Bumiputera economic status but its effectiveness is becoming limited. The growth in the Bumiputera’s overall share of Malaysian companies has slowed in recent years; many of the best state-owned enterprises have already been privatized and the market is much larger than at the start of privatization in 1983 so an increase of a few percent now is larger in absolute terms. Despite the decrease in the overall effect of the minimum 30% Bumiputera equity ownership requirement, it will remain for the foreseeable future. The maximum 30% foreign investment requirement will also remain.

**Ensure toll roads are technologically interoperable from the consumer point of view**

The biggest problem in interoperability was solved with the government requiring concessionaires to shift to the Touch ‘n Go system. Advanced Traveler Information Systems (ATIS) is the next area where consumers would need technological interoperability. ATIS will not grow if people have to use several sources for the information they want. The logical course of action is to have concessionaires provide traffic information to the government in a standardized format.

Concessionaires may balk at this idea. With better information, people may use less expensive routes, depriving the concessionaire of revenue. In a study of ATIS use by Seattle commuters, Peirce and Lappin found that only 10% of travelers used ATIS and only 9% of this group changed departure time, routing, or other aspects of the trip (Peirce and Lappin, 5). Even if travelers change their routing, it may just be changing where they enter or exit the toll road. If Malaysian travelers replicated this performance, concessionaires lose at worst 1% of their travelers and they may even gain some travelers if the toll road is perceived as a good value. Of course, Seattle highways are free while Malaysia has tolls so there is greater incentive for the Malaysian traveler to seek out traffic information to find a route that meets their personal needs for travel time and cost. Even then the effect may be minor since the low cost route may have much higher travel times.

Another concern of concessionaires will be if the government integrates the toll road traffic information into their operations and what the effect will be. Just to be clear, this is integration of traffic information and not government operation of the toll road. Like ATIS, the author does
not expect much of a negative impact; there may not be feasible alternatives to the toll road available to travelers. Integrating the information with government traffic operations may even help the toll road by improving traffic flow around the entry and exit points which should smooth the flow on the toll road. This will hopefully increase reliability and provide greater value to the consumer.

Like ATIS, concessionaires should be required to comply with government standards for CVO. The standards for ATIS and CVO should be devised with the cooperation of the private sector, including concessionaires, system vendors, and users, but that process is separate from Enabling PPP Policy or PPP Project Deployment.

The final Enabling PPP Policy has selected these alternatives:
- Any PPP arrangement is permitted.
- Open competition is required for non-innovative toll road PPPs with published selection criteria and the release of the relevant information from each proposal for the selection criteria.
- Private sector toll road proposals will be accepted if the government deems them innovative.
- Toll road PPPs must comply with all government safety regulations at their own expense unless a significantly negative profitability impact can be shown.
- Toll road PPPs must comply with standards for ETC, ATIS, and CVO technologies to ensure efficient system operation.
- Stakeholders including citizen groups, shippers, and carriers, will be allowed to participate in the technical design phase of PPP Project Deployment. Other stakeholder involvement is optional.
- A quick environmental assessment must be successfully completed before environmental approval negotiations can begin and a comparison with the no-build alternative will be part of this assessment. An in-depth investigation will be done during the technical design phase.
- A minimum of 30% of the equity in new concessions must be owned by Bumiputera. A maximum of 30% of the equity can be owned for foreign stockholders.

This selection of alternatives still provides considerable flexibility for the PPP Project Deployment process and should be more acceptable to the public. With this flexibility and expected public acceptance, it should be robust enough to perform well in a variety of future scenarios.

7.3.3 Implementation Stage

7.3.3.1 Step 10: Design Strategy for Implementation in the Physical Domain And Implement

As stated in Section 4.4.1, the strategy for implementation in the physical domain depends on the relationship between the organizations that developed Enabling PPP Policy and those responsible for implementing PPP Project Deployment. There are two sets of qualitatively different
relationships in Malaysia for this issue. The first is between the national agencies and the regional and local agencies. The second is between the national agencies.

In the conception of PPP Project Deployment as part of the RSTP process, local and regional agencies will play a central role. In Malaysia, local and regional officials are appointed by the national government, not elected by local people. While there may not be a directly hierarchical relationship between the organizations, the local officials will be more accepting of federal policies than if they were elected. The assumption is that regional and local officials will follow the Enabling PPP Policy without protest, which the EPU will take into account when designing their implementation strategy.

The implementation strategy hinges on the treatment of the other national agencies. Issues include the need for compromise or the choice of implementing an alternative through policy or law.

The Ministry of Natural Resources and Environment should not be expecting much from the process so any increase in addressing environmental issues will be welcome. One issue will be who pays for the assessments. For private sector-initiated proposals, the private sector will be responsible for all costs. For government proposals, regional agencies will pay for the initial assessment and the private sector for the in-depth assessment. Since the Ministry will not face an additional financial burden while also shaping a higher level of environmental protection, they should support the Enabling PPP Policy. This will eliminate the need for political wrangling. If the EPU wants to enforce the Enabling PPP Policy through department policy rather than legal code, the Ministry of Natural Resources and Environment will likely accept.

The Ministry of Finance’s (MOF) objectives include ensuring economic growth, effective financial management, and a more equitable distribution of wealth. Given the government’s policy that privatization is an important part of its economic growth strategy, the MOF is assumed to be pro-privatization. The large amount of financial support provided by the government should lead to some restraint for toll road PPPs by the MOF since it probably does not want to appear like a poorly managed institution handing out loans to anyone who asks; would prefer to give loans to concessionaires who can effectively manage the risk. An equitable distribution of wealth indicates a desire to protect the current investment policies limiting foreign investment and mandating a minimum level of Bumiputera participation. The expectation of the overall MOF goals are that they support privatization but only for financially viable projects that best meet the ethnic distributions requirements for equity. The Enabling PPP Policy contributes to all of these goals and should be acceptable to MOF. Since no additional resources are required from the MOF, they should be willing to accept whatever implementation the EPU chooses.

The MHA’s core mission is to monitor the construction, operation, and maintenance of toll roads; with the greater emphasis on the regional level in PPP Project Deployment, it is unclear whether it will survive. The MHA will surely fight any policy that will lead to its elimination. The EPU can either force the issue and try to eliminate the MHA, pushing its responsibilities to the regions, or it can compromise. A possible compromise would be to explicitly protect the MHA. Again, the expectation is that PPP Project Deployment is embedded in the regional
planning process, not the construction, operation, and maintenance phases so regional agencies are not necessarily involved here. The least contentious choice is to go for the compromise solution that protects the MHA's role.

With institutional buy-in, the EPU does not need to enact any new laws. It can formalize the Enabling PPP Policy using its own processes. Since the other agencies have been involved and accommodated, they are expected to agree to the new policy. This process has modified the Enabling PPP Policy, though. In addition to the policy points from step 10, the additional changes have been made:

- The initial environmental assessment will be funded by the regional planning agency (or equivalent) for government-initiated projects and by the private sector for their proposals.
- The in-depth environmental assessment will be funded by the concessionaire who won the concession.
- The MHA will continue in its role of monitoring the construction, operations, and maintenance of toll road PPPs.

7.3.3.2 **Step 11: Design Strategy for Implementation in the Institutional Sphere and Implement**

Central to this strategy is determining the roles of government agencies in the negotiation process. As noted in Section 4.4.2, an effective PPP Project Deployment process requires government personnel who can successfully negotiate with the private sector. The EPU has this capability in Malaysia while the agencies at the state level or lower do not. In this scenario, the State Planning Committees are responsible for the regional transportation plans so the EPU cannot take full control of the process. A more likely arrangement is that the SPC manages the regional transportation planning process while the EPU acts as a government consultant on toll road topics and manages concession agreement negotiations so the SPC is not taken advantage of by the private sector.

While the relationship between the government and private sector was noted as a concern in Section 4.4.2, the government is not expected to change this. This kind of change would probably require new laws. Limiting relationships would not benefit elected officials who may need private sector support for election campaigns so there is little incentive for them to expend political capital on the issue. The toll road issue alone may also not be enough to lead the public to act. The close relationship between the private sector and elected officials is a concern but there does not appear to be sufficient incentive to change things.

The other relationships between organizations in the institutional sphere are not expected to require changes. The main point of the institutional strategy is defining the roles of the EPU and MHA in the PPP Project Deployment process. Giving the SPC's responsibility for regional transportation planning and PPP Project Deployment is also part of the architecture, although one mandated as part of this chapter's scenario rather than one developed during the CLIOS process.

7.3.3.3 **Step 12: Post-Implementation Evaluation and Modification**

Toll road PPP performance will be monitored by the MHA and reported to the EPU for future planning. The EPU can determine if there are issues that are pressing the boundaries of what the government can tolerate and the cause of those issues. The system representation will be
updated if necessary, slight changes to the Enabling PPP Policy made, or an overhaul of the policy using the complete CLIOS process performed with new stakeholder roles or new analytical tools.

In determining the cause of any problems with the toll road PPP program, the EPU must consider the possibility that the cause was a flaw in the process for developing the Enabling PPP Policy, this process that has been explained in this first half of the chapter. For example, the representation could be wrong because an important stakeholder was missing whose knowledge would have provided the necessary insight into the system.

This initial run through the CLIOS process was assumed to have been done by the EPU in coordination with other national agencies. Businesses, regional and local agencies, and citizen groups did not formally participate. The reinvention of this process, similar to development of the Regional Planning Architecture concept Jon Makler (Sussman, 2005, 67-70), is expected to focus on the roles of these organizations.

An assumption is that the EPU will follow the policy of “If it ain’t broke, don’t fix it.” If the toll road PPP program performs well, organizational roles will remain the same in another iteration through the CLIOS process through institutional inertia on the EPU’s part and a lower demand for changes from citizen groups. The downside of this is that it may rob society of an even better toll road PPP program. Insights of other stakeholders could improve the program but since there is no incentive for this improvement, it will not be implemented. This is an unfortunate outcome but based on expected organizational actions, this is the likely one. Of course, the program may perform poorly, leading to the necessary changes in stakeholder roles or perhaps more extensive changes to the process.

7.4 The New Malaysian PPP Project Deployment Process

To better explore how PPP Project Deployment works, it will be applied in the Kuala Lumpur Metropolitan Region (KLMR) rather than considering a general process applicable to all Malaysian regions. Despite this specificity, it should still provide value for other Malaysian metropolitan regions. This section will be based on the work done for Chapter 5 in applying the CLIOS process to PPP Project Deployment. To reiterate, the PPP Project Deployment is integrated into the regional strategic transportation planning (RSTP) process where toll road PPPs are treated as one alternative among many possible alternatives to meet transportation needs.

Before beginning the process, the participants in the RSTP process must be identified. In most other Malaysian metropolitan areas, the State Planning Committee (SPC) would be responsible for managing the process but KLMR is a special case. As shown in Figure 7-6, it includes the Federal Territory of Kuala Lumpur and eight local authorities in the state of Selangor (Zakaria, 2004, 70). The main corridors of development have been from Kuala Lumpur westward to Port Klang, the major shipping port in Malaysia and southward to the new cities of Cyberjaya and Putrajaya, an area also promoted as the Multimedia Supercorridor. Cyberjaya is intended to be a city for the growing technology industry, perhaps a Malaysian version of Silicon Valley. Putrajaya is the new center for the national government with many of their offices relocating there.
In regards to the institutional structure for transportation planning in KLMR, Zakaria writes, "There is lack of data on the institutional mechanisms of how transportation strategic planning works." (Zakaria, 2004, 82) What Zakaria did find is a proposed institutional structure from 1989 by Mohamed Ishak, the Director-General of the Federal Department of Town and Country Planning at the time, but it is not known if it is still followed. In the absence of better information, it will be used as the existing institutional structure. This structure is shown in Figure 7-7.

Figure 7-6 - The Kuala Lumpur Metropolitan Region (Source: Bunnell and Barter)

Based on Ishak's organizational descriptions for the Klang Valley Regional Planning Council, Klang Valley Regional Development Committee, and Klang Valley Planning Secretariat, the substantial planning activity occurs in the Klang Valley Planning Secretariat (KVPS) (Zakaria, 2003, 29). In the scenario described in this chapter, the KVPS will work with the planning units for the State of Selangor and the Federal Territory of Kuala Lumpur to develop the regional strategic transportation plan. Other government agencies are surely involved in actual KLMR planning but in this scenario they will not be formally involved since it cannot be well established as to who they are and what their roles are.

Businesses and citizen groups will be involved in the process. In this scenario, the KVPS is aware of the problems caused by the lack of stakeholder involvement and has moved to incorporate this involvement in the adoption of the CLIOS process for RSTP. It is an advisory, non-binding involvement; if the government desires a project, it can approve the project regardless of public opinion. Since the focus is on the PPP Project Deployment portion of RSTP and not RSTP as a whole, a more rigorous examination of potential public involvement strategies.
will not be pursued. The separate activities for innovative toll roads will not be considered as part of this section. Chapter 5 provides the details necessary for the extension of the process to innovative toll roads.

Figure 7-7 - The KLMR Transportation Planning Institutional Structure (Source: Ishak)

7.4.1 Representation Stage

7.4.1.1 Step 1: Describe System; Issue Checklist and Initial Goal Identification
The issues and initial goals apply to the regional transportation system in general and not to toll road PPPs specifically.

Issue Checklist:
- Growing transportation needs, particularly automobile needs
- A federal government unwilling to fund major highway infrastructure
- Increasing urbanization
• Large number of motorcycles, mopeds, and other two-wheeled vehicles mixed with larger vehicles leading to an unsafe environment
• Limited planning resources and inexperience in handling toll road PPPs in regional and local institutions
• Low involvement of the public and other non-governmental stakeholders
• Requirements placed on the PPP Project Deployment process from Enabling PPP Policy
• A push to maintain economic growth to achieve Developed Nation Status by 2020
• A fragmented institutional structure due to the multi-jurisdictional nature of the region
• A growing need for regional competitiveness in the freight sector, especially in international shipping at Port Klang
• Development of the Multimedia Supercorridor, Putrajaya, and Cyberjaya area in the southern part of KLMR
• An increasing need to efficiently operate the transportation system
• Air quality issues that can become severe at times

Initial Goals:
• Meet regional transportation needs for travelers and freight
• Promote regional competitiveness through efficient freight operations
• Improve air quality
• Improve the safety of the regional transportation system
• Use a process that stakeholders can support
• Meet needs in a financially efficient manner

7.4.1.2 Step 2: Identify Major Subsystems of the Physical Domain and Major Actor Groups on the Institutional Sphere

The major subsystems in the physical domain and major actor groups from Chapter 5 are sufficient for the KLMR in this step.

Major Subsystems:
• Transportation
• Economy
• Land Use
• Environment

Major Actor Groups:
• Government
• Businesses
• Citizen Groups

7.4.1.3 Step 3: Populate the Physical Domain and the Institutional Sphere on the CLIOS Diagram

These representations are based on the ones developed for Chapter 5. Link matrices and diagrams are provided. The new components will be denoted below the appropriate link matrix. New links or different component descriptions, such as a component no longer being a policy lever, will be discussed later.
Table 7-6 - Malaysian PPP Project Deployment Transportation Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td>Travel Cost</td>
</tr>
<tr>
<td>Travel Cost</td>
<td>Freight Use</td>
</tr>
<tr>
<td>Freight Use</td>
<td>Intermodal Efficiency</td>
</tr>
<tr>
<td>Intermodal Efficiency</td>
<td>Transportation Capacity Needs</td>
</tr>
<tr>
<td>Transportation Capacity Needs</td>
<td>Transportation Investment Policy</td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>Mode Choice</td>
</tr>
<tr>
<td>Mode Choice</td>
<td>Automobiles</td>
</tr>
<tr>
<td>Automobiles</td>
<td>Two-wheeled Vehicles</td>
</tr>
<tr>
<td>Two-wheeled Vehicles</td>
<td>Public Transportation</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>Safety</td>
</tr>
<tr>
<td>Safety</td>
<td>System Operations</td>
</tr>
<tr>
<td>System Operations</td>
<td>Transportation Infrastructure</td>
</tr>
<tr>
<td>Transportation Infrastructure</td>
<td>Congestion</td>
</tr>
<tr>
<td>Congestion</td>
<td>Regional Population Growth</td>
</tr>
<tr>
<td>Regional Population Growth</td>
<td>Travel Time Reliability</td>
</tr>
<tr>
<td>Travel Time Reliability</td>
<td>Travel Time</td>
</tr>
<tr>
<td>Travel Time</td>
<td>Urban Planning</td>
</tr>
</tbody>
</table>

As in Enabling PPP Policy, Transportation Capacity Needs has been explicitly included whereas it was implicitly part of Transportation Investment Policy in the generic region. Mode Choice has been expanded to include choices for Automobiles, Two-Wheeled Vehicles, and Public Transportation. The mix between Automobiles and Two-Wheeled Vehicles is an important driver of Safety. Intermodal Efficiency is included to reflect the importance of Port Klang and freight in general to the regional economy and a Safety component is added to deal with a major concern for that issue.
Figure 7-8 - Malaysian PPP Project Deployment Transportation Subsystem Diagram
Table 7-7 - Malaysian PPP Project Deployment Economy Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Use</td>
<td>Employee Productivity</td>
</tr>
<tr>
<td>Freight Use</td>
<td>X</td>
</tr>
<tr>
<td>Worker Productivity</td>
<td>X</td>
</tr>
<tr>
<td>Innovation</td>
<td>X</td>
</tr>
<tr>
<td>Industrial Policy</td>
<td>X</td>
</tr>
<tr>
<td>Education</td>
<td>X</td>
</tr>
<tr>
<td>Air Quality</td>
<td>X</td>
</tr>
<tr>
<td>Environmental Policy</td>
<td>X</td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td></td>
</tr>
<tr>
<td>Regional Economic Growth</td>
<td></td>
</tr>
<tr>
<td>Interest Rates</td>
<td>X</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X</td>
</tr>
<tr>
<td>Private Sector Capital Investment</td>
<td>X</td>
</tr>
<tr>
<td>Regional Competitive Advantage</td>
<td>X</td>
</tr>
<tr>
<td>Congestion</td>
<td>X</td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td>X</td>
</tr>
<tr>
<td>Transportation Capacity Needs</td>
<td>X</td>
</tr>
</tbody>
</table>

Transportation Capacity Needs is added to the Economy Subsystem as it was in the Enabling PPP Policy. Unlike the Enabling PPP Policy, Transportation Investment Policy remains. There are relationships captured in this representation such as between the cost of money (interest and exchange rates) and Transportation Investment Policy that could be important. Those relationships were replicated elsewhere in Enabling PPP Policy, causing no net loss of information in that system's representation when Transportation Investment Policy was removed.
Figure 7-9 - Malaysian PPP Project Deployment Economy Subsystem Diagram
Table 7-8 - Malaysian PPP Project Deployment Land Use Subsystem Link Matrix

<table>
<thead>
<tr>
<th>From</th>
<th>Regional Population Growth</th>
<th>GDP Per Capita</th>
<th>Population Density</th>
<th>Residential Development</th>
<th>Employment</th>
<th>Urban Planning</th>
<th>Transportation Investment Policy</th>
<th>Industry Placement</th>
<th>Commercial Service Placement</th>
<th>Transportation Infrastructure</th>
<th>Congestion</th>
<th>Quality of Life</th>
<th>Freight Use</th>
<th>Regional Competitive Advantage</th>
<th>Environmental Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Population Growth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP Per Capita</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population Density</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Investment Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry Placement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Service Placement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Infrastructure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Competitive Advantage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no change in the land use subsystem representation from the generic representation.
Figure 7-10 - Malaysian PPP Project Deployment Land Use Subsystem Diagram
Table 7-9 - Malaysian PPP Project Deployment Environment Subsystem

<table>
<thead>
<tr>
<th>From / To</th>
<th>Water Supply</th>
<th>Agriculture</th>
<th>Biodiversity</th>
<th>Air Quality</th>
<th>Innovation</th>
<th>Soil Erosion &amp; Deforestation</th>
<th>Quality of Life</th>
<th>Power Generation</th>
<th>Residential Economic Growth</th>
<th>Urbanization</th>
<th>Congestion</th>
<th>Inaccessible Settlement Growth</th>
<th>Regional Population Growth</th>
<th>Environmental Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Erosion &amp; Deforestation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of Life</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Generation</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Development</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Economic Growth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inaccessible Settlement</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Population Growth</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Policy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are no differences between the environment subsystem here and the generic one in Chapter 5.
Figure 7-11 - Malaysian PPP Project Deployment Environment Subsystem Diagram
Figure 7-7 provides an overview of the institutions involved. To reiterate, the three primary institutions from that figure are the Klang Valley Planning Secretariat, Federal Territory Planning Unit, and Selangor Planning Unit. Local agencies will have to act through the appropriate planning units as those respective jurisdictions see fit.

The national government retains a strong influence over regional transportation planning. The EPU will have a central role in the process due to the dictates of the Enabling PPP Policy that it created. The Ministry of Natural Resources and Environment will influence the environmental approval process for PPP projects thanks to the requirements of the Enabling PPP Policy. If government financial support is needed, it will be requested through the Ministry of Finance since individual states do not have the financial resources for their own PPPs and the multi-jurisdictional nature of the KLMR further complicates issues. The MHA’s influence is expected to be mild during the planning process but it may still play a role.

The same types of organizations for businesses and citizen groups are involved in the PPP Project Deployment process as are involved in Enabling PPP Policy. Whereas the Enabling PPP Policy may see the influence of national or trade organizations, if they exist, PPP Project Deployment will handle local groups. These groups have more influence during the RSTP process than with Enabling PPP Policy development in that they will be more focused. At the national level, the outcomes are vague so social advocates may have difficulty drumming up support. When a toll road PPP is being considered that will run through specific neighborhoods, the public will more easily organize in protest.
7.4.1.4 **Step 4A: Describe Components in the Physical Domain and Organizations on the Institutional Sphere**

The conventions of Chapters 4 and 5 are used. Policy levers are shown in bold font in Table 7-6, Table 7-7, Table 7-8, and Table 7-9. Common drivers are shown in the last three rows of each table.

The main difference between this representation and those for the Enabling PPP Policy and the generic PPP Project Deployment is with the policy levers. The higher degree of centralization in
Malaysia as opposed to the generic region removes some policy levers from regional control. In this representation, such levers as Industrial Policy and Environmental Policy are not expected to be present. Regional control may clash with the dictates of the national government. This reduces the system alternatives for this iteration of the process although a new institutional architecture may create these levers. In one case, this does not eliminate the possibility of an effective strategy.

7.4.1.5 **Step 4B: Describe Links between Components in the Physical Domain and between Actors on the Institutional Sphere**

**Class 1 Links**
**Transportation Subsystem**
Intermodal efficiency is driven by investment in intermodal facilities and operating existing facilities efficiently. The system operations driver operates on a short timeframe of minutes to hours. The transportation policy investment driver occurs over a longer timeframe than operations since they must pass through a deliberative planning process. This will certainly take months and probably years, especially for larger facilities.

Intermodal efficiency will drive how shippers and carriers act. The speed of this link depends on how flexible the shippers and carriers are, which freight containerization contributes positively to, and how much information is available. If shippers and carriers can quickly detect changes in efficiency, they may be able to adjust their operations quickly if they are not constrained to one specific way of operating.

Intermodal efficiency applies to travelers, as well. If intermodal transfers between rail and buses or between car and public transportation are done well, the value of the public transportation modes increases relative to cars.

Mode choice, focusing on traveler choice, is still driven by a variety of level-of-service components as well as traveler attributes such as income. The outcome of mode choice is then the number of travelers in automobiles, two-wheeled vehicles, and public transportation. This decision is made continuously by individuals although changes in the aggregate levels for each mode will change slowly. Unless one of the level-of-service attributes changes or a new mode becomes available, such as when a person buys their first car, people tend to choose the same mode they did in the past for similar trips.

The distribution between the modes will drive congestion and safety. Safety is especially driven by the mix between cars and two-wheeled vehicles, with public transportation not contributing as much. Freight use may also affect safety. While the freight-safety link can operate very quickly, there may be little day-to-day change in mode distribution; congestion and safety will be about the same from one day to the next. The medium- to long-term changes are more interesting. More people switching from two-wheeled vehicles to cars may improve safety through two mechanisms. First, cars offer more protection than a motorcycle or moped in an accident. Second, cars take up more space, leading to greater congestion. The accidents that do occur will be at lower speeds with a reduction in damage.
Most of the drivers for safety have been mentioned: congestion and the mix of automobiles and two-wheeled vehicles. Another driver is the operation of the transportation system. Highway fatalities could be reduced by limiting the types of vehicles on highways. Enforcement of traffic laws will reduce unsafe behavior. Effective operation could also reduce road rage or other tensions from driving that cause people to act in an unsafe manner. The timeframe of influence of this link is probably several weeks. People may not instantly recognize a change in operation but it may become clear to them eventually. This timeframe could be reduced in some instances. Informing the public that there will be greater enforcement of traffic laws beginning on a specific date should bring about quicker compliance when that date arrives.

The final component added to the transportation subsystem is Transportation Capacity Needs. It is driven by aggregate travel demand as expressed through GDP per Capita and regional population as well as the historic mode choice and freight use. The needs will drive the decisions for the transportation investment policy. Increasing automobile ownership and GDP per Capita may lead to the decision to build toll roads.

**Economy Subsystem**

In the economy subsystem, the new drivers of Transportation Capacity Needs are Regional Economic Growth and Employment. The former represents additional transportation needs of companies as they ship more products. The level of employment will also be an important driver of transportation needs since more workers means more people needing to get to work, increasing capacity needs. These links will operate on the order of several months to a couple years.

**Class 2 Links**

The square in the upper left area of Table 7-10 between Elected Officials and Automobile Associations on both the rows and columns represents the Class 3 links which will be discussed shortly. The area to the right of the Class 3 links lists the projections from the institutional sphere onto the physical system. The bottom area under the gray section lists the projections from the physical system back onto the institutional sphere.

The projections onto the physical system are more limited than with Enabling PPP Policy. The regional agencies do not have the same powers as the national government in the centralized Malaysian political system. Elected officials will still influence government policies while government agencies are more limited in their sphere of influence. Businesses and citizen groups will still influence policies important to them.
To reiterate the point about the reduction in policy levers compared to Enabling PPP Policy, some connections will be very difficult to use for regional purposes. The EPU will influence the regional transportation system and the industrial policy is a lever for the EPU but from the regional planner’s perspective, that connection is more of a fixed policy, almost an exogenous factor, rather than something it can change. The EPU will be reluctant to change these nationwide policies based on the needs of one region. The regional agencies are not expected to have that kind of influence on the EPU.

As in previous descriptions of the Class 2 links from the physical system to the institutional sphere, the components are ones that are important to the organization’s mission. For example, elected officials want to get reelected which requires that voters be satisfied with the government’s direction. The economy and quality of life measures are important drivers in determining where the region is going so elected officials will change policies if these measures are producing negative results.
Class 3 Links
The main axis of influence for the planning process is through the Klang Valley Planning Secretariat (KVPS), an agency that is not expected to be politically strong and is more open to the influence of other departments. Many other government agencies will affect the actions taken by the KVPS. The state and federal territory planning units have an obvious influence on the KVPS, and the KVPS on them, since they should be closely coordinating with the KVPS on regional planning. The national agencies will influence the KVPS through their policies and standards. The EPU will be an agency that takes on a much more active role with the KVPS, providing technical expertise for any toll road PPP projects.

As in previous representations, the businesses and citizen groups influence elected officials who can then change government agency operations. It is assumed the businesses and citizen groups do not directly influence the agencies, relying on the link through elected officials, although they will interact with them.

7.4.1.6 Step 5: Seek Insight about System Behavior
This section focuses on the insights gained from the new components. A base set of insights for from the generic PPP Project Deployment process can be found in Section 5.2.6.

Class 1 Links
Are there strong interactions within or between subsystems?
As in Chapter 5, the Transportation and Land Use subsystems have strong interactions with each other. They are slow interactions, though, as it may take several years to develop an area large enough to significantly shift behaviors and even longer to redevelop an existing area.

Are there chains of links with fast-moving, high-influence interactions?
The interaction between system operations and intermodal efficiency can be fast-moving. It may not be high-influence unless there is high variability from day-to-day in that efficiency. Travelers and freight value low variability.

Are some of the paths of links non-linear and/or irreversible in their impact?
None of the new links are irreversible.

The links between automobiles and two-wheeled vehicles and the safety component may be nonlinear. A change of only a few percent in the current number of two-wheeled vehicles could lead to greater safety benefits or costs if they have a high mode share than if they have a small share.

The links between intermodal efficiency, freight use, and mode choice could theoretically be nonlinear although there may be physical and eventually financial constraints. An improvement of several percent in intermodal efficiency may make the use of the modes involved much more competitive with other modes and draw in far more people than that several percent improvement would indicate, especially if it moved from providing a level-of-service that was not quite competitive to one that is superior. Private sector transportation providers may raise prices if they do not have the capacity to meet demand. Public sector providers will have to work through slow moving government budgeting processes of the public sector.
Can strong positive or negative feedback loops be identified?
The additional components do not appear to introduce any new feedback loops from those described in Section 5.2.6. Most of the new components are merely expansions of existing components so feedback loops incorporating them have been covered previously.

Class 2 Links
Are organizations pushing the system in the same direction, or is there competition among organizations in the direction of influence?
The national government agencies will have a mix of influences, as described in Section 7.3.1.6. The EPU and MHA will want a large, unencumbered toll road PPP system. The Ministry of Natural Resources and Environment will want to limit the environmental impact, which could potentially reduce the size of the program.

There may be mild competition between the national and regional agencies, although overall they likely push in the same direction. The regional officials are appointed by the national government. The expectation is that straying too far from national government policy could damage the official’s career. Another possibility is that the system has been structured in such a way that regional officials could be strong advocates for the regional position over the objections of the national government, in private at least. Given the centralized nature of Malaysian government, it is more probable that regional officials will toe the national government policy line in public. If the CLIOS process were actually used, the government agencies that are participating in the process should know what the effects are.

Businesses and citizen groups will have competing influences as is usual.

Are there organizations on the institutional sphere that have an influence on many components within the physical system?
Elected officials technically influence many components but their actual influence is limited. These officials only exist in the national government and are less interested in local affairs, even if that locality is KLMR. They do influence national policies and could always target legislation to KLMR.

The KVPS is expected to be the most influential organization in the regional transportation system. It can coordinate transportation and urban planning which will strongly influence the long-term transportation needs of the region. Not enough is known about the KVPS to tell if this is a strong influence that can be exerted over the state of Selangor and the Federal Territory of Kuala Lumpur or if the KVPS is a weak regional agency that requires the buy-in from the two jurisdictions and their planning units. In this scenario, this process is being performed by the KVPS so the assumption will be that it has some influence but will have to consider the needs of the two jurisdictions.

No other organizations have significant influence over many physical system components.
Class 3 Links

Are the relationships between organizations characterized by conflict or cooperation?
The interaction between the KVPS and state and federal territory planning units is not altogether clear. The two planning units could be in competition, as in the Mexico City Metropolitan Area where the State of Mexico (EM) and the Federal District (DF) are run by two different political parties that fear losing a political edge if they cooperate (Ortiz, 33). The key difference is that officials for both jurisdictions are chosen by the national government rather than elected. This national influence should encourage greater cooperation than if they were elected, although perhaps with some loss of concern for the local constituents. It will be assumed that the overall effect is that the regional organizations push the system in the same direction despite occasional disagreements. The uncertainty over the relationship presented in this scenario should not be an issue in a real-life implementation of the process. The KVPS understands the nature of the relationships between organizations.

Are there any high-influence interactions, or particularly strong organizations that have direct impacts on many other organizations within the institutional sphere?
Elected officials, particularly the Prime Minister, have direct impacts on the national agencies. The impacts are not quite so direct on the regional agencies. The elected officials will still be concerned about the direction of Kuala Lumpur but the additional layers of organizations and bureaucracy will weaken the influence. The legislature is also less concerned with the day-to-day affairs of organizations. There is still significant power held by national officials. If the national government really wants a project, it will get it despite the weaker influence.

What is the hierarchical structure of the institutional sphere, and are there strong command and control relations among the organizations?
The national agencies are under the control of the Prime Minister. Elected officials’ control over regional agencies is more indirect, going through more layers of bureaucracy. The regional agencies, businesses, and citizen groups are all independent of each other.

Are there any links between organizations that act via the physical system (e.g. an organization has a projection to a physical component and this physical component has an impact on another organization)?
The KVPS and EPU can strongly affect concessionaires through the physical system. They could plan for competitive infrastructure, allow the operation of the regional transportation system in an unbeneficial manner for the concessionaire, and negotiate the concession agreements that will determine the financial feasibility of the toll road PPP.

The KVPS will also affect elected officials through the physical system. They may choose projects that turn out poorly. Voters may blame the elected officials for these mistakes and vote for other candidates.
7.4.2 Design, Evaluation, and Selection Stage

7.4.2.1 Step 6: Identify Performance Measures, Refine System Goals and Build Quantitative Model

The following performance measures are identified as relevant to the system:
- GDP Per Capita
- Travel Cost
- Travel Time
- Travel Time Reliability
- Intermodal Efficiency
- Safety
- Congestion
- Regional Economic Growth
- Employment
- Air Quality
- Quality of Life

Again, the performance measures can be mapped to the initial goals to help shed light on what the region is truly pursuing for its goals:
- Meet regional transportation needs for travelers and freight
  - Travel Cost
  - Travel Time
  - Travel Time Reliability
  - Congestion
- Promote regional competitiveness through efficient freight operations
  - Intermodal Efficiency
  - Regional Economic Growth
- Improve air quality
  - Air Quality
- Improve safety on the regional transportation system, especially roads
  - Safety
- Use a process that stakeholders can support
  - None
- Meet needs in a financially efficient manner
  - Travel Cost

Not all of the performance measures are related to a goal. This could indicate that either new goals are needed for the measures to be mapped to or the performance measure is not needed. The unused performance measures are GDP Per Capita, Employment, and Quality of Life. If these decline, elected officials will be ousted and their may be upheaval in government agencies, businesses will have lower profits and may go out of business, and the public will directly feel the effects. For all concerned, these should be included as goals.

A refined set of goals including goals covering the omissions are:
- Meet regional transportation needs by providing a low cost, low travel time, and high reliability intermodal system
- Promote regional competitiveness and regional economic growth by supporting freight needs
- Improve the regional quality of life by developing a transportation system that increases employment opportunities and decreases air pollution
- Improve safety through better system design and operations
- Use a transparent process that involves the appropriate stakeholders
- Achieve the above goals in a financially efficient manner

The new goals ignore certain issues that have been addressed in the Enabling PPP Policy, particularly technology interoperability. If the Enabling PPP Policy had not settled the issue, the KVPS should add a goal for regional system interoperability.

7.4.2.2 Step 7: Identify and Design Strategic Alternatives for System Improvement

The strategic alternatives are increasingly specific from this step forward. For example, the KVPS may identify a need for additional transportation capacity between Kuala Lumpur International Airport and downtown Kuala Lumpur. Alternatives could include a toll road, a light rail line, a monorail, or a freeway. This requires the capability to identify specific needs, though. An in-depth investigation of KLMR’s transportation needs is beyond the scope of this thesis. This process will be handled in a general way to illustrate the use of the CLIOS process and the integration of PPP Project Deployment.

Section 5.3.2 illustrated several of the considerations for designing a toll road PPP strategic alternative. This was handled with little thought about the constraints of the Enabling PPP Policy since there was not a specific policy to adhere to. With a specific Enabling PPP Policy, those alternatives are narrowed down and a better designed set is possible.

Physical Design
The design must use the Touch ‘n Go system and must also have manual payment booths. The Touch ‘n Go system is not the most advanced ETC system. The driver must place the Touch ‘n Go card against a reader at the toll booth and then a gate will open to allow the vehicle to pass. This is still disruptive to the flow of traffic and nowhere near the convenience of modern ETC systems where drivers can drive through at freeway speed. Perhaps toll road PPPs would face less criticism if they were more convenient.

Malaysian toll roads are typically Design-Build-Finance-Operate affairs where the concessionaire builds and tolls the entire road. The author cannot find an example similar to California Route 91 where toll lanes were added to existing capacity. There does not appear to be a legal constraint to this type of design and the Enabling PPP Policy allows any PPP arrangement. If a need could be identified, perhaps in denser urban areas where tolled lanes could be added to an existing road, these projects could be used.

Operation
An important topic that was mostly settled by the Enabling PPP Policy is the responsibility of the toll road PPP for network operations. The concessionaire must provide its traffic data to the
appropriate transportation operations organization in a standardized format. The concessionaire must also comply with prevailing CVO standards. The policy does not forbid further integration with regional operators but concessionaires may desire some autonomy in their operations. First, their profit depends on efficient operation so they have a natural incentive to manage the operation themselves. Second, there are several toll roads in KLMR. There may be some competition between parallel routes and the concessionaires would not want to place their profitability in the hands of the government to this extent.

Malaysia has yet to use HOT lanes or other managed lane ideas. Congestion pricing has yet to be introduced, either. The result is that Malaysian toll roads are invariably roads where all lanes are tolled with the toll based on the class of vehicle. It does not appear that the law prohibits managed lanes or congestion pricing. The KVPS could identify strategic alternatives with this feature as a way to manage congestion through operations.

**Finance**
Beyond the 30% minimum Bumiputera-owned, 30% maximum foreign-owned equity requirement, the Enabling PPP Policy ignores finance issues. If a project requires a financial package, it will be negotiated later in the process.

Within these boundaries, a set of alternatives are developed for KLMR. Possible toll road PPP alternatives include a toll road with a rate based on the class of vehicle, a toll road with congestion pricing, the addition of congestion-priced managed lanes to an existing untolled facility, and the conversion of an existing road to a toll road as part of an operations and maintenance lease. The strategic alternatives can even be further shaped by setting a maximum toll if social equity is important or by deciding what the concession period should be. The EPU will perform a role in advising KVPS what alternatives may be appropriate for the situation. With this amount of information, KVPS could make a preliminary determination that financial support will be needed and begin processing the appropriate paperwork. Even when the request for proposals is made could be part of the strategic alternative although that might be better left for Step 9 when the sequencing of projects is determined within the entire regional transportation plan.

Stakeholder involvement will play an important role in this step. The stakeholders can suggest strategic alternatives or point out early which alternatives are feasible and which ones are unacceptable. This can be done through workshops and focus groups, allowing the participants to investigate issues in-depth. One possibility for this process that would fit into the overall CLIOS process is the SAM-PD process as proposed by Mostashari and Sussman (Mostashari and Sussman, 1).

7.4.2.3 **Step 8: Flagging Important Areas of Uncertainty**
The uncertainties from Section 5.3.3 still apply to KLMR. The new source of significant uncertainty for this chapter’s scenario is in the representation of the institutional sphere, particularly regional organizations. If the appropriate organizations were actually going through this process, it should not be a problem; the organizations would hopefully know what they do.
For this exercise, only limited data is available for regional organizations and relationships between the organizations in general.

7.4.2.4 Step 9: Evaluate Strategic Alternatives and Select Robust Bundles that Perform “Best” Across Uncertainties

In this step, strategic alternatives are evaluated against the goals developed in Step 6 for a small number of scenarios. Here we are using scenarios as presented by Peter Schwartz in The Art of the Long View and used by Shell beginning in the 1970s for strategic planning. This implies a weighting of the goals or an evaluation function of some form since an alternative may perform better on some criteria and worse on other criteria than the other alternatives. The goal weighting will be determined by the stakeholders in the RSTP process. The KVPS will have the ultimate say in the weighting but businesses and citizen groups will contribute their priorities.

We assume that businesses have more influence than the citizen groups in this process. Within the business sector, the goals conflict; concessionaires want high profits while shippers and carriers want low costs. High profits can be achieved through low tolls if there is enough volume but a road has finite capacity. In this step, concessionaires will be very vocal about supporting financial efficiency since they are very dependent on the outcome. Shippers and carriers will place an emphasis on low (or no) cost but they may be agreeable to toll roads if that is the only way necessary infrastructure will get built.

Citizen groups will promote low cost, low travel time, high reliability, and low ill environmental or social effects as the priorities. These groups may not be as unified since certain groups will have different priorities for various goals. A neighbor to a proposed facility will place high emphasis on minimizing ill social and environmental effects. A person who uses the facility but lives far enough away that the ill effects are small will prefer low cost and low travel time as priorities.

A possible ranking of the technical goals after stakeholder involvement and government approval is:

1. Achieve the goals in a financially efficient manner
2. Meet regional transportation needs by providing a low cost, low travel time, and high reliability intermodal system
3. Promote regional competitiveness and regional economic growth by supporting freight needs
4. Improve the regional quality of life by developing a transportation system that increases employment opportunities and decreases air pollution
5. Improve safety through better system design and operations

Three possible scenarios include one where Malaysia’s Multimedia Supercorridor is a success, providing a international competitive edge; one with a chaotic edge where environmental damage is severe and security is a major concern; and a third where the United States enters a depression, leading to a worldwide economic slowdown with more severe instability in nations linked to the dollar, like Malaysia. Proper scenario planning would provide much more detail about these alternate futures including a reasonable chain of events.
With scenarios in hand and a weighting of the goals, the strategic alternatives can be ranked on their performance. Selecting a bundle that has maximum performance in one scenario is not desirable if performance suffers in the other scenarios. A preferable outcome is a bundle of alternatives that performs reasonably well across scenarios. Every alternative does not have to perform well in each scenario; if one alternative performs poorly in one scenario, another alternative should have strong performance to compensate.

The result will be the creating of a Regional Infrastructure Network, Regional Planning Architecture (RPA), and Regional Operating Architecture (ROA). The Regional Infrastructure Network is the plan for the physical side of the transportation – roads, rail, ITS system – and is referred to as "lines on maps". The ROA is an institutional change plan. Roles, responsibilities, and relationships for system operators are covered by the ROA. The RPA is also an institutional change plan and it describes the roles, responsibilities, and relationships for the next iteration of the planning process.

Since the focus of this thesis is on toll road PPPs, it will be assumed that the robust bundle includes at least one toll road PPP. For each toll road PPP in the bundle, the full bundle will be compared to an alternate bundle where one toll road PPP has been removed. This action is required by the Enabling PPP Policy to compare the toll road PPP with a no-build alternative. The EPU will assist in the evaluation by helping predict the performance of toll road PPPs in the different scenarios.

7.4.3 Implementation Stage

7.4.3.1 Step 10: Design Strategy for Implementation in the Physical Domain And Implement

The implementation strategy involves the implementation of the Regional Infrastructure Network designed in the previous step. Part of this strategy will involve the deployment of toll road PPPs.

As a reminder to the reader, PPP Project Deployment as embedded in RSTP involves several tasks in Step 10, shown in Figure 7-13. One missing step that was introduced by the Malaysia-specific Enabling PPP Policy is the quick environmental assessment before the concession can be put out for bid. The KVPS will perform this step since it will be a government-initiated proposal.

Put Concession Out for Bid

The request for proposals will include published selection criteria, as mandated by the Enabling PPP Policy. It can be multidimensional, using the evaluation criteria of Step 9 as a guide, or it can be a single measure such as the lowest toll. The EPU may assist in developing appropriate selection criteria.

Award Concession

The concession is awarded to the concessionaire whose design performs best on the selection criteria. Each proposal’s information relating to the selection criteria will be made public so it can be verified that the best proposal won as required by the Enabling PPP Policy.
Put Concession Out for Bid
The request for proposals will include published selection criteria, as mandated by the Enabling PPP Policy. It can be multidimensional, using the evaluation criteria of Step 9 as a guide, or it can be a single measure such as the lowest toll. The EPU may assist in developing appropriate selection criteria.

Award Concession
The concession is awarded to the concessionaire whose design performs best on the selection criteria. Each proposal's information relating to the selection criteria will be made public so it can be verified that the best proposal won as required by the Enabling PPP Policy.

Negotiate Contract
The details of the contract, technical design, and financial terms of the concession are negotiated with significant assistance from the EPU who has the experience in this field. The negotiations are divided into two parts. The technical design negotiations come first followed by financial negotiations but there will be an overlap between the two since technical design choices will depend on the cost estimates.

Stakeholders from businesses and citizen groups will be involved in the negotiations over the technical design, as mandated by the Enabling PPP Policy. The technical design must be informed by the more detailed environmental assessment, paid for by the concessionaire. Stakeholders will want to know the social, environmental, and financial effects of different
designs and without the assessment, this information is absent. The design changes should not be too substantial; otherwise it would indicate the previous steps in the process were performed poorly. By the end of the technical design negotiations, the design will have obtained environmental approval and should have the support of stakeholders.

The financial negotiations include toll rates, concession period, and government financial support. While the concessionaire's bid will include proposed toll rates and maybe a concession period, the technical design will affect the outcome. While the hope is that no financial support is needed, there could be valid reasons for providing some support. The EPU will guide the KVPS through this process with the Ministry of Finance who manages government loans. Even if there is no upfront government support, the concession agreement may include terms that would trigger support in certain events. For example, the agreement may include a schedule of toll increases subject to government approval. If the government does not approve, the agreement could require compensation for the concessionaire.

Build Toll Road
The concessionaire builds the road. The MHA will monitor the progress to ensure it meets the terms of the contract and applicable laws.

Operate Toll Road
Travelers and freight can now use the road but there several issues that should be considered. As part of the Enabling PPP Policy, the concessionaire must supply traffic data to the government in a standardized government format. The MHA can inspect the structure and the operations to ensure the concessionaire continues to meet the terms of the concession agreement. There may be a need to renegotiate the concession agreement and the concession agreement should delineate who handles that. The KVPS should be the point agency but it may involve monetary compensation, requiring the involvement of the EPU and possibly Ministry of Finance.

7.4.3.2 Step 11: Design Strategy for Implementation in the Institutional Sphere and Implement
The RPA and ROA are implemented during this step of RSTP. With regard to toll road PPPs, the roles of non-government stakeholders, the involvement of other government agencies, and their relations to the concessionaire will be examined. Much of this has been predetermined by the Enabling PPP Policy, though. The EPU and MHA are still players regardless of the KVPS view.

Reinventing the Regional Planning Architecture is difficult to do without actually performing the process. The interactions between stakeholders in real-life would present the opportunities for improvement. Considering aspects of the Regional Operating Architecture is more feasible for the hypothetical scenario presented in this chapter. The primary aspect is the relationship between the concessionaire and system operators.

Part of the technical design will be negotiating the relationship between the concessionaire and system operators. Any operational integration beyond that required by the Enabling PPP Policy must be determined in this step. Aspects may include service patrols for clearing small
incidents, a highway patrol for traffic enforcement, and even mutual-aid agreements for emergency personnel for larger incidents.

Increased operational integration will be especially difficult to achieve in KLMR. There is a number of toll road PPPs so the concessionaires are not quite in monopoly positions. Government system operators should be expected to run the system with a system-optimal standard in mind, which may not be beneficial to certain toll road operators. Coordination rather than integration may be a more acceptable arrangement for concessionaires. A subset of the regional operating architecture dealing with toll road PPPs would be like TRANSCOM, the New York City metropolitan area operations organization.

The TRANSCOM model creates a regional operations organization called a virtual organization. It has no real resources of its own; it acts as a communications forum for the participating agencies. This model is useful when organizational relations may be contentious, as is possible with competing toll road PPPs in KLMR since each individual organization retains its autonomy and can act as they desire based on the information gathered (Conklin and Sussman, 9-11).

7.4.3.3 Step 12: Post-Implementation Evaluation and Modification
The KVPS will monitor the performance of the toll road PPP for its future planning efforts. The main consideration is deviations from the desired performance. These deviations could be due to a poor system representation, a process that needs to be revamped, or the natural uncertainty of future events. It may be several years before good data is apparent from the new toll roads but the KVPS could also monitor existing toll roads for their conformance to the system representation.

The MHA will also be gathering information for national purposes due to its regulatory role during construction, operations, and maintenance of the toll road. It will pass this data on to the EPU so it can perform more effectively during negotiations. This data will also be of value for updating the Enabling PPP Policy.

7.5 Expected Outcomes
7.5.1 Transportation
Travel Time
With the open competition for concession driving tolls lower, more vehicles are expected on the same amount of infrastructure. It is unlikely that more toll road PPPs would be built under the new PPP Project Deployment process and it is possible that fewer will built. This will increase travel time. Congestion pricing can be used to reduce travel time but these are not in use yet in Malaysia. Congestion pricing is a possibility for the future, though. Enabling PPP Policy does not consider the issue of travel time so it is assumed to produce the same as the current policy.

Travel Cost/Tolls
The open competition in the new PPP Project Deployment process will force tolls lower than with the current process. Public involvement may push the tolls in the other direction as toll road neighbors request greater mitigation measures. The chumminess between the public and private sectors in the current process may have caused higher tolls than necessary so even including
mitigation measures, the tolls under the new process could be lower. These improvements result from the PPP Project Deployment process where the competition and public involvement occurs. The new Enabling PPP Policy has the same effect as the existing one since neither emphasizes particular toll level policies.

**Reliability**
Reliability should be improved through the PPP Project Deployment process. With the current process, tolls are probably higher than they would be under open competition. It would not be surprising to find the concessionaires receiving a fairly high rate of return on their investment. High profits in a near-monopoly situation are not expected to encourage efficient operation of the toll road. With open competition driving tolls down, the concessionaire will have to operate the road more efficiently and reliably in order to receive the same profits. An unreliable road could turn a profit into a loss when the concessionaire does not have that monopoly cushion.

The Enabling PPP Policy does not address reliability which is not considered in the current policy either.

**Network Integration**
Physical and operational integration is stronger with the new policies than with the old. By considering the toll road PPP in the RSTP process, the choice of the toll road PPP as the desired strategic alternative will be due to its logical role in the network rather than as a piece of infrastructure profitable enough to draw private investment whether it makes sense from a network point of view or not. Operation integration improvements are caused by the Enabling PPP Policy’s requirements for technological interoperability and the sharing of traffic information. Further integration may occur during PPP Project Deployment.

Both Enabling PPP Policy and PPP Project Deployment share in this success. Technology integration issues were noted during the development of the Enabling PPP Policy while PPP Project Deployment requires the potential toll road PPP to be evaluated for its fit in the regional network.

**Needs-Based Process**
The CLIOS process is a needs-based process. Step 1 involves identifying the issues that are affecting the system. The system representation and growth in system insight should enable analysts to understand what the needs are and how meeting that need will affect the rest of the system. The development of the Enabling PPP Policy, RSTP, and PPP Project Deployment are all based in the CLIOS process so they will likely be improvements over the current process, if they can be implemented.

Stakeholder involvement in the PPP Project Deployment process will further improve the needs-orientation of the process. Stakeholders can assist the system representation development and they can provide insights that government officials may miss. This can improve the orientation of the process towards stakeholder needs if the stakeholders involved are a representative sample of the population.
7.5.2 Economic

Access to Markets
Access to markets is improved from both Enabling PPP Policy and PPP Project Deployment perspectives. Both take into account the needs of the freight sector in their goals which should find its way to the identification and evaluation of strategic alternatives. The inclusion of employment concerns in the goals for both should produce a similar effect for labor market access. This may not be a huge improvement; market access may have a lower priority than reducing social impacts. The improved network integration could ameliorate this problem for market access.

Innovation
The new PPP Project Deployment process provides an incentive for firms to be innovative. If a concessionaire can come up with an innovative idea, it will receive sole negotiation rights over the proposed facility. There would be no open competition as is done with government proposals. The greater emphasis on technological interoperability may act to decrease innovation, though. The design space for technological innovation is now limited to systems compatible with current standards. If the standards are designed with the ability to grow, then this factor may not be as limiting as it seems. Even with the standards, innovation is not strictly limited to the ETC and CVO standards covered by the Enabling PPP Policy. This is unlike the current process which provides limited innovation incentive. Any private sector proposal may receive sole negotiation rights, not simply innovative ones.

Enabling PPP Policy does little directly for innovation other than mandating technological interoperability. This interoperability mandate could be seen as either innovation promoting or limiting. Concessionaires are limited to the standard but having a core standard may allow concessionaires to focus on innovative new services rather than reinventing existing ones. The result is that this new Enabling PPP Policy is assumed to have the same effect on innovation as the old one.

7.5.3 Environmental and Social

Pollution
The slightly stronger environmental approval process will probably do little for pollution reduction. Public involvement in PPP Project Deployment will play a greater role in reducing pollution. If the public feels strongly about reducing pollution, they will make their voices heard during the strategic alternative evaluations and the concession agreement negotiations. Enabling PPP Policy contributes little to the pollution debate.

Sustainability
Sustainability is ignored in both Enabling PPP Policy and PPP Project Deployment. While Sussman, Sgouridis, and Ward argue that the CLIOS process is well-suited for including sustainability concerns in transportation planning, this inclusion requires organizations willing to consider the issue. There is no evidence that Malaysian transportation planning agencies would consider it.
Neighborhood Effects
Public involvement in PPP Project Deployment will increase the priority of neighborhood concerns in the process. If a project is going to have a substantially negative effect, the citizens have an official forum to shape the project and reduce that negative effect. The input will inform the government of possible additional needs. Perhaps the road runs through many low-income neighborhoods that would be poorly served by the proposed tolls. The government could provide financial support or increase the concession period in order to reduce tolls.

Enabling PPP Policy does not include the public in its process and does not take neighborhood effects into account. As a national policy, it would be inappropriate for it to do so. It is better to leave those concerns for the local government agencies that have a greater understanding of the situation.

7.5.4 Political

Transparency
Transparency is improved for both Enabling PPP Policy and PPP Project Deployment. In Enabling PPP Policy, a formal policy is created and distributed to the SPC’s or equivalent organizations. This will provide something tangible that other stakeholders can discuss and suggest improvements for. Selection criteria and relevant bid information will be published and the public is involved in a portion of the PPP Project Deployment process, contributing to greater transparency in that process.

Public Involvement
Public involvement is clearly improved for PPP Project Deployment. There was no formal involvement before; now there is in designing and selecting alternatives and in technical design negotiations for toll road PPPs.

Enabling PPP Policy does not include public involvement in its first iteration through the CLIOS process. It has the capacity for public involvement and the author would hope the EPU would identify this as one of the future changes for the process but the EPU may not. Until public involvement is implemented, the Enabling PPP Policy is no different than the current process.

Accountability
Improvements in transparency could lead to improvements in accountability. The decisions of the EPU for Enabling PPP Policy and state and regional agencies for PPP Project Deployment will be a matter of public record along with other evidence to show that their decisions were justified by data available at the time. When the public provides feedback to elected officials, their comments will be better informed and the elected officials can then press for appropriate changes.

One weakness of the new process is the lack of connection between Enabling PPP Policy and PPP Project Deployment. The public will focus on decisions made during PPP Project Deployment and place greater blame on regional officials for mistakes made. It is possible that the regional officials will be blamed for problems that they had no choice in; the problems may have been caused by Enabling PPP Policy. This would be a loss of accountability for Enabling PPP Policy. In the current situation, the EPU is responsible for both Enabling PPP Policy and
PPP Project Deployment. The blame or praise for toll road PPP results is more likely to find the correct target in the current arrangement.

PPP Project Deployment accountability improves overall but the Enabling PPP Policy’s result is unclear. On one hand, the policy is a public document but on the other, mistakes in Enabling PPP Policy are more likely to fall on officials carrying out the PPP Project Deployment process. These negative fallout effects are expected to outweigh the mere publishing of a standard. The net result is a decrease for Enabling PPP Policy accountability.

Ease of Changes
Updating the new Enabling PPP Policy should require only moderate change. Organizational roles are not being displaced by introducing the CLIOS process, at least not initially, and the EPU retains much of its power over the policy. The initial moderate change could slowly lead to greater change as the government continually redevelops the policy using the CLIOS process.

The new PPP Project Deployment process is expected to be more difficult to install. The EPU’s central role has been reduced as a result of the new Enabling PPP Policy. Regional agencies gain new powers and processes that they may not have the experience to handle. The EPU will remain as an advisor to the regional agencies on toll road PPP topics, reducing the difficulty of the change, but it could still be a tough battle to reduce the EPU’s powers.

Government Program Support
The new Enabling PPP Policy supports toll road PPPs as well as the old one. There is still the flexibility to use PPPs wherever necessary and in any arrangement desired. There are additional requirements that PPPs must meet in terms of technological interoperability and safety regulations but they are not expected to reduce the number of toll road PPPs built.

The new PPP Project Deployment process does result in a decrease of support for toll road PPPs. In the current process, toll road PPPs are treated as a special piece of infrastructure handled separately from the rest of the transportation network. In the new process, toll road PPPs are treated as one alternative out of many. It is possible that the same number of toll road PPPs could be built but there is the chance that some will not fare well in comparison to other alternatives.

7.5.5 Financial
Government Financial Support
Neither Enabling PPP Policy nor PPP Project Deployment directly addresses increasing or reducing government financial support. The goal is to provide transportation capacity in a financially efficient manner and the expectation is that there will be times when support is necessary. The open competition during PPP Project Deployment should result in a proposal that requires less government support, though. Producing a proposal that would require significant support would put the company at a competitive disadvantage. Although the process does not directly dictate less support, process changes may lead to that result.

An uncertainty for this measure is the treatment of concessionaires that become bankrupt. Currently, the government is very helpful in getting them back on their feet. The expectation is
that the large amount of Bumiputera equity investment in these projects will lead the government to intervene at times to prevent a significant loss but the improved competitive process should lead to better managed concessions less likely to enter bankruptcy in the first place.

Risk Allocation
Competitive bids will lead to the private sector shouldering more of the revenue risk, which is desirable for toll road PPPs. Stakeholder involvement during PPP Project Deployment should reduce political risk as stakeholders have greater buy-in with the toll road PPP. The assumption of this risk by the government is proper since its role is to balance needs between stakeholders. The process places greater environmental risk on the private sector since concessionaires will be funding the in-depth studies but given the weak environmental assessment process in Malaysia, this reallocation is not expected to significantly change any outcomes. The overall result is a better risk allocation due to the PPP Project Deployment process.

Enabling PPP Policy does not address risk allocation issues. It just places an emphasis on financial efficiency and lets the state and regional agencies determine the allocation during PPP Project Deployment.

7.5.6 Malaysia Specific
Bumiputera-Promotion
The new Enabling PPP Policy retains the same investment standards so it is no different than the current policy. PPP Project Deployment may not promote the economic status of Bumiputera to the degree that the current process does. The public will push for untolled infrastructure and by involving them in the process, the public’s goals will receive greater reception. This may result in a minor reduction in the number of toll road PPPs and those that are built will not be as profitable due to the reduction in government protections caused by the public scrutiny.

Developed Nation by 2020
The journey to developed nation status is improved by the new Enabling PPP Policy and PPP Project Deployment process. Both contribute to more informed decision making for toll road PPPs. The open competition in PPP Project Deployment will lead to a more efficient use of revenue. The Enabling PPP Policy’s technological interoperability mandate will lead to greater economic competitiveness since traveler and freight operations will be smoother. Innovation is encouraged by PPP Project Deployment which is useful for the economic growth necessary to reach developed nation status. Since money is used more efficiently on new toll roads, the savings can be funneled into other investment opportunities, further moving Malaysia towards its desired status.

7.5.7 Uncertainties
An assumption made was that the savings from open competition would exceed the additional costs from public involvement. The result would be lower tolls but higher travel times due to increased volume, all else equal. It is possible that this assumption is incorrect. Stakeholder involvement may lead to higher mitigation measures than expected that will have a greater impact on costs.
The Malaysian concession industry is not filled with hundreds of firms. A small number of firms are capable of bidding on a concession so the possible savings from open competition could be limited. Combining this with higher design costs may result in higher tolls and lower travel times as the road volume decreases. Another possible outcome could be added government financial support to keep the toll down to a desired level.

Government financial support is expected to decrease during PPP Project Deployment but the open competition may reduce the profitability of the concessions. With profitability reduced, more concessions will be exposed to the possibility of bankruptcy. The government’s desire to promote Bumiputera status could produce a conflict in the goals. Part of the reason to involve the private sector is that the possibility of bankruptcy should spur them to improve their operations. If concessions do go bankrupt, it will be taking some Bumiputera equity with it which the government may like to protect. It is possible that the government will place a greater emphasis on Bumiputera protection and if the number of troubled concessions increases, the total government financial support will increase.

7.6 Conclusion

This chapter has covered a substantial example of how the CLIOS process can be used to manage a toll road PPP program from national policy down to project deployment. Table 7-11 provides the results from the qualitative evaluation of the resulting Enabling PPP Policy and PPP Project Deployment. Society is expected to benefit from the adoption of the CLIOS process for developing toll road policy.

There will be roadblocks. Organizations are difficult to change and changes on the scale required for the proposed processes will require work to successfully enact, especially at the PPP Project Deployment level. Power is shifted from the EPU to state planning committees and the Klang Valley Planning Secretariat for KLMR. The EPU will still play an important role due to its expertise in negotiating concession agreements but it will still be a reduced role from today.

The expected plan still gives significant latitude to government agencies regarding stakeholder involvement. They will be involved but there is no requirement for government agencies to listen to them if they do not want to, either because government goals supersede the stakeholder’s or the agency is unsupportive of a particular stakeholder’s views.

Despite this, the CLIOS process does produce an improved outcome over the current Malaysian process. This does not mean that it is the best process available. Other processes could produce better results than the CLIOS or similar results but with more ease. The next two chapters will explore two alternatives. The first alternative is taking the current process and making incremental changes targeted at the weaknesses. These changes may be much easier to enact although the benefits may be narrower in scope. The second alternative is to adapt the United States transportation planning process to the Malaysian milieu. Could the features of that process improve the Malaysian outcome or does this introduce more weaknesses? Even if the qualitative evaluation is favorable, it may be very difficult to move the current centralized process to a process developed in a decentralized, federal political environment.
### Table 7-11 - Expected Outcome of the CLIOS Process

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>Enabling PPP Policy</th>
<th>PPP Project Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Environmental and Social</td>
<td>Pollution</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
8 Alternative 2: Incremental Changes to the Current Malaysian Process

8.1 Introduction
Applying the CLIOS Process will be time-consuming and take careful deliberation to use in an effective manner. Are there more cost-effective ways to achieve many of the benefits? The most direct approach is to make targeted changes to the current Malaysian process that will address the weaknesses cited in Chapter 6. If the environmental assessment phase is weak, bolster it. If public involvement is nonexistent, add it to the process.

This modified Malaysian process will probably not produce the most beneficial program possible but it will stand the best chance of being implemented. It is not intended to change the balance of power or institutional relationships, reducing the resistance that will be faced.

8.2 A Refresher: The Strengths and Weaknesses of the Current Malaysian Process
In Section 6.7, the strengths and weaknesses of the current Malaysian process for handling Public-Private Partnerships (PPPs) were listed:

Strengths:
- Legal and institutional support for PPPs from conception through operations
- Government open to renegotiations when conditions adversely change
- Private sector proposals permitted
- High flexibility in developing the terms of PPPs
- Clearly delineated roles for the Economic Planning Unit (EPU) and Malaysia Highway Authority (MHA) in running the bid process and supervising PPPs.

Weaknesses:
- Low transparency throughout the process
- Minimal public involvement in decision-making
- Poorly-suited toll structure for congestion charging or other programs to encourage certain behavior like carpooling
- Greater importance placed on financial viability than integration into the regional transportation system
- Favorable outcomes from government negotiations for concessionaires at the expense of the public interest
- Low concerns for environmental and sustainability issues
- Unclear what the evaluation criteria are during the bid process
- No good measures on the effectiveness of the toll road program compared to other possible ways to provide infrastructure

These factors have resulted in a toll road PPP program that is considered by the public to be plagued by cronyism where business associates of the ruling party, UMNO, are rewarded with
money from drivers and taxpayers. On the positive side, the program has also produced a highway system that spans much of peninsular Malaysia, providing transportation infrastructure in urban and rural areas. The share of equity owned by the Bumiputera in Malaysian companies has grown in part because of the 30% equity ownership requirements for toll road companies. The favorable treatment of the Malaysian government towards concessionaires has produced a favorable environment for investment.

In creating improvements for the current process, the weaknesses will be reduced but it may also reduce the strengths of the program. In this alternative, the focus will be on reducing the weaknesses. There will be some constraints on how far the weaknesses can be reduced if they affect the strengths, as will be explained shortly, but balancing the changes in weaknesses and strengths is not a priority in this chapter. In a sense, these changes are driven by politically risk adverse considerations. Now, not every improvement necessarily will ameliorate a weakness while reducing a strength; an improvement could provide benefits on both sides of the ledger.

8.3 The Scenario
Here is a hypothetical scenario to aid our explanation. From here on, a hypothetical future is discussed along with possible strategies, decisions, and outcomes. With a scenario laid out, this chapter will try to create strategies, decisions, and outcomes consistent with the interests and powers of the stakeholders.

In this scenario, public criticism has grown over the administration of the toll road PPP program. Protests are more frequent and political opponents are exploiting the anger to weaken the Barisian Nasional coalition led by the UMNO political party which has ruled Malaysia since 1959. To stop the gains of his political opponents and to also increase his control over his own party, the Prime Minister has ordered the Economic Planning Unit (EPU) to revise the policies and procedures of the toll road program. He has requested that the new process perform the following:

- Increase public participation
- Ensure toll rates in the concession agreement have taken public concerns into account
- Improve the importance of the environmental assessment process
- Create a more transparent process
- Maintain financial viability for the overall toll road PPP sector so that it can be used as the primary means for providing highway infrastructure into the future
- Do not add significantly to the time needed to deploy toll road PPPs

It will be assumed that, consistent with the theme of this chapter, the EPU will meet these goals with a minimal number of changes to the existing process. The Prime Minister has left it open as to how the goals are to be met and the balance among them.

8.4 Changes to Current Malaysian Processes and Policies
The initial impulse is to overhaul the Enabling PPP Policy first but it does not have to change much to accommodate the Prime Minister’s goals. The specific problems with the current process are in how the individual projects are developed and deployed. Thus, the changes in the Enabling PPP Policy will be for PPP Project Deployment process requirements. One way to go
about this is to modify the PPP Project Deployment process and then change the Enabling PPP Policy to accommodate the modifications.

On the six points mandated by the Prime Minister in this scenario, the first four can be considered goals: public involvement in the design, public-sensitive tolls, a stronger environmental approval process, and a more transparent process. The final two points are constraints in achieving the four goals. For example, negotiating the tolls with some public input does not require that it meet the public’s demands of low or no tolls; the tolls still have to be high enough to ensure a sufficient expected return to the concessionaire.

The PPP Project Deployment process, shown in Figure 8-1, will need to be changed to meet the new goals for the process. The most crucial aspect will be the public participation requirement. If handled well, the EPU will alleviate public concerns over tolls, the environment, and transparency. If not, the government will be able to add a façade of legitimacy to a process that has changed little. It will be assumed in this scenario that the government does want to make meaningful change rather than maintain the status quo under the guise of change.

8.4.1 Public Involvement
The concerns of the public include the projects selected to be toll road PPPs, the alignment, the criteria used to select the concessionaire, the tolls and their schedule of increases, the social impacts, and the environmental impacts. These concerns map naturally onto the different steps of the existing process:
1. Project Selection → EPU Accepts/Rejects Proposal
2. Concessionaire Selection Criteria → Government Proposals Put Out for Bid
3. Alignment, Environmental and Social Impacts → Negotiations with EPU Technical Subcommittee
4. Tolls → Negotiations with EPU Financial Subcommittee

Modifying the current process now becomes a question of addressing public involvement for these individual steps. The two constraints are maintaining financial feasibility for the projects and having a process that is not too time-consuming.

For project selection, the public may end up having minimal involvement. There may be time for public comments during the EPU’s deliberations but it is not expected to be a critical part of the process. Historically, most of the projects have been technically justified in meeting transportation needs. The EPU may also be hesitant about ceding too much power to the public. Public involvement in the later steps will change the projects at the margins - tolls may be lower or the alignment may be different - but the project will proceed. In contrast, if significant public involvement were allowed at this step, it could kill a project. Since the government wants to continue using toll road PPPs near the current level, they will want to limit public involvement to steps with few effects on toll road PPP approval.
Figure 8-1 - The PPP Project Deployment Process

Private Sector Proposal

Project from Government Plan

EPU Accepts/Rejects Project

Government Proposals

Private Sector Proposals

Government Proposals Put Out for Bid

Concession Agreement Negotiations Begin with EPU Privatization Committee

Negotiations with EPU Financial Subcommittee

Negotiations with EPU Technical Subcommittee

Agreement Approval by EPU Privatization Committee

Approved by Cabinet or a designated representative

MHA Monitors Construction, Operations, and Maintenance
The public can be useful in devising the concessionaire selection criteria. The traditional primary criterion throughout the world is the lowest expected toll, which is probably what the public wants as well. The tradeoff between other goals will depend on who in the public is talking. Those who would use the toll road but who suffer few of its negative impacts will place the toll as the sole criterion. Those who live near it but will not depend on it will place greater emphasis on low noise or other social and environmental impacts. These concerns will drive the later steps but they must be known for potential concessionaires to develop effective bids. It makes little sense to choose a concessionaire based on one expected project and then have them build something completely different after the public is involved in the negotiation phase.

To quickly gain an idea on the tradeoff between different criteria, the EPU could hold workshops with the neighborhoods that would be impacted, presenting a variety of project alternatives and seeing how the public reacts. These alternatives will be conceptual with ranges for possible tolls. The EPU could use the results to get a rough idea of what the decision logic of the public may be and close in on a proposal that has enough detail to draw a meaningful bid but can also survive well during the later public involvement phases.

The final two parts of public involvement are in the negotiations with the financial and technical subcommittees. These two functions cannot be fully separated; the financial viability of the project will depend on technical decisions. Whereas the current process probably has a limited range on the issues to be discussed, allowing some compartmentalization between financial and technical, the public may make a much wider array of demands as to where intersections will be, what environmental impact reduction measures need to be taken, and what tolls are desirable. Performing the steps sequentially with the technical design developed and then the financial particulars agreed to could significantly slow down the process.

Gathering public responses in the previous step will help the EPU maintain the current process. The EPU and the concessionaire will have an idea of what the technical subcommittee will develop with public involvement, helping the financial subcommittee plan the financial package. Since much of the costs and tolls will be driven by the decisions of the technical committee, the public involvement will be limited to that area.

The public involvement will take the form of workshops in the affected neighborhoods, again presenting the different alternatives but with more concrete details. A much more specific toll range will be included with each alternative. The EPU can gather the responses of the neighborhood. With this public input, the EPU can work with the concessionaire to deploy a project that has high financial viability but will also not upset too many people. The working assumption in this regards is that the EPU will recognize the political logic noted by Mancur Olson that concentrating costs will cause much more opposition than spreading them out even if the total costs are the same (and the corollary that stakeholders who receive concentrated benefits will provide greater support than stakeholders receiving an equal amount of diffuse benefits) (Olson, 27-29).

This arrangement is expected to meet the two constraints on financial viability and not adding too much time to the process. By introducing the tradeoffs between low tolls and other concerns, the final design should be one that maintains financial viability. The public will have a better
idea of the costs of mitigation measures they request and can provide better input rather than demanding expensive mitigation and low tolls. The concessionaire should be indifferent since the toll will be increased to accommodate the additional costs, although higher tolls may make traffic projections more uncertain. In a case where the public’s demands are threatening financial feasibility, the concession period could also be lengthened and tolls reduced to a less uncertain revenue level. The additional time necessary for including public involvement is not expected to be enormous although it is difficult to come up with a quantitative range. A very rough estimate may be that a public involvement strategy done in parallel with the rest of the process will add at least several months to the process, depending on how rigorous the strategy is.

Another benefit of this approach is that it meets the second goal of the Prime Minister in having projected tolls receive public input. The tolls should have greater public acceptance if the public understands why they are set at the level they are at and what the public is getting for that toll. The public will still argue for lower tolls but perhaps less vociferously. This will support a more stable political environment in the future.

8.4.2 Improve the Importance of the Environmental Approval Process

The literature is not entirely clear on how this part of the process works but what can be gleaned is that approval of a toll road PPP project is not contingent upon meeting environmental standards. The role of the environmental approval process is to determine, given an already approved project, which technical design will have low environmental impacts. The fit of environmental goals with other goals for the toll road PPP program do not make the task of strengthening the process easy.

An overarching government goal is to reach developed nation status by 2020, requiring a hefty amount of sustained economic growth. Soft environmental standards will support this growth as products are more cost competitive in the international market thanks to the low cost in meeting regulations. While this will have long-term detrimental effects, the idea may be to have the money to ameliorate the damage. One school of thought posits that environmental regulation could provide a source of competitive advantage by spurring innovation that could diffuse to other countries (Ashford, 15) but it is assumed that the Malaysian government will stay with the more traditional view that stringent environmental regulation limits economic growth.

It would be presumptuous to argue that Malaysia’s economic goals should be sacrificed for environmental goals. Again, one of the objectives of this thesis is to determine if there is a process that can better meet Malaysia’s goals than the current process. Is there a way to strengthen the environmental approval process without a significant economic impact? What are some alternatives?

The first alternative is to make the approval of the toll road PPP contingent on gaining environmental permits through a more rigorous environmental approval process. This would lengthen the time needed to deploy the toll road. The design specifications needed to meet environmental requirements will also reduce the design space later where cost may be traded off with other considerations. The result is expected to be higher costs with the possibility that a potential toll road may not be built if it cannot support environmental standards. Shifting this
amount of procedural power to meeting environmental concerns does not seem likely given the
government’s past priorities.

The second alternative is to maintain the current place within the process for environmental
approval but to strengthen the standards. This alternative may not produce substantial changes.
The essential goal with regard to environmental approval remains minimizing the impacts given
that the project will be built. This outcome should still be an improvement from an
environmental protection point of view over the current process.

A third alternative is to blend the two. The first phase could be a brief investigation of the
environmental impacts such as a rough estimate of the change in air quality standards from
building the road. A criterion for the EPU to accept a proposal would be that it does not grossly
violate environmental standards. If the violation is minor and could be fixed with some design
changes and if the toll road PPP provides worthwhile benefits in other areas, the process should
continue. The goal is to give concessionaires an idea of the requirements and to develop broad
bounds on what will be needed to meet standards while also identifying projects that should not
proceed. This step will also be relatively quick so as not to make a significant negative impact
on the deployment time.

The second part of the environmental approval in this alternative will be wrapped into the
negotiations with the technical committee. The project will have to meet the environmental
standards but the public will be able to comment on the process. This should provide some
additional benefit to the public involvement process since how much the project exceeds
environmental standards can be traded off with the toll. It should not add appreciably to the time
needed to deploy a project and the realization of the cost/benefit tradeoff by the public should
increase public support for the final tolls in the concession agreement.

Of these three alternatives, the latter two are the ones that are suitable to the political
environment. Neither are particularly strong forms of environmental protection but they should
help. It will be assumed that the EPU will select the third alternative so they can demonstrate to
the Prime Minister and the public a significant change in the process. Here, the choice is as
much a public relations move as a technical selection.

8.4.3 Create a MoreTransparentProcess
Transparency is helped through public involvement but it should not be the sole means for
achieving transparency. The EPU will still be responsible for key decisions in the PPP Project
Deployment process and the public should know the basis for their decisions. Awarding the
concession is the key area that has not been touched on through public involvement and where
transparency is most needed.

The dual source of proposals, from the private sector and from government plans, will
complicate matters since the transparency problem cannot be solved simply by publishing award
criteria or the bids. It is assumed that the EPU will want to continue permitting proposals
directly from the private sector. Developing a transparent process for these proposals is more
difficult due to the lack of competition. There may always be the perception that the project was
awarded because of political connections rather than the innovative nature of the proposal.
Transparency for plans proposed by the government can be dealt with using simple methods. When the request for proposal is made, the award criteria should be made public. If there is a prescreening qualification process for concessionaires, the qualification criteria should also be public. When the award is made, brief summaries on the proposals should be made public so that it can be verified that the best proposal won. While the full proposals could be publicized, this action may have detrimental effects if the concessionaires fear that their competitors would learn too much information on how efficiently they can operate. Brief summaries could provide the necessary information without divulging competitive details.

For the government proposals, the impact on time is expected to be small. Extra time will be needed to ensure that the criteria are clear or that the summaries are ready when the concession is awarded. If the critics are correct and the current process has been based on political connections, adequate award criteria will need to be created which may take time. Also in this case, once the bids have been submitted, more time may be necessary to seriously evaluate them. Neither of these additions is expected to add a substantial amount of time.

For private sector proposals, the transparency questions become “Why is this proposal deserving of sole negotiation rights?” and “Is this proposal good for society?” There is no hard and fast rule on what is deserving and what is not. The EPU may also be unwilling to change this part of the process since it may reduce how quickly toll roads are deployed. Concessionaires will hesitate in making proposals since the government may deny them, forcing the government to make the first move. It will be assumed that the EPU will keep this proposal channel intact.

To answer “Is this proposal good for society?” an independent, internationally-known firm could audit the proposal. This audit would check that the initial estimates in terms of cost and projected traffic are justified and that the anticipated tolls provide reasonable rates of return. The government could do this itself but it would be more open to charges that they are just producing results that give the government its desired outcome. Investment firms will also perform their own check later in the process before providing a loan but given that the government will often provide some financial support and that there may be an expectation that the government will bail out ailing roads, financial firms’ concerns may be different. The investigative depth that the independent firm explores will drive the additional time needed for project deployment. A study that takes around six months is reasonable.

The audit should have no effect on true financial viability. Its purpose is to ensure that the government is not accepting a misleading proposal that provides an excessive rate of return to the private sector or one that is created with the unstated expectation that the government will bail the concessionaire out later. If an honest proposal is put forth, there will be no financial impact. If a misleading proposal is made, the audit should note that the traffic projections are understated, leading to greater than expected profits later; that costs are overestimated which would lead to higher tolls than necessary; or that other discrepancies are found in the proposal.

The final modified process is shown in Figure 8-2.
8.4.4 Changes to the Enabling PPP Policy

The Enabling PPP Policy will not need to be overhauled for these changes. The changes address specific weaknesses in the current policy that are handled during PPP Project Deployment. To highlight the necessary changes, the applicable questions and answers from Section 6.4.1 are taken and the differences between the old and new policies outlined.

What are the guidelines on the process used to choose a private sector partner?

**Old:** There is usually a competition but due to the low transparency of the selection process, it does not always appear that the most competitive bid wins, as discussed in Section 6.5.2 regarding the North-South Expressway. There does not seem to be much legal recourse if someone disputes the outcome but it provides the political opposition an opportunity to criticize UMNO over this.

**New:** The EPU must publish prequalification and award criteria. When the concession is awarded, summaries of the bids must also be released. It should be more apparent if the most competitive bid won.

Which stakeholders should be involved in the different phases of PPP deployment (decision to pursue a PPP versus other solution, project specifications, bids, alignments, etc.) and what requirements should there be on the level of participation of these stakeholders?

**Old:** The EPU and MHA are the only agencies who have a formal role. Other government agencies like state or local governments, departments of public works, and finance departments will also assist the process depending on the nature of the project. There is no requirement for public involvement.

**New:** There is a requirement for public involvement in determining whether a proposal should be pursued and in making tradeoffs between tolls and design specifications. The public’s comments do not drive the final decisions but they should inform the decision-makers.
Figure 8-2 - The Modified Malaysian Planning Process

Private Sector Proposal

Project from Government Plan

EPU Accepts/Rejects Proposal

Public Involvement - Workshops with conceptual alternatives
Environment - Check for no significant violations

Private Sector Proposals

Government Proposals

Government Proposals Put Out For Bid

Transparency
Government Proposals - Published criteria, brief summary of proposals
Private Proposals - Proposal audited by independent firm

Concession Agreement Negotiations Begin with EPU Privatization Committee

Public Involvement - Workshops with specific tradeoffs
Environment - Ensure design meets environmental standards

Negotiations with EPU Financial Subcommittee

Negotiations with EPU Technical Subcommittee

Agreement Approval by EPU Privatization Committee

Approved by Cabinet or a designated representative

MHA Monitors Construction, Operations, and Maintenance
How should tolls be determined and what factors can be used to calculate them? Should the public participate and should equity concerns be addressed? Is government approval required to raise tolls? Is congestion pricing permitted?

Old: There are no restrictions on how tolls are set but it is usually spelled out in the contract. No matter what is said in the contract, the federal government must still approve any toll increases. If there are deviations from the signed contract, the government has a policy to compensate the concessionaire for the foregone revenue. Congestion pricing is not used but it does not seem to be illegal, either, so it may be possible for the government to negotiate a contract that would allow it.

New: The public will participate in the technical design process and will be informed of the tradeoffs between tolls and design standards. Addressing equity concerns is not mandatory but it could be raised during the public involvement process.

What requirements are there for an environmental assessment of a PPP? At what point should one be done (before or after private sector involvement)? Should the process differ from the process for non-PPP roads?

Old: There is a requirement for an environmental impact assessment to be made but it may come after an agreement is signed. It does not appear to be much of a roadblock to building a toll road like in the United States. In the case of the Penang Outer Ring Road (PORR) concession, its main purpose was to choose the best alignment.

New: An initial assessment must be done before government proposals can be put out for bid or negotiations entered for private sector proposals. The technical design must then specifically meet environmental standards during the EPU Privatization Committee’s technical subcommittee negotiations over the final concession agreement.

8.5 Expected Outcomes

The requirements for the new Malaysian toll road PPP process in this hypothetical scenario are concentrated in the PPP Project Deployment process. The process for revising Enabling PPP Policy is the same as in the current system. While there are changes to the Enabling PPP Policy, they are just requirements for the PPP Project Deployment process. The benefits from these types of changes are credited only towards PPP Project Deployment.

8.5.1 Transportation

Travel Time

The process changes should not significantly change the amount of built capacity. It is possible that a proposed road is not built but the more likely outcome is a different alignment or an emphasis on measures to reduce local impacts. Since lower tolls are expected, there should be more vehicles driving on the toll road which will lead to increased congestion and higher travel times, all else equal. The public will have a role in determining the alignment and interchanges of the road, which will affect travel time. Assuming the public is likely to trade technical efficiency for mitigating social impacts, the travel time will be longer. These decisions that affect travel time are part of PPP Project Deployment. Enabling PPP Policy ignores travel time; the importance of travel time for each project is determined through the PPP Project Deployment process.
Travel Cost
The impact on travel cost is difficult to predict even qualitatively. The open competition for government proposals and independent audit for private sector proposals should decrease tolls. The public may then push for higher tolls if it feels that the mitigated local impacts are worth the additional cost. Since the greatest concern among the Malaysian public appears to be the tolls, the public may not trade all of the toll savings for local impact mitigation. In this respect, the new PPP Project Deployment process leads to lower tolls. Enabling PPP Policy is neutral on travel cost as it leaves it up to the PPP Project Deployment process to decide what the tolls will be.

Reliability
Reliability will remain about the same. There is not much incentive to improve reliability from the current state. Innovative ways to operate the system are not substantially encouraged by the new process. The concessionaire will operate the system more reliably if its profit margins are thinner, which lower tolls may contribute to, and disruptions could mean the difference between profitability and bankruptcy but it is not immediately clear that the new process will reduce profit margins that much. The process should ensure that rates of return are ‘reasonable’ but it is still up to the government to define reasonable and the government’s definition may not cause a significant change from today. Neither PPP Project Deployment nor Enabling PPP Policy will cause appreciable differences in reliability.

Network Integration
The changes in the network integration of toll road PPPs will be driven by the changes in public involvement. The public’s desires and the government’s treatment of those desires will affect network integration, though. Neighborhoods will lobby for changes to the road that provide all of the benefits but none of the costs. At best, there will be no change from today for physical network integration. At worst, the results of public involvement may lead to an alignment that is far from technically optimal for network integration if regional goals are completely sacrificed to satisfy local groups. Since public approval is not required, the EPU can ignore suggestions that would produce poor highway integration.

Requirements for operational integration are unchanged in the current process. The main point of public contention in this area would be a common electronic toll collection system but the government has already mandated the Touch ‘n Go system.

Overall, the Enabling PPP Policy does not improve or decrease consideration for network integration. At the PPP Project Deployment level, a slight decrease in the effectiveness of physical integration due to public involvement is expected.

Needs-Based Process
The project will better meet the needs of the public with the inclusion of public involvement at the PPP Project Deployment level. Currently, public input has an indirect route to the decision-maker but with the new process, the public has direct access to the decision-maker. It may not affect the decision to build a toll road versus a free road or a transit project, options which may be more appropriate for the region, but given that a toll road is built, it will meet the region’s
needs better than with the current process. The EPU can also balance the local needs from the public with national needs.

Enabling PPP Policy provides no change in meeting national transportation needs. It does not involve the input of the public to understand what people want from the national policy and it only considers how toll roads may best meet its own interests. It has no direct mechanism to consider other modes.

8.5.2 Economic

Access to Markets
Access to both labor and goods markets is not expected to change significantly under the new process. There may be slight changes in alignments and interchanges but the result will mostly be a change in the distribution of benefits and costs from one neighborhood to another with only mild changes systemwide. If additional roads were built or forbidden under the new process, the effect on access to markets would be more substantial but the process changes will probably have mild or no effect on the number of roads built.

Innovation
There is expected to be little change in innovation between the existing and new processes. Changes in innovation would require significantly different ways of handling private sector proposals or technical negotiations. The new process is not significantly different in a way that would spur innovation. The requirements for meeting environmental standards are not much more stringent than today.

The results of public involvement could lead to greater innovation but the public may also be wary of unproven methods for minimizing environmental impacts or improving freeway operations. For example, the American public does not always applaud ramp metering despite the improvements in highway operations (Cambridge Systematics, ES-4). Innovation could also be promoted by explicitly including it as one of the award criteria but it is not mandatory in the new process.

8.5.3 Environmental and Social

Pollution
Pollution should certainly be no worse than currently but the changes are not expected to be particularly strong requirements. The process should prevent the construction of facilities with very negative environmental impacts but there is not enough data to tell if this is a significant problem with current projects. It may be possible to produce lower environmental impacts if the public decides to make the tradeoff with higher tolls. PPP Project Deployments may show mild improvements over the current process.

Sustainability
Sustainability is not specifically considered in the updated process. It is no different from today for either Enabling PPP Policy or PPP Project Deployment.
Neighborhood Effects
By introducing public involvement into the PPP Project Deployment process and providing a system where various benefits are traded off with tolls, the government and concessionaire’s understanding of local priorities will improve. The EPU still has the power to override any concerns of the populace but that is less likely than under the current system. The Enabling PPP Policy itself does not take into account neighborhood concerns nor does the process for creating the Enabling PPP Policy.

8.5.4 Political

Transparency
Transparency for PPP Project Deployment is improved. The reasoning behind decisions for awarding a concession or setting design specifications and tolls will be perceptible to the public rather than hidden behind a shroud of secrecy as it often is now. Transparency for Enabling PPP Policy is unchanged. The process for changing it is the same where the government is still free to make changes as it sees fit without having to explain it to the public.

Public Involvement
Like transparency, public involvement is greater for PPP Project Deployment than in the current process while involvement in developing Enabling PPP Policy is unchanged. This is not an especially hard task since public involvement in any part of the process is currently nonexistent.

Accountability
Improvements in transparency for PPP Project Deployment will help accountability. The public will have a better idea of what is driving the EPU’s decisions and complain to elected officials if they feel the decision-making is poor. The elected officials can then change PPP policies or lobby for the removal of the appropriate EPU staff. Accountability for the Enabling PPP Policy is unchanged as the process that produced it is the same.

One area of uncertainty is who is making decisions. If decisions are being driven behind the scenes by elected officials on behalf of concessionaires, then EPU staff will take the blame for the decisions of others. It is unclear if this is different than currently. Abdul-Aziz writes that the blame for poor decisions are “largely directed at the government rather than the private companies” but he does not provide a breakdown on how much is blamed on the EPU versus the Prime Minister, his cabinet, or other elected officials. Assuming the blame is spread around with the current process, accountability would be reduced with the changes as elected or senior officials who are responsible for the decisions reduce their share of the accountability at the expense of EPU staff.

Ease of Changes
Compared to the other alternatives, the difficulty in bringing these changes to the PPP Project Deployment process are lower. The environmental requirements are not very stringent and the public’s role is not to make the decisions but to provide input to the EPU. The EPU is still free to ignore their input for projects the EPU deems critical, just with the realization of the ire that may be caused by the action. In these two areas, power shifts are low so institutional opposition should also be low.

242
The area which will engender the most opposition is in publishing award criteria and bid summaries. Improved transparency will hinder the government from awarding concessions to the politically well-connected rather than to concessionaire with the best bid. It will improve the ruling party’s public support, though, as people have more confidence in how the government is handling the process.

There are no changes in how Enabling PPP Policy is developed. The EPU is in charge and they do not have to listen to the public in shaping the policy.

Government Program Support
In this scenario, the government is still very supportive of the program. While public involvement and the environmental approval process are strengthened, they are not major roadblocks in deploying PPPs. The legal framework for government handling of PPPs is also unchanged so concessionaires should not fear an increase in unfavorable government action. The process changes will contribute to different PPP designs but they should not impact financial viability. From the concessionaire’s perspective, additional costs are passed on to a willing consumer. Enabling PPP Policy and PPP Project Deployment are thus unchanged from the current process in their support of the toll road PPP program.

8.5.5 Financial
Government Financial Support
The process changes do not address the levels of government support given to PPPs. Enabling PPP Policy does not limit or expand on the forms of support the government may provide so at this level it is the same as today. For PPP Project Deployment, the EPU’s financial subcommittee is still free to develop financial support packages for individual PPP projects that are the same as today. The public will want lower tolls while also pushing for more impact mitigation. The EPU could take the politically expedient route by offering both and then compensating the concessionaire which would be an increase in financial support relative to current levels. Since the government will be trying to maintain a toll road PPP program at near the same levels as today while the public will be pushing for lower tolls and greater benefits leading to higher costs for the concessionaire, government financial support may increase due to these changes for PPP Project Deployment.

Risk allocation
The treatment of political and revenue risk are the risks most affected by the new process for PPP Project Deployment. The Enabling PPP Policy is unchanged in its treatment of risk allocation.

Political risk is not directly reallocated; the government assumes the risk in the existing process and it still assumes the risk in the new process. The government has changed its handling of the risk by involving the public. The concession agreement that results from this process will have greater public support so while the government has not directly changed the political risk allocation, it has reduced the political risk. There is an indirect reallocation, though. In the event of a change in ruling party or a new Prime Minister from the same party, the government is less likely to overhaul the toll road PPP program at the expense of concessionaires if people are happy with it. In this sense, some risk is shifted from the concessionaire to the government.
Since the government is the partner in charge of managing the PPP program on behalf of the public, they are in the position to best manage the risk, making the indirect reallocation an appropriate one.

The increase in government financial support will affect revenue risk allocation. More financial support reduces the risk to the private sector partner and decreases their incentive to operate efficiently. The magnitude is contingent on whether the government will provide higher financial support throughout the life of the project or if it is a one-time increase at the beginning of the project through the provision of larger loans. The added revenue risk burden for the government is generally considered negative but if it provides significant social benefits, it may have a positive outcome.

What is the net result in this area? The value in reallocating political risk is partially a function of the risk of a change in political party. The coalition of parties that has ruled Malaysia since its first election in 1959 has been anchored by UMNO but opponents have been slowly making gains. It may be some time before UMNO is ousted, though. The value is thus a low but positive improvement. An increase in government financial support could be more substantial since the cost of building toll roads is significant, requiring large amounts of financial support if the public’s input is listened to. Strictly speaking about this measure, the net result will be negative compared to current policies although the overall result to the program of the government’s risk assumption could be positive through its affect on the other program evaluation criteria.

8.5.6 Malaysia-Specific Bumiputera Promotion

The government goal of Bumiputera promotion will not be greatly enhanced or degraded in the new process. The number of roads built, and hence investment opportunities, will remain about the same with no changes in the percentage of equity that must be owned by Bumiputera. Rates of return may drop a little but not significantly and the government will probably continue supporting ailing concessionaires through contract restructuring or extending financial support when necessary. Since treatment of Bumiputera and their financial investment is not treated significantly different than today at the Enabling PPP Policy or PPP Project Deployment level, it will be assumed that the outcome is the same.

Developed Nation by 2020

The greatest contribution of the new PPP Project Deployment process under this scenario is in promoting long-term stability of the toll road PPP program. With higher public satisfaction, some investment risk will be lower which will reduce the cost of loans. This saved money can be used in other areas of the economy. In Malaysia, political risk from public satisfaction is not a large contributor to total risk, though. Malaysia has a stable government and a two decade track record in handling toll road PPPs. The local impact mitigation could support Malaysia’s drive towards developed nation status as people will be happier, healthier, and more productive. Even if extensive data were available, it would be difficult to calculate this impact and the improvements may be marginal. Overall, there may be slight improvements towards reaching developed nation status by 2020 but nothing major. Enabling PPP Policy again contributes little to this improvement since its support for this goal is unchanged.
8.5.7 Uncertainties
Throughout the explanations of the expected outcomes, the public has been assumed to be rational and willing to accept an outcome that they participate in. This can be incorrect. The public may assume any cost estimates put forth by the government are biased to favor the concessionaire. The public may also demand much lower tolls and much greater impact mitigation measures than financially feasible. The EPU has the right to ignore these demands but critics will charge that the public involvement process is a ruse and that business as usual is continuing. If the EPU ignores these charges, the results for PPP Project Deployment will be no different than hypothesized in this scenario. If the EPU does listen, concessionaires will face reduced profits which may decrease the number of companies proposing toll road PPPs or participating in the sector. In this case, an even greater increase in government support will be required to maintain the size of the toll road sector.

Another problem with public involvement will be changing public attitudes over time. The public may be generally happy with the outcome of the process when the concession agreement is made but become unhappy several years later. This would degrade the risk allocation as the political risk has not been reduced as much as assumed.

As stated in the accountability portion of Section 8.5.4, the EPU will bear greater responsibility for the decisions made which may not be an improvement on the current process if elected officials or non-EPU government workers are the ones making the decisions. If EPU workers are receiving undeserved blame and firings, then the quality of EPU work, such as concession agreements, will decline. This will benefit concessionaires and the outcome of the PPP Project Deployment process will not be much different than today.

8.6 Conclusion
The results of the modified version of the current Malaysian process, as shown in Table 8-1, show favorable results for PPP Project Deployment with no change for Enabling PPP Policy. Incrementally changing the existing Malaysian toll road PPP program does not always improve on the current policy but the negatives are expected to be mild. For example, the level-of-service may not be as good as with the current process due to accommodation of local requests. It is hard to tell the magnitude of this degradation but the current process does take into account some local and environmental concerns. Greater concern for local concerns may only produce mild increases in travel time. The tradeoff in higher public acceptance should make it a worthwhile trade.

There are no changes in the process or the participants for developing Enabling PPP Policy. The changes for the actual Enabling PPP Policy are limited strictly to the requirements needed for the new PPP Project Deployment process, which the improvements in the toll road program’s outcome are credited to.

The best aspect of this process is that it is expected to be the easiest to bring about compared to the other alternatives. The government’s power is not seriously reduced. It may take public suggestions to heart or completely ignore them. The government will have more information of what the consequences of its actions are, though, and it can search for a win-win technical design where financial viability is maintained while better meeting local needs. The size of the toll road

245
PPP program may also not be seriously affected. It is possible for a potential project to be killed but it is unlikely.

There are no significant losers who would protest the changes. Financial viability will be reduced but concessionaires may accept the lower risk as a fair trade. The greater amount of impact mitigation will also be compensated with the knowledge of the public as to why that higher toll is deserved. If there is more government financial support, this will be a diffuse cost to the taxpayers which may not raise their ire of those impacted by the facility. The government ministries and departments and elected officials will benefit since voters will view them as supporting their interests.

The Modified Malaysian process does not provide widespread improvements but on balance it is better for society than the current process. The ease of implementing the changes should not be discounted and it is this alternative’s advantage over the other alternatives.

Table 8-1 - Expected Outcome of the Modified Malaysian Process

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>Enabling PPP Policy</th>
<th>PPP Project Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Environmental and Social</td>
<td>Pollution</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>0</td>
<td>+</td>
</tr>
</tbody>
</table>

The next chapter will cover the final alternative, adapting the United States transportation planning process. Whereas this alternative did not require extensive changes, using an adapted US process will require more widespread changes procedurally and institutionally.
9 Alternative 3: Adapting the US Transportation Planning Process for Malaysia

9.1 Introduction
A third alternative to the existing Malaysian process is to adapt the United States transportation planning process. A key part of the US process is a decentralization of transportation planning. The federal government provides policy direction through legislation and the funding policies of the US Department of Transportation (USDOT). The states also provide policy direction through their own legislation and funding policies. Regional transportation agencies, termed Metropolitan Planning Organizations (MPOs), make many of the regional transportation decisions using the direction provided by the federal and state governments combined with goals developed from local representatives. Two other key parts of the process are public involvement and the environmental approval process.

The US process does not translate directly into the Malaysian milieu. The history and geographical characteristics of the US explain much of the decentralized nature of political decision-making in general. Malaysia is a much smaller country and having federal, state, regional, and local levels of decision-making is arguably unnecessary. In this case, the MPO responsibilities of the US are transferred to the state level. Public involvement in developing Enabling PPP Policy is also assumed to be limited for reasons outlined in section 09.3.3.1. Other than that, many of the roles and responsibilities can be transferred over.

This adaptation could lead to significant improvements over the current process but the institutional barriers are substantial. Going from a centralized to a decentralized process will lead to substantial resistance. For the moment, it will be assumed that this resistance can be overcome.

9.2 An Overview of the US Transportation Planning and Policy Process
The responsibilities in the US transportation planning process are divided among the different government levels but different levels may share similar powers. This has allowed for a variety of institutional arrangements for transportation planning. This section will describe the powers and responsibilities apportioned to each level and the relevant policies and processes for toll road PPPs. It is not meant as an in-depth treatment of US transportation planning as some institutional arrangements are unnecessary in Malaysia. The goal is to capture the salient points in such a way that they can be adapted to the institutional environment in Malaysia.

9.2.1 Transportation Planning Institutions in the United States
Transportation planning institutions exist at four levels in the US: federal, state, regional, and local. The organizations at these levels do not have a strict division of powers and responsibilities; they can have similar powers between the levels, especially between federal and state.
Federal Level
Federal institutions are responsible for developing national transportation legislation and policies. Congress and USDOT are the two primary institutions currently involved in the surface transportation planning process. The Environmental Protection Agency (EPA) sets standards and regulations that affect the process.

Congress can levy taxes on transportation-related goods and services and approve programs to be administered by the executive branch. The major format for approving programs is a multiyear transportation act and the approved legislation sets the boundaries for transportation investments by affecting funding levels, the balance between modes, and financing methods available for the states and local jurisdictions. A major shift occurred with the approval of the Intermodal Surface Transportation Equity Act (ISTEA) in 1991 which allowed for increased flexibility in planning and funding transportation systems and empowered MPOs. The Transportation Equity Act for the 21st Century (TEA-21), authorized in 1998, continued many of the programs. Part of the legislation requires an MPO for any metropolitan area with a population greater than 50,000 and for that MPO to develop plans to cover long, medium, and short-range planning horizons.

USDOT is the lead executive agency for administering the programs and funding. It creates many of the regulations and principles that guide the transportation planning process. USDOT oversees many transportation research and educational programs, providing the country with the human resources necessary to build, operate, and maintain the transportation system.

EPA is responsible for developing environmental standards and ensuring that the states comply with the National Ambient Air Quality Standards. The EPA does not have a direct transportation planning requirement but it does require the state to develop a State Implementation Plan (SIP) if there are areas that do not meet the environmental standards. MPOs must then develop plans that support the SIP in coordination with the state, as required by the TEA-21 legislation (CADOT, 6-3, 6-4).

Security is not currently a part of the regional transportation planning process but the importance of the transportation system to the nation could change this. Response to an attack or other disruptive event will require an adaptive and robust system to swiftly handle the disabling of key arteries. Most of the changes for security will be handled at the operational level but transportation planners can design systems that will improve detection and communications capabilities and inform drivers of the need to detour around damaged areas. The Department of Homeland Security is expected to devise guidance in this area.

Federal programs for the Americans with Disabilities Act (ADA) and environmental justice will impact transportation planning. Transportation planners and operators must adequately provide services for the elderly and handicapped to comply with the ADA. Environmental justice principles, as set out in Executive Order 12898, February 1994, require planners to eliminate, if feasible, or mitigate the environmental and social impacts that a transportation project has on neighboring communities, especially those with little political power.

With regard to toll road PPPs, the federal government had a long-standing rule that prevented the development of toll roads as part of the interstate program with the exception of pre-existing toll...
roads (23 United States Code Section 301). The government has recently been loosening the legal barriers as financing has fallen increasingly short of needs and increasing federal taxes has not been a politically viable option. SEP-15 is an experimental USDOT program to test new approaches for public-private partnerships in order to improve the delivery of transportation infrastructure services.

**State Level**
Many of the functions of the federal government are mirrored at the state level. States levy fees and taxes related to transportation, fund programs, and set guidelines for agencies within the state. The organizations are also similar, with states having their own departments of transportation and environmental protection. Compared to USDOT, state DOTs are more active in constructing and operating the transportation system, albeit with the aid of federal funds. State DOTs may also be organized into districts that have similar boundaries to the major metropolitan areas and can be involved to a much greater extent in the planning process than the federal government.

State and federal involvement with the San Francisco Bay Area illustrates some of the similarities and differences between state and federal DOTs’ involvement in regional transportation planning. According to the Long-Range Transportation Plan (LRTP) developed in 2001, state and federal DOTs were projected to each provide 12% of the available funds (MTC, 5). The expectations that the MPO for the Bay Area, the Metropolitan Transportation Commission, had for them in supporting regional goals were different, though. The expectations for federal agencies were that they would promote policies to aid regional goals, such as tightening emissions regulations for airplanes or allowing more flexibility for railroad operations. Expectations for the state DOT, Caltrans, were operations-oriented such as increasing staff and funding for highway operations management or for safety enforcement.

Other state transportation functions are freeway safety enforcement and commercial vehicle regulation. Planners and highway patrol agencies can coordinate concerning future trouble spots and the resources required to manage them. ITS investments should also be discussed with the highway patrol so systems are compatible, allowing the highway patrol to respond more quickly to incidents. The level of enforcement for commercial vehicles will affect the safety and maintenance of the region’s roads and it may impact the economy through its effects on freight movement in the region.

States are more active than the federal government in promoting toll road PPPs but PPPs are still not common. The Route 91 project in California where a private company built and operated congestion-priced high-occupancy/toll lanes (HOT) and the more conventional Dulles Greenway toll road are two examples of recent PPPs in the US. One problem is that the most financially feasible routes have already been built as part of the interstate system and the government has forbidden tolling with some exceptions. Political willingness to build toll roads is also low due to the users’ expectation of free roads supported by gas taxes. Funding shortfalls have led several state DOTs such as Texas and California to explore more creative solutions to transportation needs and toll road PPPs have been one tool.
Regional Agencies
Regional agencies appear in a wide variety of forms with numerous responsibilities, powers, or lack thereof. MPOs are the regional organizations most involved with regional transportation planning, managing many of the planning tasks. Other regional agencies that will be involved in transportation planning include air quality management districts, transit agencies, and operating agencies. There are often multiple agencies working at the subregional level, such as several transit agencies servicing a multi-city region. Agencies may also operate across regional boundaries.

The powers of regional agencies are typically the weakest of the institutional levels in the United States. Power has historically been divided between federal, state, county, and municipal levels. With their relative youth, the powers needed by regional agencies have to be ceded by local and state governments, none of whom may be too eager to lose those powers. Another complication is that the governing boards for MPOs often consist of representatives from the local city and county governments. This organizational form is not conducive to increasing regional organization power at the expense of the local municipalities or developing plans that are to the disadvantage of a municipality. Plans must be developed that provide benefit to each municipality even if it is not the optimal plan for the region.

Since the region often includes several counties and may be in multiple states, the politics involved in handing normal governmental powers to a regional organization, whose leadership may not be directly accountable to the public through elections, are quite complicated but not impossible to handle. The most powerful regional organization in the United States is Metro in Portland, Oregon, a region with only one major city that does not cross state boundaries. Metro’s strength was originally derived from state legislation rather than the voluntary agreement of the municipalities (Marshall, 168).

In general, the greatest planning weakness of MPOs is that they generally do not have the power to introduce regional taxes. In the US, only two states – California and Nevada - give MPOs this power (Goldman, 29). In Lee and Rivasplata’s comparison of metropolitan transportation planning in three countries, they concluded that regional agencies should have the authority to generate revenues (Lee, 59).

For PPPs, an MPO could take a lead role in identifying projects that are financially feasible and support the LRTP. With the experimental nature of PPPs in the US, most potential projects have been identified and planned for by the state, though. If PPPs were to become an accepted method for meeting transportation needs, it is likely that the MPOs would assume these responsibilities.

Local
The local agencies are those in the counties, cities, and towns that make up the region. These agencies are responsible for building, operating, and maintaining local roads; enforcing traffic laws on local roads and expressways; and responding to accidents or other traffic disruptions. They can also levy taxes and fees and control zoning within their borders. Local organizations may provide the personnel that oversee the management of regional agencies or perform the work, such as local elected officials sitting on the governing board of an MPO.
Local agencies would play roles in drumming up support or trying to block a PPP depending on the benefits for the local area. The scale of feasible PPP projects has been too large for a single town or city to take on but in cooperation with others municipalities they could propose projects to the regional, state, and federal agencies that do have the capability to approve and support a project. If a project is unbeneﬁcial to the community, local politicians and agencies can usually find ways to delay the project until a more favorable solution is found.

9.2.2 The Regional Transportation Planning Process in the United States

While the federal government plays an important role in guiding transportation policy, much responsibility for the development of the system is delegated to state and regional agencies. The federal government still maintains an important role through federal funding processes and other regulatory measures. State and regional agencies are critical in identifying projects and applying for federal government funding. It is expected that a similar mechanism would be used to identify potential PPP projects.

At the regional level, MPOs are responsible for developing a long-term and a medium-term plan. The long-term plan is called the Long-Range Transportation Plan (LRTP) and it has a time horizon of at least twenty years. The MPO must develop one at least every five years and an important requirement of the plan is that it must be ﬁnancially constrained to existing funding sources. The goal is to produce a realistic plan rather than a “wish list”. The medium-term plan is called the Transportation Improvement Program (TIP) with a time horizon of no less than three years and it must be updated every two years. The projects on the TIP are those projects that have committed funding and meet air quality requirements.

How do projects get in the LRTP? The federal government provides broad guidelines on the process. A general representation of the process is provided by Figure 9-1.

The items on the feedback paths are critical parts of the process. Two topics in the diagram not explicitly noted yet in this chapter are public involvement and Title VI. The public must be involved in the planning process, which has taken many forms like mail-in surveys, focused workshops, and general public meetings. Scholars are paying increasing attention to this aspect (Moshtashari and Sussman, 1). Title VI refers to environmental justice requirements which are discussed in 0. The public involvement process can help meet the requirements for environmental justice by integrating community concerns early in the process and improving public support.
The regional vision and goals are developed by the MPO as it consults with local governments and the public. The federal government mandates seven planning factors that must be considered via the TEA-21 legislation, although TEA-21 also states that the factors are not legally binding mandates. MPOs usually fashion the regional goals to accommodate the planning factors. Anticipated funding will affect the ability of the organization to present a grand vision. Transportation improvements needed to meet expected population and economic growth may greatly exceed projected funds. Amidst all the mandates and constraints, the vision and goals provide a window into the characteristics of a region as different regions emphasize different goals.

During the “Alternate Improvement Strategies” step, a variety of projects are proposed based on the possible needs of the future transportation system. It is like a brainstorming session where ideas are not bound by constraints. The ideas may be completely new or recycled from previous
plans and they may be driven by the regional vision or as a response to a specific problem. The planners may divide the ideas up into categories, such as road options and rail options or capital improvement projects and operations projects.

With all the strategies and projects on the table, the next step is an evaluation of the quantitative and qualitative aspects of each project. They are prioritized based on the regional vision, goals, and values and on financial and environmental constraints. The quantitative evaluation includes financial costs, effects on traffic, safety benefits, and environmental effects such as emissions and noise. The qualitative factors will include the project's effects on social equity or environmental justice, disturbance of a neighborhood's social fabric, and conformity to the regional vision.

With a prioritized list of projects and public feedback on them in hand, the LRTP brings together the different parts of the process to develop a final list of projects and provide a rough idea of when the projects will be carried out. In addition to the financially constrained plan, the LRTP may include less constrained plans such as an ideal plan where cost is no object or one that can be achieved with some increases in funding. This can highlight the shortfalls expected under current funding and help build support for unfunded projects among the public and decision-makers. The LRTP must also address how it meets federal requirements for the planning process, the level of public involvement, promotion of environmental goals, and environmental justice principles for minority and disadvantaged groups.

As funds are identified and proposed projects come closer to their planned construction dates, the projects and funds are matched up and added to the TIP. In the US, projects that receive federal funds or are subject to federal action are included. The TIP must receive approval for air quality conformity and it must be financially constrained. The public can comment on the TIP but the public involvement process is far less extensive than in the LRTP process.

Eventually, designs are drawn up, contracts put out for bid, and construction commences. With the completion of the construction, the project enters the operations and maintenance phases. Future projects may be planned to rehabilitate or increase the capacity on the road.

9.2.3 Integrating PPPs into the US Planning Process

Integrating Enabling PPP Policy and PPP Project Deployment into the US transportation planning process as normal policy alternatives is not conceptually difficult. Specific issues could certainly be contentious but they will not be explored since they are not as relevant to Malaysia. What will be considered is how the different powers and responsibilities would be divided up between the different institutional levels.

The expectation is that the federal government and state governments could both develop Enabling PPP Policy. The federal government's rules would pertain primarily to the interstate highway system or other projects under the federal government's jurisdiction while the state's policies would cover state highways or other state projects without federal involvement. The state rules may overlap with federal rules but they may also provide added detail for a project that the federal rules are silent on. For example, a project to add tolled capacity to an interstate highway would be subject to federal PPP regulations. Suppose that land needs to be acquired for
the project. The federal rules may not cover this topic while state rules may allow the state to use eminent domain powers but require the private partner to pay the purchase costs.

PPP Project Deployment would be handled at the MPO level or state level depending on the project. An MPO can manage projects confined to a single metropolitan area. California State Route 91 is an example project that could be handled by a sole MPO. The state would handle projects that are rural in nature or involve several metropolitan areas. The Trans-Texas Corridor stretching 316 miles from Dallas to San Antonio (Landers, 27) is an example of a PPP where the state would be the lead agency due to the scale of the project and the large number of metropolitan areas affected. The lead agency, whether MPO or state, would choose projects based on their ability to meet the needs of the jurisdiction.

9.3 **Adapting the US Model to Malaysia**

Extensive changes to the Malaysia institutional framework are necessary to use the US model, especially for PPP Project Deployment. The government will have to integrate public involvement and environmental justice concerns into the process. Regional transportation planning agencies or similar organizations will have to be created or given new powers. Both structural and process changes will be needed to emulate the US model for transportation planning.

9.3.1 **The Scenario**

Here is a hypothetical scenario to aid our explanation. From here on, a hypothetical future is discussed along with possible strategies, decisions, and outcomes. With a scenario laid out, this chapter will try to create strategies, decisions, and outcomes consistent with the interests and powers of the stakeholders.

In order to strengthen his political position and reduce criticism of the toll road PPP program, the Prime Minister has decided to reduce the power of the EPU over the toll road PPP program and transfer some of its roles and responsibilities to the states, namely those for PPP Project Development. The goal is to make transportation decisions that are more responsive to local needs and reduce the perceptions of corruption. While the development process for Enabling PPP Policy will remain largely intact, PPP Project Development will be couched in a regional transportation planning process like in the US.

To retain direction of the overall program, the EPU will continue to manage the Enabling PPP Policy. The EPU will also control the financial support to toll road PPPs since the states are unlikely to be able to provide support for the typical project and poorly managed financial support programs by the states could lead to adverse consequences for investment markets beyond what the federal government finds tolerable.

PPP Project Deployment will be part of the regional transportation planning process run by the State Planning Committees (SPC), similar in function to the EPU. The SPC will be assisted by other departments, notably the Town and Country Planning Department, and it will involve the

---

7 This is assuming that PPPs would be mainstream options. At the time of SR-91's conception, PPPs were not and it was an experiment by the state to see how it would perform.
public as mandated by the Prime Minister. The goal is to not build toll road PPPs for their own sake but as part of an integrated transportation plan. By requiring a public involvement process, the public approval for them should improve and the toll increases should be more palatable.

Specific requirements that the Prime Minister will place on the process are that the public is involved, social concerns are considered, the environmental approval process strengthened, and toll road PPPs put out for open bids. This scenario assumes that the legislature will develop laws to mandate these requirements. Institutions may try to bypass the process and meet their own goals but they must still comply with these requirements.

9.3.2 Structural Changes
Structural changes are necessary to emulate the US planning process for the PPP Project Deployment phase. Regional agencies do not exist except in the Kuala Lumpur region and even then these are not very strong. However it may be possible to produce the same effect as an MPO without the creation of another set of agencies. There are no structural changes necessary for the Enabling PPP Policy. This results from the smaller geographical scale of Malaysia.

Enabling PPP Policy in an Adapted US Process
Enabling PPP Policy is general in nature, setting the bounds for any number of PPPs. If the potential number of PPPs is large and the circumstances for their deployment show high variations, it makes sense to allow multiple levels of government to develop PPP policies. US government PPP policies would have to support the Northeast, with its relatively higher transit use and cold weather conditions, as well as the Southwest where sunshine and roads are in abundance. States can develop their own policies to take into account these differences, especially if they have the potential for several PPP projects on their own as is possible in large states like California or Texas.

In Malaysia, the geographical conditions are less varied and the number of potential PPP projects is smaller. Outside the Kuala Lumpur region, there currently isn’t the market for several toll road PPP projects in one state. It makes little sense for the state government to develop its own Enabling PPP Policy for so few opportunities. Even the Kuala Lumpur region with the largest market for projects is fractured between a state and a federal district, which would require them to coordinate PPP policies if they wanted to be successful. Given the scale of the toll road PPP program, the federal government should continue to be the level of government that develops Enabling PPP Policy.

PPP Project Deployment in an Adapted US Process
The institutional structure for dealing with PPP Project Deployment is dependent on the type of project. With decentralization as a guiding principle, PPP Project Deployment should be managed by the smallest administrative unit responsible for the area the toll road is in. For example, suppose a toll road is proposed that is in one metropolitan area. If a metropolitan transportation agency exists, it should manage the PPP Project Deployment rather than the state. If a road goes through rural areas or several cities in one state, the state should administer it rather than the federal government.
Does Malaysia need a structure similar to the United States with regional agencies along with state and federal governments and agencies? With the exception of Kuala Lumpur, regional agencies may be unnecessary. The country is slightly larger than New Mexico at 329,750 square kilometers and is divided into thirteen states and one federal territory (CIA Factbook website). The two non-peninsular Malaysia states, Sabah and Sarawak, are a disproportionate portion of this area at 205,160 square kilometers (Zakaria, 2003, 6). The average state in Peninsular Malaysia is about 12,000 square miles, slightly smaller than the state of Connecticut. This alternative does not depend on a perfect replication of the US structure. The states will handle the functions of PPP Project Deployments for projects solely within their jurisdictions.

For multi-state projects, the guidance from the US process is lacking. Multi-state toll roads run by one company or agency do not exist in the US. A road may be tolled on both sides of a border, such as I-90 in Indiana and Ohio, but it is tolled by different agencies. Given the decentralization principle, the Malaysia scenario will require a concessionaire to get approval from each state the proposed toll road runs through rather than having the federal government force the states to approve the toll road on behalf of the company.

Kuala Lumpur is a special case since its metropolitan area includes the city of Kuala Lumpur, which is a federal territory, and extends into the state of Selangor. Many potential toll road PPPs would require the cooperation of both the state and the federal territory. A regional agency may be useful since cooperation would be required on a regular basis. The Klang Valley Planning Secretariat (KVPS) from 7.4 on Malaysian PPP Project Deployment using the CLIOS process would assume MPO-type powers over the Kuala Lumpur Metropolitan Region and include representatives from the federal government, Selangor state government, and Kuala Lumpur City Hall.

A Proposed Institutional Framework for Malaysia Adapted from the US Process

Table 9-1 provides information on a proposed Malaysian framework that emulates the US planning process. Many more functions are pushed down to the state level than in the current system.

The federal government maintains three important roles in the new process. The first role is to develop the Enabling PPP Policy, as discussed previously. The legislature and Cabinet continue their roles in developing the legal basis for the policy while the EPU makes the policy operational. The second role involves the partial subsidization of projects as necessary. The scale of subsidies can be large and the federal government will want to maintain oversight of the subsidies and their effect on national debt and equity markets. The Malaysian states could apply for subsidies from the federal government, just like how US states and MPOs apply for grants from the USDOT. Finally, a project receiving support from the federal government would automatically trigger the involvement of the Malaysian Highway Authority as a regulatory body to ensure that the government's investment is protected.
### Table 9-1 - Proposed Institutional Functions

<table>
<thead>
<tr>
<th>Level</th>
<th>Organization</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>Legislature and Cabinet</td>
<td>- Approve and maintain PPP legislation</td>
</tr>
<tr>
<td></td>
<td>Economic Planning Unit</td>
<td>- Develop Enabling PPP Policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Administer any federal financial support programs</td>
</tr>
<tr>
<td></td>
<td>Malaysia Highway Authority</td>
<td>- Develop minimum technical standards for roads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Regulate roads receiving federal financial support</td>
</tr>
<tr>
<td>State</td>
<td>State Planning Committee</td>
<td>- Jointly identify potential projects (economic needs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Manage bid process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Negotiate contracts</td>
</tr>
<tr>
<td></td>
<td>State Town and Country Planning Department</td>
<td>- Jointly identify potential projects (urban planning needs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Work with concessionaire to integrate into urban environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Consider environmental issues</td>
</tr>
<tr>
<td></td>
<td>State Public Works Department</td>
<td>- Regulate construction, operations, and maintenance phases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Provide technical support during bid process</td>
</tr>
<tr>
<td>State</td>
<td>Local governments</td>
<td>- Identify projects to meet local needs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Provide input on impacts of projects on their communities</td>
</tr>
<tr>
<td></td>
<td>Klang Valley Planning Secretariat</td>
<td>- Identify potential projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Manage bid process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Negotiate contracts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Consider environmental issues</td>
</tr>
<tr>
<td>Kuala Lumpur Region</td>
<td>Selangor State Government</td>
<td>- Work with concessionaire to integrate into Selangor urban environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Regulate construction, operations, and maintenance phases in Selangor</td>
</tr>
<tr>
<td></td>
<td>Kuala Lumpur City Hall</td>
<td>- Work with concessionaire to integrate into Kuala Lumpur urban environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Regulate construction, operations, and maintenance phases in Kuala Lumpur</td>
</tr>
<tr>
<td></td>
<td>Federal Government</td>
<td>- Ensure national needs are met with Kuala Lumpur Metropolitan Region projects</td>
</tr>
</tbody>
</table>

257
The state takes a much more active role than before with several agencies involved. The State Planning Committee (SPC) inherits many of the EPU's functions in the current process. It identifies projects with the Town and Country Planning Department, local governments, and representatives but its focus will be on projects that bring economic benefits. Once a project is identified, it will manage the bid process and then negotiate a concession agreement with the concessionaire. The Town and Country Planning Department is concerned with the environmental and social impacts of the project and helps identify projects that can meet these goals. The Public Works Department mirrors the previous tasks of the Malaysia Highway Department in regulating the concession once construction starts. Local governments will also be involved in identifying projects and advising the SPC on how projects can be designed to best meet their needs.

The Kuala Lumpur Metropolitan Region is a special case with KVPS functioning as a state government for the region in regards to toll road PPPs. If structured like a US MPO, it would also assume many of the duties of the Town and Country Planning Departments. Selangor and Kuala Lumpur City Hall Public Works Departments would provide technical oversight once construction starts on their respective portions of the roads as US MPOs are less involved with this phase in projects. Selangor and Kuala Lumpur would also be active in advising KVPS on integrating projects into urban environments although KVPS would take the lead on these issues. The federal government would still be involved given the national importance of the Kuala Lumpur region and it may reserve the right to identify projects to meet special needs that KVPS may neglect.

9.3.3 Procedural Changes

Along with the structural changes, there will be procedural changes to better match the US process. These changes will be more extensive than in the institutional structure where there are existing organizations that can assume the duties. The procedural changes required are often new to the political system which has limited public involvement and low concern for environmental issues.

9.3.3.1 Enabling PPP Policy

The Malaysian Enabling PPP Policy has been relatively stable over the years. It has slowly drifted away from a division of risk characterized as favorable to the concession companies in Section 6.5.1 but the overall policy has not drastically changed. Since the EPU is responsible for both Enabling PPP Policy and PPP Project Deployment, this has been an adequate process; the EPU could slowly change the Enabling PPP Policy on a project-by-project basis.

With the division between Enabling PPP Policy and PPP Project Deployment in a US-style process, the EPU will need to formalize the Enabling PPP Policy for the states. Changes in the policy may not occur with each project but rather every few years as the EPU gathers feedback on recent PPP projects. There are three parts to the overall process: the process of creating and maintaining the legal basis and rules for PPPs, the process of developing policies based on the laws, and updating PPP policies in response to the outcomes of PPP Project Deployments.

Figure 9-2 - The Feedback Process
Process Changes for the Legal Aspect of Enabling PPP Policy
The existing laws are very broad and the EPU has been very flexible in their interpretation over the past two decades. The process for developing them through the Malaysian legislature is adequate. The legislative process may be strongly determined by the Prime Minister’s agenda but changing this dynamic would require institutional changes beyond the scope of this thesis. The legislature would probably have to pass laws to shift to the US process but it is assumed that this will occur in this scenario. Beyond that, there is no need to change the legislative end of the process.

Process Changes for the Policy Development Aspect of Enabling PPP Policy
The policy development phase will require changes to formalize the policies and the process for changing them. Before the EPU did the whole process but now states will manage the individual projects and thus need the policy guidance from EPU. How will these policies be developed? One possibility is that since this is an adaptation of the US process, the policy development process should be similar to the US with notices of proposed rulemaking, public involvement, legal review processes, and numerous other requirements. Another possibility is that the EPU will develop the Enabling PPP Policy as it currently does with a great deal of informality but culminating in the issuance of a final set of formal policies.

The first possibility closely matching the US process is a poor fit for the Malaysian institutional structure. Requiring Notices of Proposed Rulemaking and similar structures would improve transparency and public participation in the process but it seems unlikely that this could be applied solely to this one area of government policy development. Extension to other programs would be likely and the result would be significant shifts in the way the federal government does business, greatly reducing its power to change policy as it sees fit.

The EPU currently develops policies behind closed doors. It will consult with other government agencies as needed but since it is in the office of the Prime Minister, the strategic thrusts of the policy will be ones the Prime Minister wants. The formal policies as they currently exist are very general with informal policies being developed through the EPU’s handling of PPP Project Deployments. In this second possibility, the EPU would take these informal policies and integrate them with the basic formal policies to provide a guide to the states on successful PPP
Project Deployments in consultation with relevant agencies. This would remain a closed door process.

The latter possibility is the most plausible. Again, the goal is not to exactly copy the US process but to follow some of its principles such as decentralization. Up until now, the Enabling PPP Policy has given a high degree of flexibility to the PPP Project Deployment phase. The government is expected to maintain this flexibility as it supports the toll road PPP program. Flexibility improves the probability that a feasible concession agreement can be reached. Formal rulemaking structures of the US will just slow down the process but have little impact on the final policy that maintains this flexibility. The government will respond to any proposals by the public to require the process to be more favorable to them as an issue that should be considered by the states on a project-by-project basis. Since the outcomes may roughly be the same whether the public participates or not and the latter alternative requires far less institutional upheaval, the latter possibility will be the process used in this thesis to develop the Enabling PPP Policy.

Two things need to be noted about this process in relation to the PPP Project Deployment phase. First, it is assumed that public involvement, environmental issues, and environmental justice concerns will be required by the Enabling PPP Policy and federal law to be addressed during PPP Project Deployment to maintain some consistency with the US process. During the PPP Project Deployment phase unlike Enabling PPP Policy, there is expected to be a great difference in the outcomes based on using a US-style process versus the current Malaysian model. In this possibility, the federal government is in effect pushing its desire for greater transparency onto the states rather than onto itself.

This arrangement would allow the federal government to take credit for the success of the PPP program and improvements in the transparency of the PPP program while placing blame for failures on the state government’s handling of specific projects. Second, the process does not completely shut out the voice of the public in developing Enabling PPP Policy but it requires it to be channeled through the government agencies involved in the process. Since state governments are expected to be involved either in this phase or the feedback phase described below, some ideas from the public should make it through to the Enabling PPP Policy, albeit not as many as may occur with a US-style process.

Process Changes for Adjusting Policies Based on Feedback
The EPU currently manages both Enabling PPP Policy and PPP Project Deployment so feedback is now handled through internal channels. The changes in the institutional structure will result in different agencies handling the results so the EPU may not necessarily have first-hand access to them. An appropriate feedback mechanism needs to be designed so the EPU can maintain an Enabling PPP Policy that provides value to society.

A basic mechanism would be reporting requirements for all projects. Details on financial status and traffic flows could be provided to the EPU by the concessionaire as part of the regulatory strategy for the toll road industry. The reporting requirements would be standard so the data may not capture the nuances of individual projects that contribute to their success or failure but it would permit greater transparency on toll road operation if the reports were made public.
A second mechanism would be a policy review by the EPU every few years that would include representatives of the states. Using the reported data, the EPU would investigate the results of the existing policy with the participating states providing detailed information on the reasons for those results. For example, is there political instability, an economic slump, or freight growth that is changing the economics of toll road operation? The EPU could then assess the future for toll road needs and how well existing policies fit those needs. If the existing policies are found lacking, they can be changed to better fit those needs.

9.3.3.2 **PPP Project Deployment**

Going back to Figure 9-1, there are seven major steps in the development of a project from inclusion on the long-range transportation plan to completion of construction:

1. Creating the regional vision and goals
2. Investigating alternate improvement strategies, both capital and operational
3. Evaluating and prioritizing those strategies
4. Developing the long-term transportation plan
5. Developing the Transportation Improvement Program based on projects in the LRTP.
6. Developing the specific project from the TIP
7. Completing construction and integrating into transportation system operations.

Throughout this process, the public is involved; economic, environmental, and social equity concerns addressed; and financial limits observed. Many of the key points in regards to PPP actions, public involvement, and environmental approvals are summarized in Table 9-2 at the end of this section.

We shall now consider how the seven step process presented above would work in Malaysia.

**Creating the Regional Vision and Goals**

The State Planning Committee (SPC) would lead the process of creating the regional vision and goals. It can use a similar process to one common in the US where different local authorities are consulted and the public is integrated. Due to the appointment of SPC officials by the federal government, the regional vision and goals would be influenced by national policy to a greater degree than in the US.

Public ideas can be solicited in different ways. Mail-in, phone, or internet surveys are useful for learning what the public thinks about transportation issues. Focus groups and workshops can explore the public’s views and opinions on different visions for tackling the issues and addressing future concerns.

Toll road PPPs will not be directly addressed during this phase. The goals may include an efficient use of taxpayer money which indicates support for toll roads but the goals should not include toll road PPPs themselves. Toll road PPPs are a means to meet regional goals; they should not be the ends.

**Investigating Alternate Improvement Strategies**

The SPC would generate numerous strategies to meet transportation needs. At this point, any strategy should be considered, whether toll road PPP, mass transit, government-built road, or an
option to not build. The Town and Country Planning Department would assist in this endeavor. The SPC would focus on strategies that meet economic needs such as ensuring access for freight or that excessive economic productivity is not lost through congestion. The Town and Country Planning Department would identify projects that meet other needs such as projects that enhance access to jobs for low-income communities or projects that can improve the local cultural life by reducing the environmental and social impact of transportation. This may be a redesign of an urban area and the roads that service it into an area that allows greater pedestrian access. Local authorities could bring their ideas to the table as well.

Public involvement is not envisioned to be a major part of this step. Ideas can be submitted by the public but they will not be actively solicited. Local representatives and the Town and Country Planning Department will act as proxies for the public and provide greater technical detail for projects that can meet the public's needs.

**Evaluating and Prioritizing the Strategies**

Evaluation and prioritization requires the development of performance measures as the first step. These measures will be quantitative in nature. Quantitative measures include travel time, congestion, financial feasibility, and air quality, among others. Qualitative measures may try to capture the effect of a strategy on social life or the aesthetics of the area but in the US, quantitative proxies are often developed so benefit-cost assessments can be performed.

Prioritizing the strategies also involves a political calculation. Each municipality should receive something out of the plan to maintain public support even if the plan is not technically 'optimal'. The state government may have greater latitude to ignore this than in the US since power is centralized to a greater degree and the culture may be more accepting of a plan if society benefits even if they personally do not. There are limits, though, and too imbalanced a plan could have repercussions at the ballot box.

The SPC will involve the public in ranking the relative importance of different performance measures although its input will not fully determine them. In this alternative, the SPC will use workshops as the principal means for this. They allow the participants to become better acquainted with the different measures and how they interact. The tradeoffs that the public makes between the measures are thus better informed and should aid the SPC in developing a strategy that is more acceptable to the public.

Toll road PPPs should not receive special treatment during this step. They should be evaluated against all the other strategies to meet regional goals. Toll road PPPs should fare well on its effective use of taxpayer money and, relative to other roads, lower environmental impacts due to tolling. It will probably be built faster than government projects as well, a benefit that should be considered. Congestion pricing can further enhance its standing in this category.

Relative to mass transit, if available as an alternative, toll road PPPs are not the most environmentally friendly. The toll road will probably provide fewer benefits to low-income communities due to the direct financial impact of the tolls and the social impacts that highways have. With an emphasis on profits, the concessionaire will be less inclined to spend money to mitigate the impacts of the road on the neighborhood. While toll road PPPs should not receive
special treatment, ones that the federal government determines are critical whether or not they meet regional needs will probably be considered high priority.

**Developing the Long-Term Transportation Plan**

With a guide on what is technically and socially important, the SPC will proceed with developing the LRTP. A rough draft will be developed that lists the projects and approximate timeframes for when they will be undertaken. The plan should also address general environmental and economic development concerns. Like in the US, the plan should meet specific environmental goals like air quality standards. The draft will then be presented to a wide variety of audiences to gather feedback and refine the plan. The audiences will include the public, business groups, special interest groups, and local governments.

The level of involvement will depend on the audience. Business groups, special interest groups, and local governments will be involved in much more focused sessions since they may have staff designated to handle transportation issues and can provide more constructive feedback. The SPC may hold dozens of information and feedback sessions with people who do not have technical training or work experience in transportation. For public involvement, the generally used method will be an information session. In these sessions, the SPC will present the draft plan and the public will comment on it. Surveys and comments gathered through a website, mail, or other means will supplement these meetings.

With more information on the concerns of the public and other groups, the plan can be finalized. Any points that raised special concerns may require more public sessions to smooth things out. Once a final draft is complete, the plan must be approved. In the US, this task is handled by the MPO’s executive committee which is often composed of elected representatives of the municipalities in the region. In the Malaysian alternative, there is no corresponding alternative since the only elected representatives are at the federal level. In general, more power is placed in the hands of the ministries relative to the US. It will be assumed that the SPC has the power to approve a plan.

All potential toll road PPPs will be listed in the LRTP. The state government does not have to put the project out for bid at this point but it should be clear that there will be a toll road PPP, not just a road where it is unclear whether it will be tolled or not, and that it will be put out for bid at some point rather than handed to a government-favored company. This does reduce potential benefits for innovative solutions from unsolicited bids.

**Developing the Transportation Improvement Program**

When the projects begin nearing the time for their execution, they are matched up with sources of funding and placed on the TIP. In the case of a PPP, placement on the TIP indicates that the PPP is about to be put out for bid.

Like in the US, projects placed on the TIP must meet environmental standards. If the road is expected to add enough pollutants that it causes the region to violate the standards, it will not be permitted on the TIP. Once the road does not cause the region to violate standards, either through changes in the basic design or improvements in other parts of the regional transportation system, the SPC can add it to the TIP. It will be assumed that the only way for a project to get
around the environmental standards is if a federal law is passed making an exception to the laws mandating conformance with environmental requirements. This should not be very difficult if the federal government determines a specific road is a necessity but it will be done in a more transparent and accountable manner through the legislative process.

Public involvement is limited during this phase. In this alternative, the state will allow comments at public meetings or through other means but it will not pursue an active public involvement strategy. Concerns about having the project should have been addressed during LRTP development and concerns about specific aspects of the project will be addressed in the next step.

**Developing a Specific Project from the TIP**

Developing a toll road PPP requires the project to be put out for bid, negotiations with the bid winner, and approval of the final technical design. While the SPC will manage the first two parts, the third part requires greater involvement from the Town and Country Planning Department and the Public Works Department.

As is the case in the US, the state will hold an open competition. There may be a prequalification phase to ensure that the bidders can perform but there will still be more competition than now. The state’s proposal will not be excessively detailed so the private sector does have some flexibility. Items covered may include minimum capacity, traffic estimates, and a general idea of the alignment. These items will be specified in further detail during concession agreement negotiations. The award criteria will be clearly stated and bid documents will be publicly accessible once the bid is awarded to improve transparency of the process.

While it is still possible to subvert this process so that the favored company wins the award, it will be harder to hide since the criteria and bids will be out in the open. Methods that could be used to favor a specific company include tailoring the design requirements or evaluation criteria to the strengths of the company, using a prequalification phase to keep out the strongest competitors, and allowing the favored company to put in a ‘lowball’ bid with the implicit understanding that the deal will be renegotiated as needed. These could occur in the other alternative processes, as well.

The clear award criteria will make it more difficult to integrate innovation into the project bid. There is no guarantee that a company that decides to use innovative technology to improve benefits with a mild cost increase will be competitive with the other bids. For instance, congestion pricing is a useful tool for managing congestion but it is more difficult to integrate into evaluation criteria than a flat toll. The net effect will be reduced innovation during bidding, although companies may try to add some things during concession negotiations once they have won.

When a concession is awarded, the state will negotiate a detailed concession agreement. Items to be negotiated include the concession period, greater specification of the structure to be built such as the number of lanes and locations of intersections, tolls and scheduled increases, and how the risks are divided between the public and private sector. When technical and financial estimates are completed, the state government can submit a request for financial support from the federal
government. The most likely support will be a soft loan (low interest or deferred repayment) but it may come with strings attached. The agreement will not be signed until all these issues are resolved.

The final technical design will require two approvals. The Town and Country Planning Department will ensure that the design meets the desired urban design needs and environmental concerns of the local community. This will include public meetings to allow the public to comment on the design. First, this will lengthen the approval process from the current state. Second, some accommodation must be made in the concession agreement to account for design changes required by the Town and Country Planning Department. Along with the environmental concerns, the Town and Country Planning Department will assist with the environmental impact assessment necessary at this step. The second approval comes from the state public works department that the proposed design is technically sound.

Completion of Construction and Integration into Transportation System Operations
When all the approvals are received, the concessionaire may begin construction. The right-of-way will need to be acquired but that will be up to the state to handle. It could use its eminent domain powers to seize the land and either give it to the concessionaire as a form of financial support or require the concessionaire to pay for it. The Public Works Department will monitor construction to ensure it meets the state government’s quality standards. Eventually construction will be completed and the toll road opened to the public.

If concession agreement issues come up, the concessionaire and SPC will have to negotiate an outcome. This is similar to the current situation between concessionaires and the EPU. If the public protests increases in toll rates or the economic situation is far different than expected, the SPC and concessionaire can modify the agreement. The magnitude of financial support needed may require the input of the EPU, though.
### Table 9-2 - Requirements for PPP Development in the Adapted US Process Alternative

<table>
<thead>
<tr>
<th>Step</th>
<th>PPP Actions</th>
<th>Public Involvement</th>
<th>Environmental Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Creating the regional vision and goals</td>
<td>None</td>
<td>Surveys, focus groups</td>
<td>None</td>
</tr>
<tr>
<td>2. Investigating alternate improvement strategies, both capital and operational</td>
<td>Consider toll road PPPs as one of many possible strategies</td>
<td>Not actively solicited. Public can still provide</td>
<td>None</td>
</tr>
<tr>
<td>3. Evaluating and prioritizing those strategies</td>
<td>Evaluate PPPs against other strategies in unbiased manner</td>
<td>Workshops Help determine priorities and performance measures</td>
<td>Performance measure for strategies</td>
</tr>
<tr>
<td>4. Developing the LRTP</td>
<td>Select PPPs that best meet regional goals.</td>
<td>Focus groups General information sessions</td>
<td>LRTP must meet environmental standards</td>
</tr>
<tr>
<td>5. Developing the TIP based on projects in the LRTP.</td>
<td>Indicates PPP about to be put out for bid</td>
<td>Limited, comments at public meeting but not as active a strategy as LRTP</td>
<td>TIP must meet environmental standards</td>
</tr>
<tr>
<td>6. Developing the specific project from the TIP</td>
<td>Put PPPs out for open bid</td>
<td>Information sessions on design issues</td>
<td>Design approved by Town and Country Planning Department for meeting standards or federal legislature exception</td>
</tr>
<tr>
<td>7. Construction and integration into transportation system operations.</td>
<td>Construct PPP and integrate into transportation system</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
9.4 Expected Outcomes

9.4.1 Transportation

Travel Time
Travel time will be higher since one of the key evaluation criteria during the bid process will be the toll and open competition should drive tolls lower than currently. Since travel costs are lower, more people will use the road. This could be offset with increased physical capacity if more roads are built than currently but this is not expected to happen. Strategies like congestion pricing will be more difficult to use since the bid process does not encourage innovation. Reliability may be improved, as will be explained shortly, but this does not necessarily reduce travel time. The drivers for increased travel time are due to the new PPP Project Deployment. Enabling PPP Policy has little influence on this measure just like the current policy.

Travel Cost
With the competition required for toll road PPPs in PPP Project Deployment, tolls are expected to be lower. The worst case, assuming the SPC can negotiate concession agreements as well as the EPU, is that tolls will be the same. Additional bidders should cause the other bidders to reduce the tolls in their bids to be more competitive. Enabling PPP Policy does not affect travel cost.

Reliability
Reliability should be greater than in the base case. The current case is similar to the case of X-inefficiency where “a monopoly does not achieve the minimum costs that are technically feasible.” (Weimer and Vining, 106) With the reduction in tolls and government financial support, increased pressure will be placed on the concessionaire to operate efficiently. An important source of efficiency is by increasing reliability through improved toll road operations and it should be expected that concessionaires will concentrate on better operations. PPP Project Deployment contributes to the pressure from tolls and government financial support while Enabling PPP Policy does little for this area.

Network Integration
Network integration will be greater since PPP Project Deployment is part of a regional transportation planning process that considers how the different elements of the transportation system work together. Previously, toll road proposals may have come from a national plan that is not as concerned with local issues or from unsolicited proposals. Enabling PPP Policy does not address network integration.

Needs-Based Process
The US process will improve the orientation of the process to one that accounts for local transportation needs through the integration of PPP Project Deployment in the normal planning process. Ideally, the SPC will come up with multiple ways to meet needs and the evaluation and prioritization step will result in the best option being chosen. The federal influence on decisions and their pro-privatization stance may lead to more biased decisions by the SPC than ideal but it should still be an improvement over the current process which does not require the consideration
of other options. The federal influence may also balance a tendency by the state to only consider local needs and ignore federal needs.

The approval authority for toll road PPPs is with the SPCs and not the EPU. The Enabling PPP Policy does not consider local or even national needs. That consideration takes place during the PPP Project Deployment. There is the goal that government policy should support reaching Developed Nation status by 2020 but that also exists in the current process.

9.4.2 Economic

Access to Markets
The involvement of the Town and Country Planning Department in PPP Project Deployment will improve consideration of access to jobs for workers. Freight access may be worsened, depending on how influential the Town and Country Planning Department and the EPU are. The EPU will be concerned with national freight issues as businesses need reliable access to operate efficiently and promote national economic development. The state may be less concerned with interstate freight issues.

The Town and Country Planning Department's greater concern for the population may have an unfavorable view towards freight running through residential areas but metropolitan areas can be planned to reduce freight's impact while maintaining its access. Business leaders may use their government ties to prevent a decrease in their access so it will be assumed that this alternative will result in freight access that is no worse than the current Malaysian process. Overall, the revised PPP Project Deployment process is a mild improvement over the base process since labor access will be improved.

The new Enabling PPP Policy does not promote or restrict access to markets. The existing policy does not address this issue, either.

Innovation
The open competition mandate for PPP Project Deployment will reduce innovation in the toll road program. Innovation requires additional effort for the toll road company and if they are not going to be rewarded for it, they will not put in the effort. It may be possible to add innovative parts to the project once the basic contract has been awarded but this innovation will not be considering the project as an integrated whole. It may be a local optimum for the project but not a global optimum due to the restraints placed by an open tender. There should be some operations innovations as a means to maximize revenue but it may not offset the losses in innovation from the outset.

The new Enabling PPP Policy does not deal with innovation but neither did the old one. They are both neutral on the subject.

9.4.3 Environmental and Social

Pollution
In this alternative, the PPP Project Deployment process requires that a project cannot be placed on the TIP if it leads to violation of regional environmental standards. Once on the TIP, the project is still subject to concerns from the public and faces the approval of the Town and
Country Planning Department. This is a major improvement over the existing PPP Project Deployment process which gives the impression that environmental approval is an afterthought.

As stated in section 9.3.3.2, the federal government still has the power to make exceptions. The result could be that if any toll road does not meet the environmental standards, the legislature provides the necessary exception, making the environmental approval process ineffectual. Since these actions will be visible, it may lead to greater public criticism that public health is being sacrificed for private sector profits. While the end result may not be perfect compliance with the standards, it should be better than the current process as the legislature only provides exceptions to truly necessary projects and companies develop projects that achieve higher compliance.

The Enabling PPP Policy does not consider the environment in any substantial way beyond the requirements it places on PPP Project Deployment. With regard to pollution, its performance is the same as the current policy.

**Sustainability**
Sustainability is not a concern addressed directly by this process. The mandatory environmental approval process, greater public involvement, and increased role for the Town and Country Planning Department will improve the process on individual measures of sustainability but it does not approach it in an integrated manner. While there may be improvements, they are not to specifically address sustainability and do not capture the integrative aspects. This is no change with the current process for either Enabling PPP Policy or PPP Project Deployment.

**Neighborhood Effects**
The involvement of the Town and Country Planning Department will reduce the negative impacts of toll road PPPs on neighborhoods. The department should also aid in the design so that social opportunities are improved. This will include alignments and intersection locations. Rather than a hodgepodge, disorderly development of the toll road and around the toll road, the resulting development should be better thought-out than the current process. The requirement for the approval of the Town and Country Planning Department will force the concessionaires to give this part of the process more than lip service. The lower tolls will also be beneficial for travelers in comparison to the base case, reducing their financial impact and increasing their work opportunities. These improvements occur at the PPP Project Deployment level. The Enabling PPP Policy does not consider neighborhood effects, especially given the lack of public involvement.

**9.4.4 Political**

**Transparency**
Transparency is greatly improved. The Enabling PPP Policy will be explicitly described, which is an improvement over the current process. The feedback process for modifying Enabling PPP Policy will also include releases of the reports from each project. This will provide insight into the success of the overall toll road PPP program and future directions the EPU may pursue. The open bid process during the PPP Project Deployment is certainly a significant improvement over the current state where there may be no bids or classified bids. Improvements in public involvement will also aid transparency.
Public Involvement
Public involvement is much greater in PPP Project Deployment with efforts made to incorporate the public in developing regional goals, ranking alternative strategies, developing the LRTP, and commenting on specific project designs. The stronger government control over the process relative to the US will mean that the public does not have quite as influential a voice as in the US but in comparison to the existing Malaysian process, it is an improvement. The state government is also more open to public involvement than the federal government. In the development process of the Penang Outer Ring Road, the state government instituted a public consultation process and even convinced the federal government to allow a time extension for the process, the first time it had been done for a toll road (Penang State Government Website).

Public involvement in the Enabling PPP Policy is still formally non-existent for reasons discussed in section 9.3.3.1. There may be informal channels but this is no different than the existing process.

Accountability
State officials may be held more accountable for toll road PPP decisions in this alternative than the federal officials in the base case. The decisions made at the federal level, especially in a centralized system like Malaysia, will cover many areas. From the voter's perspective, poor toll road PPP decisions may be offset by good decisions in a wide variety of other areas or there may be some good toll road decisions and some poor ones. For the state official, toll road PPP decisions may make up a greater share of their activities and it is probably more politically convenient to remove an official at the state level than one in the EPU who may have a great deal of knowledge and experience.

The public's focus will be on decisions made during PPP Project Deployment. In the average person's mind, if the toll is too high, it's because the government did not negotiate a good deal with the private sector. If the government is bailing out a concessionaire, it is because the owner is a close associate of the ruling party. The public will ignore the Enabling PPP Policy that contributed to the outcomes. In the base case, if reform did occur with PPP Project Deployment, it would also occur with Enabling PPP Policy since the EPU handled both. Now that the two are dissociated, pressure to change PPP Project Deployment issues will not directly affect the Enabling PPP Policy. The feedback process from the deployments to the EPU will help link the two but the effects will be delayed and attenuated. The transfer of PPP Project Deployment responsibilities to the states leads to a decrease in accountability for Enabling PPP Policy.

There is a net improvement in accountability since the state officials involved in PPP Project Deployment decisions are easier to remove. The officials who create Enabling PPP Policy may be difficult to remove but it is likely given the actions of the government over the PPP program that they are difficult to remove now.

Ease of Changes
The changes required by this alternative are quite extensive. The Malaysian toll road PPP program is a centralized program and decisions on major transportation programs appear to be centralized in general. The most difficult part is the changes to the process. States do perform regional land use planning in the form of Structure Plans (Zakaria, 2003, 22) but the
transparency, environmental requirements, and extent of public involvement are new. Specific
to toll road PPPs, the SPCs do not have experience in developing them and negotiating
concession agreements. They will have to develop this capacity or pay for it from consultants.

Enabling PPP Policy will not require as many significant changes. The EPU loses some
responsibilities and a feedback process will need to be developed. Developing the feedback
process is within the capabilities of the EPU since it has performed internal adjustments to its
PPP program based on previous results.

**Government Program Support**

Government program support does decrease relative to the current process at the PPP Project
Deployment level. The adapted US process would view a toll road PPP as just another option
while the current process makes toll road PPPs key parts of the transportation strategy. Expected
reductions in financial support may also be discouraging to investors. This should not be
confused with a withdrawal of support for PPPs. The government is expected to continue using
PPPs for major highways and maintain strong overall support for them, just not at the same level
as the existing system.

The Enabling PPP Policy provides roughly the same amount of support as currently. The
changes do not affect the core policy of trying to provide highway infrastructure using the
private sector. The changes are procedural, requiring formal policies and developing a feedback
structure which should have insignificant effects on the government’s support for the program.

9.4.5 **Financial**

**Government Financial Support**

The effects on financial support are complicated since it is unclear what support the federal
government may give troubled concessionaires. Since the tender process is an open competition,
the bids should have lower tolls and rely on less financial support than currently. If
concessionaires are not able to cut costs in commensurate amounts, meaning that much of the
savings comes from reduced concessionaire profits, they will be operating closer to a break-even
level and a greater number may go bankrupt. The government could let bankruptcies occur and
allow other concessionaires to purchase the toll roads with investors taking the losses or it could
take over the road if no other concessionaire wants it. The result would be less government
financial support, a positive development, with a toll road industry that comes closer to a free
market.

The majority of the losses will be Malaysian due to the 70% Malaysian equity requirement (30%
Bumiputera, 40% other). The government has developed the Malaysian equity markets through
the privatization program and it may want to prevent significant losses, especially among
Bumiputera. In this case, the increased number of bankruptcies will require more government
support to get out of bankruptcy, possibly offsetting the gains from reduced government support
during the bid process.

Which option is expected? Perhaps a little of both will be used. The government will probably
bail out some projects but it will be more careful in choosing which ones to aid rather than today
where it indiscriminately helps concessionaires restructure so losses to investors or reduced. The
PPP Project Deployment leads to individual gains due to open competition. The Enabling PPP Policy ignores this area beyond permitting government financial support, much like the current policy.

**Risk Allocation**

In the area of risk allocation, withdrawal of government supports will result in greater revenue risk assumption by the private sector. The private sector is also expected to shoulder more of the financial risks like exchange rate risk. Construction risk allocation will be about the same. The only change from the new process is in the environmental approval process but the approvals are required before putting the project out for bid so the private sector is still unaffected. For political risk, public involvement led through government efforts will reduce the risks from an unsupportive public. The government and private sector may still negotiate contracts which guarantee compensation for unfavorable decisions, so this aspect of political risk allocation is unchanged. The total risk allocation is slightly improved with the increase of the financial burden on the private sector and the reduction of political risk through public involvement.

Much of the improved risk allocation occurs at the PPP Project Deployment level where public involvement and open competition lead to an expected shift in risk allocation. The new Enabling PPP Policy does not directly address improvements in risk allocation which is similar to the current policy.

### 9.4.6 Malaysia Specific

**Bumiputera Promotion**

As a result of the new PPP Project Deployment process, the greater consideration for alternatives to meet transportation needs, higher environmental compliance requirements, and public involvement should decrease the number of toll road PPPs built. Other options may be chosen instead or there may be years of delays until an approvable design is developed. Since there are fewer toll roads, there are fewer investment opportunities for Bumiputera. There is expected to be less financial support as well so if a Bumiputera investor chooses wrong, the government is less likely to bail them out.

The Enabling PPP Policy retains the requirement that investment in new concessions must have at least 30% Bumiputera investment. This neither strengthens nor weakens the position of Bumiputera in society.

### Developed Nation by 2020

Will the outcome of the new policy be to contribute to reaching Developed Nation Status by 2020? Fewer toll roads are expected to be built but the toll roads that are built should be smarter investments that require fewer government funds. These investor and government funds can be directed to more productive areas. There are also benefits from the environmental approval process and the anticipated higher reliability of the roads. The savings from lower tolls used for consumption can stimulate activities in other areas of the economy. Greater public confidence in the process can reduce some of the political risks so not as many investors will leave the toll road industry, all else being equal. This could aid Bumiputera since they should also be making smarter investments but the outcome is not as guaranteed as before. These new benefits occur at the PPP Project Deployment level, not with Enabling PPP Policy. With regard to achieving
developed nation status, the new Enabling PPP Policy contributes about as much as the existing one.

9.4.7 Uncertainties
While the aim of this process is to place more power in the hands of local decision-makers, the role of the federal government in the appointment of the civil service for the whole country increases the uncertainty that local concerns will actually be considered. There does not even have to be deliberate action taken by the government; state officials may make decisions in tune with federal government wishes because they think that it will help them get promoted. This will weaken the positive ratings for the adapted US process for Travel Cost, Needs-Based Process, Pollution, Neighborhood Effects, Public Involvement, and Government Financial Support. It is not expected to drive them to 0 or into negative territory. Travel time, access to markets, and government program support will improve thanks to the greater emphasis on national and private sector needs. Accountability may be worse than the base case as state officials may be removed for poor decisions being driven by the federal government.

The capabilities of the SPC in handling the process are a significant source of uncertainty, especially if the federal government does not provide active regulatory oversight. Concessionaires could negotiate very advantageous agreements for themselves, even more than currently where the EPU’s experience can provide a check on the private sector’s demands. Travel cost and government financial support could be worse than the current process, changing a positive to a negative. Risks may be misallocated between public and private sector, leading to high expected returns for the risk taken by investors. As more investment funds are used for the distorted returns on toll roads, they become unavailable to more appropriate investments, reducing Malaysia’s ability to reach developed nation status by 2020. Travel time would improve as vehicles are priced off the road, though.

There is a potent counterargument to the expectation of a decrease in tolls. The SPCs have no experience in negotiating concession agreements and since they will be negotiating fewer agreements than the EPU does currently, they will not gain the experience necessary to be as efficient as the EPU. Naidu and Yaacob note that “One factor that favors the bureaucracy in its negotiations with private firms is its information advantage... There have been so many road privatization projects, for example, that government departments and agencies are sufficiently well informed to undertake effective negotiations on all substantive issues of a road privatization proposal.” (Naidu and Yaacob, 48). If states are incapable of negotiating good concessions and the EPU does not provide proper oversight, then the performance of toll roads under a decentralized program will be significantly altered, perhaps wiping out the gains from the open competition.

9.5 Conclusion
The results of the adapted US planning process are provided in Table 9-3. An adapted process would be an improvement over the current process, assuming the SPC is up to the task of negotiating with the private sector. To reiterate what has been stated many times in this chapter, much of the improvement is due to the requirements for public involvement, environmental approval, and transparency required by this scenario. The results would be much different if these requirements are not put in place.
### Table 9-3 – Results of the Adapted US Planning Process

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>Enabling PPP Policy</th>
<th>PPP Project Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Environmental and</td>
<td>Pollution</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Social</td>
<td>Sustainibilty</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>0</td>
<td>+</td>
</tr>
</tbody>
</table>

The major difficulty in using an adapted US process is the need to change the roles of many institutions. The state institutions do not have the experience to handle toll road PPPs and would require aid and the EPU may not like its loss of control over the process. The introduction of transparency requirements may result in voters wanting greater transparency throughout government institutions, which is not always desirable from the government’s point of view otherwise the current toll road program would operate more in the open.

Overall, there are benefits to adopting a US-style process but the institutional changes required are significant and perhaps may be insurmountable at this time. With the results for the three alternatives prepared, let’s now compare them to see which one provides the best option for Malaysia.


10 Comparison of Alternatives

10.1 Introduction

The heart of this thesis is to determine if the CLIOS process is appropriate for developing a new Malaysian toll road PPP program. This determination is aided by the consideration of other alternatives. The Malaysian toll road PPP program has several flaws that prevent it from providing a great value to society and improving on it is not a difficult task, at least in the abstract. The interesting question is if the CLIOS process is the best way to carry out the improvement. The result of the comparisons done below is that the CLIOS process will produce a superior toll road PPP program to the two alternatives, Incremental Changes and the Adapted US Process.

Since the purpose of this thesis is to apply the CLIOS process to toll road PPP programs, the focus will be on how the CLIOS process compares to the other alternatives. The advantages will also be considered but the main focus is to ensure that the new toll road PPP program should do no worse than today. Incremental Changes and the Adapted US Process will not be compared to each other.

10.2 Comparisons of the Comprehensive Outcomes

The comprehensive expected outcomes of the three alternatives are listed in Table 10-1. These will be used to evaluate the proposed programs as an integrated whole on the 38 criteria. There are 19 different measures with each one applied twice: once to Enabling PPP Policy and once to PPP Project Deployment. Sections 2.5 and 6.6 have further information on the criteria. As a reminder, the scoring is compared to the current process. A ‘+’, ‘0’, and ‘-‘ indicate an improvement, no change, or a decline compared to the current process.

10.2.1 The CLIOS Process vs. Incremental Changes

The CLIOS process has better expected performance than the Incremental Changes process in 11 of the 38 areas and approximately equal performance in 22 other areas, as can be seen in Table 10-1. The five exceptions are:

- Enabling PPP Policy Accountability
- Enabling PPP Policy Ease of Changes
- PPP Project Deployment Ease of Changes
- PPP Project Deployment Government Program Support
- PPP Project Deployment Bumiputera Promotion

The reduction in Accountability for the CLIOS process is a concern but the choices that lead to the reduction, namely having state and regional agencies perform PPP Project Deployment, provides several other benefits. The most important one is that local concerns have higher priority since toll road PPPs are chosen at the regional rather than the national level. The toll road PPP program has received criticism for its lack of local concern and the regional orientation should change this.
Table 10-1 – Combined Expected Outcomes of the 3 Alternative Processes

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>CLIOS Process</th>
<th>Incremental Changes</th>
<th>Adapted US Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Enabling PPP Policy</td>
<td>PPP Project Deployment</td>
<td>Enabling PPP Policy</td>
</tr>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Environmental and Social</td>
<td>Pollution</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>-</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>-</td>
<td>--</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Government Program</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
</tbody>
</table>
The Ease of Changes advantage in introducing the Incremental Changes process is considerable. Is it enough to exceed the benefits of the CLIOS process in 11 other areas? In the author’s opinion, it does not but changes in organizational processes can be difficult to predict. Significant resistance could develop that could erase many of the CLIOS process’ advantages. In this case, Malaysia may be better off using the incremental change process with an increased likelihood of those benefits, limited as they are, compared to the CLIOS process. This thesis’ development of the CLIOS process attempted to be sensitive to organizational issues so an institutionally feasible toll road PPP program could be created. The significant realizable benefits of this program outweigh the institutional resistance they would engender.

The worse performance by the CLIOS process in Government Program Support is not a major negative. The support is considered to decrease because fewer toll roads may be built. The reduction in the number of toll road PPPs is caused by the inclusion of toll roads in a regional transportation planning process where a toll road PPP is one alternative to be compared with others. If regional planners do not choose to build the toll road PPP, it is because another alternative is expected to perform better. This choice is a positive for the regional transportation system and society although maybe not to a specialized subset of that system like toll road PPPs.

The reduction in Bumiputera Promotion could be a sensitive issue. It depends on how sizable the toll road PPP industry is in the Malaysian economy and how the Bumiputera would react to any losses in investment opportunity. From the public’s point of view, this may be a relatively minor issue. Only wealthy Bumiputera are likely to be greatly affected by a reduction in opportunities. Most Bumiputera would not be worse off so reductions would not trigger public unrest. This may also not be a major issue if new toll road PPPs are not a major part of new investment throughout the economy.

The significant benefits derived from the CLIOS process overwhelm the ease in which the Incremental Changes process could be enacted, that process’ major benefit. Two other advantages for the Incremental Changes Process, Government Program Support and Bumiputera Promotion, are not critical advantages and in the case of Government Program Support, may actually be beneficial from the regional transportation system point of view. Assuming institutional resistance can be overcome, the CLIOS process should be chosen over the Incremental Changes process.

10.2.2 The CLIOS Process vs. The Adapted US Process

The Adapted US Process is not expected to perform better than the CLIOS process in any of the 38 areas and is expected to perform worse than the CLIOS process in 5 areas. To a first approximation, the CLIOS process is superior to the adapted US process. This is not entirely unexpected. Sussman, Sgouridis, and Ward identified 12 weaknesses of the US regional transportation planning process and then proposed using CLIOS for regional strategic transportation planning (RSTP) to reduce the problems (Sussman, Sgouridis, and Ward, 3-4).

The comparison of the Malaysia toll road PPP program to US regional transportation planning is not an apples-to-apples comparison. The focus for Malaysia is on toll roads, partially embedded within RSTP, rather than RSTP only. The comparison is not between the same processes but between a US process and an adaptation of the US process to the specific institutional...
environment encountered in Malaysia. This will produce differences between this outcome and the expectations of Sussman, Sgouridis, and Ward. Sustainability, technology scanning, and human resources development are all areas identified by Sussman, Sgouridis, and Ward that are ignored by the Malaysian processes as developed in this thesis. Many of the strengths of CLIOS over the US process remain such as the addressing of freight concerns, operations, and uncertainty management.

There is no compelling reason to choose the Adapted US Process over the CLIOS process. Both require significant institutional change and if the government is willing to undertake that change, it should use the one that provides the best expected benefits. One advantage of the CLIOS process over the Adapted US Process is that the CLIOS process includes greater sensitivity to the institutional environmental and the resulting policies should be more harmonious with organizational missions. Some of this is due to the stakeholder involvement of the CLIOS process but some may be a result of the way the author developed each process.

The CLIOS process is expected to perform better than either alternative but with caveats. Changing institutions is not easy. Depending on the institutional environment, it may be preferable to go for the incremental route that has fewer expected benefits but a greater chance of realizing those expected benefits. The CLIOS process’ advantages over the Adapted US Process are not major and a more rigorous analysis could possibly result in the Adapted US Process outperforming the CLIOS process.

10.3 Comparison of the Outcomes by Level
Could an Enabling PPP Policy developed under one process be matched with a PPP Project Deployment process developed elsewhere? This could be done but it would require modifications to both. The Enabling PPP Policy and PPP Project Deployment are developed with some dependence on each other. This dependence is especially significant from Enabling PPP Policy to PPP Project Deployment. For experimental purposes, let’s assume that they could be mixed and match without modifications. Which is the best Enabling PPP Policy and which is the best PPP Project Deployment process?
Table 10-2 - Comparison of the Enabling PPP Policy Outcomes

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>CLIOS Process</th>
<th>Incremental Changes</th>
<th>Adapted US Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>+</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Environmental and Social</td>
<td>Pollution</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>+</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>+</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 10-2 compares the three Enabling PPP Policies and the CLIOS process produces the best Enabling PPP Policy. The Incremental Changes’ Enabling PPP Policy is the same as the current policy. The Adapted US Policy does not fare much better overall than Incremental Changes in comparison to the CLIOS process. The strengths and weaknesses that exist in the Adapted US process also exist in the CLIOS process. In addition, the CLIOS process also has a few other benefits.

Table 10-3 provides the results for PPP Project Deployment and requires more analysis to determine the superior process. It is not immediately clear which is the best process unlike Enabling PPP Policy where the CLIOS process’ performance is apparent.
Table 10-3 - Comparison of PPP Project Deployment Expected Outcomes

<table>
<thead>
<tr>
<th>Area</th>
<th>Category</th>
<th>CLIOS Process</th>
<th>Incremental Changes</th>
<th>Adapted US Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Travel Time</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Travel Cost/Tolls</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>+</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Network Integration</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Needs-based Process</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Economic</td>
<td>Access to Markets</td>
<td>+</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td>+</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Environmental</td>
<td>Pollution</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>and Social</td>
<td>Sustainability</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Effects</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Political</td>
<td>Transparency</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Public Involvement</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Ease of Changes</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Government Program Support</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Financial</td>
<td>Government Financial Support</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Risk Allocation</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Malaysia-Specific</td>
<td>Bumiputera Promotion</td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Developed Nation by 2020</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

For PPP Project Deployment, the CLIOS process and Adapted US Process are expected to perform roughly the same except in the area of Innovation where the CLIOS process holds a major advantage. The CLIOS process encourages innovation whereas the Adapted US process discourages innovation, relative to the existing PPP Project Deployment process. The CLIOS process appears to be the better of the two although not by much.

The disadvantages of the CLIOS process compared to Incremental Changes are in Ease of Changes, Government Program Support, and Bumiputera Promotion. As discussed earlier, decreased Government Program Support may be bad from a toll road PPP program point of view but the actions that caused the decrease in support should strengthen the entire regional transportation network, a fair tradeoff. Ease of changes has been discussed earlier and it still remains a significant advantage for Incremental Changes.

In exchange for tougher required institutional changes such as the move to a regional transportation planning emphasis, PPP Project Deployment has advantages in reliability, network integration, access to markets, innovation, government financial support, and risk allocation. The gap between the CLIOS process and Incremental Changes has narrowed compared to the comprehensive programs compared in Section 10.2.1. Network integration is the only area the
The CLIOS process is expected to perform substantially better than in Incremental Changes. There are only minor gains for the CLIOS process over Incremental Changes in the other areas.

A more rigorous analysis is needed to determine how sizeable the CLIOS benefits are and what kind of institutional resistance it may face. The simple measures used here indicate that the CLIOS process is preferable but there is tremendous uncertainty about the magnitude of the benefits and costs.

The net result is that the CLIOS process is the preferred outcome for both Enabling PPP Policy and PPP Project Deployment. The CLIOS process’ advantage in the Enabling PPP Policy is clear but for PPP Project Deployment, its advantage is slim. One advantage that the CLIOS process has that is not listed in the measures is that it is designed to be more self-evaluating with the final step in the process, post-implementation evaluation and modification. It is expected to adapt better to changing times, maintaining many of its strengths and reducing its weaknesses. The other two processes do not explicitly include their own reinvention so changes to address rising problems may occur less frequently or in a less thoughtful manner.

10.4 Conclusion

The CLIOS process is expected to perform better than the two alternatives presented here and produce a toll road PPP program that is superior to the existing one. The CLIOS process’ advantages are most clear when comparing the three alternatives with Enabling PPP Policy and PPP Project Deployment processes integrated.

Splitting up the evaluation into Enabling PPP Policy and PPP Project Deployment phases produces less certain results. The CLIOS process is the preferred method in both but for PPP Project Deployment, the CLIOS process’ higher performance is not substantial in the face of the high uncertainty introduced by the qualitative analysis. A quantitative analysis could show the CLIOS process performing worse than the alternatives. This is an experimental comparison and an Enabling PPP Policy cannot be easily matched with a PPP Project Deployment process developed separately. The two phases should be considered coupled systems and evaluating them separately is perhaps not the best method for choosing a process.
11 Conclusion

11.1 Restatement of Purpose
This thesis set out to meet the following goals in Chapter 1:
1. Determine the quality of Malaysia’s Toll Road PPP Program
2. Develop the use of the CLIOS Process for a new application: toll road PPP policy and program development
3. Evaluate the outcome of the CLIOS Process’ application to Malaysia’s toll road PPP program against the outcomes of other transportation planning processes

Several actions were taken to achieve these goals. The background on public-private partnerships was explored and a framework developed for evaluating them. The state of the Malaysian toll road PPP program was investigated and the determination was made that it had been successful in providing a good deal of highway infrastructure but that there were several weaknesses that reduced its value to society. The CLIOS process as a tool for handling Complex, Large-scale, Integrated, Open Socio-technical systems was provided and further developed for toll road PPP programs. This was then applied to Malaysia and finally compared with two alternatives for revamping the Malaysian toll road PPP program.

The results were favorable for the CLIOS process. When the Enabling PPP Policy and PPP Project Deployment were considered as an integrated program, the CLIOS process produced a better outcome than the two alternatives. It may not be possible to include the CLIOS process for both due to institutional issues. Exploring the possibility of using one alternative for Enabling PPP Policy and one for PPP Project Deployment, the CLIOS process was found to still have a better performance in each one but its edge was more pronounced for Enabling PPP Policy. These findings are limited by the qualitative nature of the evaluation but they lend credence to the expectations that the CLIOS process could be a valuable framework for analyzing complex systems.

11.2 Key Findings
The key findings are organized by the goals of the thesis.

Determine the Quality of Malaysia’s Toll Road PPP Program
1. The program is successful in providing highway infrastructure with nearly 1800 km either built or agreements signed between concessionaires and government but it has several weaknesses, which are listed below.
2. The government has provided significant financial support to concessionaires. Soft loans and guaranteed compensation if toll rates are not raised as agreed to in the concession agreement are the two most common forms of support.
3. The government has granted sole negotiation rights to private sector proposals. These proposals do not need to be distinctive in any way from other toll road PPPs.
4. The government is willing to provide aid in times of need by the concessionaire. Extended concession periods, additional loans, and other restructuring help are often provided.
5. The public has limited involvement in the process of deploying a toll road PPP. Only one instance could be found in Malaysia of a public feedback process for the design of a toll road PPP. The most common form of public involvement is protests over proposed toll increases.

6. Transparency is limited since the government can classify proposals and other bid documents. These powers coupled with past actions such as the award of the largest toll road concession to a company that did not have the lowest proposed toll but was owned by the ruling party do little to dispel perceptions of corruption.

7. The environmental approval process is not a significant roadblock for deploying toll road PPPs. It is geared towards reducing the social and environmental effects of an already approved toll road PPP rather than determining if the social and environmental effects are so high that the toll road PPP should not be built.

8. All of these issues have contributed to a favorable environment for concessionaires. They are treated favorably in the initial phases of the project and if revenues fall, the government is willing to provide aid.

Develop the Use of the CLIOS Process for a New Application: Toll Road PPP Policy and Program Development

1. A toll road PPP program can be divided into two parts: a general “Enabling PPP Policy” applicable to all toll roads in the state or nation and a “PPP Project Deployment” process applied to the development of a specific toll road project.

2. The CLIOS process can be extended to handle these two parts as two separate but linked CLIOS processes. An Enabling PPP Policy is developed that will affect the execution of the CLIOS process for multiple PPP Project Deployments done at different times. The results of these deployments then provide feedback to the Enabling PPP Policy process for which it can then be modified.

3. The Enabling PPP Policy is intended to be used at the state or national level where the policy can guide the development of numerous projects while PPP Project Deployment is best used at the regional level.

4. The PPP Project Deployment process can be embedded in within the Regional Strategic Transportation Planning process if it is also based on the CLIOS process (Sgouridis, 63-76).

5. Only so much depth can be achieved by exploring the development of the application for a generic nation. A specific institutional environment is needed to inform the representation of the system, especially the policy levers available, and the selection and evaluation of alternatives.

Evaluate the Outcome of the CLIOS Process’ Application to Malaysia’s Toll Road PPP Program Against the Outcomes of Other Transportation Planning Processes

1. As an integrated program, the CLIOS process approach is expected to perform better than making incremental changes to the existing Malaysian process or using an adapted version of the transportation planning process in the United States.

2. When Enabling PPP Policy and PPP Project Deployment are considered separately, the Enabling PPP Policy developed by the CLIOS process is much better than the two alternatives.
3. PPP Project Deployment is also expected to have better performance but the lead is not so clear. A more detailed analysis would be needed to reduce the uncertainty.

11.3 **Future Research**

The natural place to perform further research is to gather more qualitative and quantitative data on Malaysia. The outline of an institutional structure has been made but institutions are often far more complex than they appear on the surface. Internal politics, relationships between organizations that are competitive when they are expected to be cooperative, political turf wars, and informal lines of communication can have significant effects on system outcomes.

Quantitative data can provide information on the magnitude of any benefits or costs. This could be difficult to do since institutional environments would have to be taken into account. Additional uncertainty would be added to any quantitative evaluation by the fact that the CLIOS process has not been used to deploy any toll road PPPs in the real world. Results would be speculative. Despite this, it will help narrow down the range of expected benefits and costs.

Additional work could be done to examine the relationships between coupled CLIOS processes. An area of focus should be feedback between the two processes. With toll road PPPs, there is a strong prescriptive relationship from Enabling PPP Policy to PPP Project Deployment. The feedback from PPP Project Deployment is less pronounced and the mechanisms are perhaps not fully developed. The ability to go from a national system representation to a regional system representation could also be explored. In the Malaysian toll road PPP representation, not all the policy levers were available at the regional level although there is the acknowledgement that there are indirect or weak paths to the national agencies. Could or should these paths be strengthened?

A framework for the development of the toll road PPP program using Enabling PPP Policy and PPP Project Deployment was provided but the division is not so clean in reality. Multiple agencies may be independently developing different parts of what constitutes Enabling PPP Policy. More research can be done into developing an effective toll road PPP program when powers and responsibilities are highly distributed and some of the organizations on the institutional sphere may not know or care that their actions are affecting the toll road PPP program, making their actions difficult to predict.

11.4 **Closing Words**

This thesis has made an ambitious attempt at developing a framework for handling toll road PPP programs using Malaysia as a case study. The results are promising and can contribute to a more effective program saving millions of dollars from and producing a better set of projects. Further research and real-world applications can help prove if these preliminary results can be realized.
References


Landers, Jay, “Firms Propose Privately Financed Freeway from Dallas to San Antonio,” Civil Engineering, 75.2 (Feb 2005): 27-28.


Ortiz Mantilla, Bernardo J. “Regional Planning and Operations Architectures as Means to Foster Transportation Integration in the Mexico City Metropolitan Area” Master’s Thesis. Massachusetts Institute of Technology, June 2005.


Sgouridis, Sgouris. Integrating Regional Strategic Transportation Planning and Supply Chain Management: Along the Path to Sustainability, Master’s Thesis. Massachusetts Institute of Technology, 2005.


Sussman, Joseph, Sgouris Sgouridis, and John Ward. “A New Approach to Transportation Planning for the 21st Century: Regional Strategic Transportation Planning as CLIOS.” Accepted for Publication in the Transportation Research Record: Journal of the Transportation Research Board. TRB Paper Number: 05-0051.


## List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>American Automobile Association</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>APTA</td>
<td>American Public Transportation Association</td>
</tr>
<tr>
<td>ATIS</td>
<td>Advanced Traveler Information Systems</td>
</tr>
<tr>
<td>BOO</td>
<td>Build-Own-Operate</td>
</tr>
<tr>
<td>BOT</td>
<td>Build-Operate-Transfer</td>
</tr>
<tr>
<td>CADOT</td>
<td>California Department of Transportation</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CLIOS</td>
<td>Complex, Large-scale, Integrated, Open, Socio-technical</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>CVO</td>
<td>Commercial Vehicle Operations</td>
</tr>
<tr>
<td>DBB</td>
<td>Design-Bid-Build</td>
</tr>
<tr>
<td>DB</td>
<td>Design-Build</td>
</tr>
<tr>
<td>DBO</td>
<td>Design-Build-Operate</td>
</tr>
<tr>
<td>DBOM</td>
<td>Design-Build-Operate-Maintain</td>
</tr>
<tr>
<td>DBOT</td>
<td>Design-Build-Operate-Transfer</td>
</tr>
<tr>
<td>DBFO</td>
<td>Design-Build-Finance-Operate</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>DF</td>
<td>Distrito Federal (Federal District)</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>DSM</td>
<td>Design Structure Matrix</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EM</td>
<td>Estado de Mexico (State of Mexico)</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EPU</td>
<td>Economic Planning Unit</td>
</tr>
<tr>
<td>ETC</td>
<td>Electronic Toll Collection</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HOT</td>
<td>High-Occupancy/Toll</td>
</tr>
<tr>
<td>ISTEA</td>
<td>Intermodal Surface Transportation Equity Act</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transportation Systems</td>
</tr>
<tr>
<td>JIT</td>
<td>Just-In-Time</td>
</tr>
<tr>
<td>KLMR</td>
<td>Kuala Lumpur Metropolitan Region</td>
</tr>
<tr>
<td>KVPS</td>
<td>Klang Valley Planning Secretariat</td>
</tr>
<tr>
<td>LPVR</td>
<td>Least Present Value of Revenue</td>
</tr>
<tr>
<td>LRTP</td>
<td>Long-Range Transportation Plan</td>
</tr>
<tr>
<td>MHA</td>
<td>Malaysia Highway Authority</td>
</tr>
<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>MOF</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>MPO</td>
<td>Metropolitan Planning Organization</td>
</tr>
<tr>
<td>MTC</td>
<td>Metropolitan Transportation Commission</td>
</tr>
<tr>
<td>NEP</td>
<td>New Economic Policy</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>NIMBY</td>
<td>Not In My Backyard</td>
</tr>
<tr>
<td>NOX</td>
<td>Nitrous Oxide</td>
</tr>
<tr>
<td>OPP</td>
<td>Outline Perspective Plan</td>
</tr>
<tr>
<td>PAP</td>
<td>Privatization Action Plan</td>
</tr>
<tr>
<td>PMP</td>
<td>Privatization Master Plan</td>
</tr>
<tr>
<td>PORR</td>
<td>Penang Outer Ring Road</td>
</tr>
<tr>
<td>PPP</td>
<td>Public-Private Partnerships</td>
</tr>
<tr>
<td>ROA</td>
<td>Regional Operating Architecture</td>
</tr>
<tr>
<td>RPA</td>
<td>Regional Planning Architecture</td>
</tr>
<tr>
<td>RSTP</td>
<td>Regional-Strategic Transportation Planning</td>
</tr>
<tr>
<td>SAM-PD</td>
<td>Stakeholder-Assisted Modeling and Policy Design</td>
</tr>
<tr>
<td>SCAG</td>
<td>Southern California Association of Governments</td>
</tr>
<tr>
<td>SIP</td>
<td>State Implementation Plan</td>
</tr>
<tr>
<td>SOE</td>
<td>State-Owned Enterprise</td>
</tr>
<tr>
<td>SPC</td>
<td>State Planning Committee</td>
</tr>
<tr>
<td>TEA-21</td>
<td>Transportation Equity Act for the 21st Century</td>
</tr>
<tr>
<td>TIP</td>
<td>Transportation Improvement Program</td>
</tr>
<tr>
<td>TOD</td>
<td>Transit-Oriented Development</td>
</tr>
<tr>
<td>UEM</td>
<td>United Engineers Malaysia</td>
</tr>
<tr>
<td>UMNO</td>
<td>United Malays National Organization</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
</tr>
<tr>
<td>UNESCAP</td>
<td>United Nations Economic and Social Commission for Asian and the Pacific</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>USDOT</td>
<td>United States Department of Transportation</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
Appendix A  Further Privatization Background

This appendix covers information briefly mentioned in Chapter 2. The first topic is on different types of contracts. The complexity of the contracted service will drive the need for a specific type of contract. PPPs may be best handled by relational contracts but incomplete contracts may suffice. The second topic is a brief stakeholder analysis for general toll road PPPs. This topic was originally part of Chapter 2 but as the thesis developed, its relevance decreased.

A.1  A Word on Contracts

A standard solution to problems in privatization is to change the terms of future contracts to ameliorate past failures. This is an adequate solution for select circumstances but it does not work for all situations and continuous application of this solution will lead to incredibly complex contracts. Understanding the nature of the service being privatized contributes to the type of contract that should be pursued.

Oliver Williamson describes three basic types of contracts: classical, neoclassical or incomplete, and relational (Chap 2, note 8 in Gomez-Ibanez, 2003). An additional two options that Gomez-Ibanez identifies for procuring a good or service are buying on the spot market and producing internally (Gomez-Ibanez, 2003, 24). The desirability of each option depends on the length of the contract and the ability to specify all possible contingencies that may occur.

The spot market is excellent for purchases of goods or services that do not require an ongoing relationship with the supplier and where the market is competitive. The quality of the good or service can typically be readily confirmed or is a commodity in good spot markets. An example would be purchasing office supplies at the store with the cheapest prices. Buying reams of paper or pens does not require inspections to ensure the quality of those goods and there is no need to maintain a good relationship with the store or the manufacturer to ensure long-term quality.

The classical contract is one where all future contingencies and their solutions are in the contract; the contract is in effect a complete contract. The ability to denote all future contingencies becomes more difficult for long-term or complex situations. Efficiently ascertaining good or service quality is also a useful attribute when deciding to use a classical contract. If quality can be readily determined, disagreements between the purchaser and the provider will be reduced. A lawn-mowing contract could be done with a classical contract. It is apparent that the contractor is not doing the job if the grass starts getting really high. There might be contingencies in the contract for the weather or if the contractor’s equipment breaks down. Simple goods and services like lawn-mowing are well-suited to the classical contract. These goods and services are typically the best for privatization since transaction costs are low.

The incomplete contract recognizes that not all future contingencies can be dealt with in the contract. To solve this problem, the contract includes an arbitration mechanism to resolve certain contingencies not included in the contract. In regards to arbitration, Gomez-Ibanez notes, “the circumstances under which arbitration is allowed, the factors the arbitrator can consider, and the scope of the remedies that he can order are often carefully prescribed.” (Gomez-Ibanez, 2003, 25) The incomplete contract is useful for long-term contracts but it may lead to an
A.2 Stakeholder Analysis for Public-Private Partnerships

Understanding the interests of each stakeholder is necessary to understanding the benefits and costs of toll road PPPs. The toll road PPP must satisfy economic and political goals to achieve success and how stakeholders respond is important for developing a PPP that can meet those goals. The following is a generic stakeholder analysis. It does not apply to a specific location but is just a collection of expected interests and actions related to toll road PPPs.
A.2.1 Elected Officials

Elected officials' main interests are a combination of concern for improving society, reelection, and increasing political power. Officials’ views on improving society differ; otherwise there would be no political parties. It is difficult to define a generic goal for them in this respect. An approximation would be that the officials want to improve the lot of their constituents, which will incidentally help them get reelected. The interest in reelection causes them to consider policy effects only as far out as the next election or two, depending on how secure they are in their seat. They do not completely ignore long-term consequences or making sacrifices in their district for the common good although they have differences as to what the common good is. Elected officials generally want to pursue policies that help society but when the policies go against their reelection interests, more persuasion is needed. Political power helps the elected official bring more benefits to those that support him or her which increases the chances of reelection or moving up to higher positions. Projects that can increase their power will receive more support than those that have negative effects.

Elected officials’ reactions to a proposed PPP will vary. Perhaps it can provide congestion relief, at least for the short term, more quickly than relying on government to build the road, a plus from the elected officials’ perspective. Construction on the road will also bring jobs, another positive come election time. An untolled road would be preferred by the elected officials since voters prefer lower cost goods so the official may hold out if he or she believes it possible to have the government fully fund the road, spreading costs across all taxpayers. Large roads also bring pollution and disrupt neighborhood life so elected officials will have to weigh these negative impacts with the positive impacts. If the elected official thinks that his or her constituents will use the road a great deal or that many of his constituents will be employed for construction or maintenance and it is very unlikely the road will get built solely by the government, the official will support the PPP. If the elected official thinks that the road is a facility that just passes through town and few constituents use it, few job or economic benefits will be conferred to the constituents, or that the road can be built purely with public funds, then the elected official will not support building and operating the road as a PPP.

The decision to permit the PPP to proceed often requires the approval of numerous elected and unelected officials across different government levels, local, state, and federal. Supporters of the PPP will try to distribute costs broadly so no group is potentially hurt badly, reducing the chances of a vocal opposition group. They may attempt to concentrate benefits to create a vocal champion for the PPP.

A.2.2 Public Works and Transportation Departments

PPPs shift power from government departments like public works and transportation to the private sector. The departments are interested in well-operated and maintained infrastructure. In comparison to the private sector, they are less interested in growing the market. Like employees in the private sector, public sector employees prefer to have a job and managers like power and responsibility. In the public sector, this manifests itself as perks like larger offices from managing large departments. If contracting is already widely used, then shifting to a PPP will not threaten jobs or perks. Given the department financial situation, PPPs may face little opposition in general and may even receive support from cash-strapped departments. A situation where the government builds and operates roads using its own labor force will produce different
results. Government workers will view PPPs as a threat to their future livelihood. From their perspective, if one PPP is allowed, more will follow with the result being the loss of their jobs. It may not be a true danger as the private sector may just hire the displaced public sector worker to perform the same job but there is a degree of uncertainty as to whether the worker gets the new job and if the new job has the same pay and benefits. Benefits may be reduced for the remaining public sector workers as they go from managing large numbers of workers to contract administration and inspections.

A.2.3 Concession Companies
Concession companies are usually consortiums created for that specific facility. The companies' consist of construction companies, financial firms, other concession companies, and other equity investors like pension funds. To construct the toll road, they need to borrow a significant amount of money, which can reach up to 90% of the costs.

Concession companies' first goal is to maximize profit. To achieve this, they desire strong institutional support, which reduces the companies' financial risk. They are involved in a partnership with the public sector and they want to trust their public sector partner. At the very least, they want the concession agreement to be followed with some possibility for renegotiation if the operating environment worsens beyond their control. An uncertain institutional environment increases the cost of attracting investment and reduces the possibility of running a profitable toll road.

Beyond contract enforcement, they do not want the government to create policies or support projects after they have signed the concession agreement that will reduce their revenue without appropriate compensation. The concession agreement for the California State Route 91 HOT Lanes forbids the construction of competitive road capacity, forcing the local governments to purchase the lanes in order to add capacity. At a session on Megaprojects and Risk at the 2005 Transportation Research Board Annual Meeting, it was noted that in the United States, newer PPPs have non-compete clauses that are not as strong as the State Route 91 clause.

The concession companies will want the toll road to be constructed, operated, and maintained in a cost-efficient manner. This is not necessarily at the highest quality level but few public roads can make a claim at quality maintenance, either. The companies will want it maintained in a manner that increases safety since accidents reduce their revenue. Repairs and maintenance should also be done more promptly since deferred maintenance tends to cost more than any savings derived from the delay. Compared to the current maintenance process on many highways which depends on the political process, the toll road should be maintained in a better condition. Construction costs will be more of a problem if the construction companies' goals are much different than the concession companies’, as discussed in section A.2.4. The concession companies will also want the road to be completed as quickly as possible so they can begin earning a return.

A.2.4 Construction Companies
The interests of the construction companies will depend on their level of investment in the concessionaire. Construction companies are typically required to provide an equity investment but they will also be the prime contractor for building the toll road. In this case, some of the
construction will be provided ‘free’ to the concessionaire as the construction company’s equity investment but most will be paid for through bond financing. If the construction company is only required to provide a small amount of equity, then most of their profit from the enterprise comes from building the road; the construction companies make a profit whether the toll road succeeds or not. In this case, they may drive up the costs of construction as they reap more profits from it. Their success comes at the expense of the concessionaire.

If construction companies are required to make a higher equity investment, they will take greater interest in controlling construction costs and ensuring that the toll road will succeed. They will not be able to offset their equity losses with the construction profits. Since they are now stuck with the investment, they might as well maximize its value by controlling their behavior.

As noted earlier, three of four of the original French concession companies went bankrupt. Along with excessive toll regulation, the low level of equity investment contributed to this result. Rather than control their costs, they sought income from the construction contracts. Compared to the sole survivor, Cofiroute, the failed companies’ construction costs were greater and they suffered more schedule delays.

A simple example is provided for clarity. Suppose a concession company is formed to build and operate a toll road and its entire cost is only for construction which is paid to the construction company that has invested $10 million in the concessionaire. Let’s assume that the construction company treats the toll road like any other contract and includes a margin in what it charges the concessionaire of 15%. At the end of construction, the result is a construction cost of $100 million, leaving the construction company with a $15 million profit. Even if the road makes $0 and the construction company loses its equity investment, it still comes out $5 million ahead. To reduce its downside risk, the construction company may try to increase the construction cost to further improve its worst case profit. Suppose that the construction company was required to make a $25 million investment instead. It would have to significantly increase the construction cost for those profits to cover its equity investment. In this case, it is better off reducing construction cost and ensuring that the road operates profitably so its equity investment provides a return.

A.2.5 Equity Investors

Equity investors want to maximize their profits. To reach this goal, they will pursue policies that maximize their revenue while minimizing their costs. These policies can be internal, such as monitoring construction and efficiently maintaining the road, or they may be external attempts to negotiate a better deal with the public partner, marketing the road to potential customers, or increasing the potential market through real estate development along the route.

Revenues are derived from a few sources for toll road concessions. The investors will want flexible toll rate policies such as allowing value pricing or permitting aggressive toll rate increases. Lengthier concession agreements are sought after since it increases the period over which equity investors receive profits. Real estate value capture may also be sought. The investors will also want a well-operated and maintained road that is completed quickly.
Equity investors will want any negative changes in their operating conditions to be compensated for by the government while keeping the windfall from any positive changes. Negative changes may be from stricter environmental regulations or greater toll regulation than agreed to in the contract. Positive changes include the approval of real estate developments along the toll road.

Equity investors will be wary of any portions of the contract that reduce their profit even if it reduces their risk. In Spain, one proposal bounded the expected return. Losses below the lower bound are covered by the government while revenue above the upper bound is retained by the government as compensation for the loss coverage (Vassallo, 6-8). The equity investors did not like the limits on their possible profit. Vassallo thought that this behavior is due to the asymmetric structure of the gains and losses. Without the bounding, their losses have a lower limit below which it cuts into the bondholders’ investment while their profits are unbounded. The Spanish scheme does little for the equity investors as the losses come out of their pockets first but their gains are capped.

A.2.6 Debt Investors
Debt investors want their debt repaid in a timely manner. They will seek out loan guarantees from the government and, if a foreign investor, some mechanism to reduce the exchange rate risk. The bounding mechanism on revenues discussed in section A.2.5 is much more attractive since it reduces their risk. They receive no benefit from the upper bound but their losses will be limited based on where the lower bound is set.

Debt investors will be concerned about costs of construction, operations, and maintenance but to a lesser degree than the equity investors. As long as the costs are controlled enough for debt servicing, they are happy. The benefits of cost controls beyond that point are much more limited for them. They will want the facility built quickly so that there is a source of revenue for the bond payments rather than the concession company taking out more loans to pay them.

A.2.7 Travelers
Travelers want a facility that reduces travel time, is low cost, well-maintained, and safe. They will support a PPP toll road if they view it as the only way for the road to be constructed. Travelers will push for low toll rates and may resist toll increases, venting their anger on elected officials. This can be especially sensitive in the concession’s later years when the toll road debt has been paid and most of the toll represents a return for the equity investor. This dislike of a tolled facility can be tempered by the existence of a free alternative or if tolls are an established part of transportation infrastructure in general. High value relative to alternatives will also reduce the anger. The HOT Lanes in California Route 91 received favorable marks because travelers can hop in them when they really need to save time while using the adjacent free facility when they do not.

A.2.8 Landowners
Landowners desire high land value which depends on good access to jobs, stores, and entertainment facilities. The increased access that is provided by the facility will increase the desirability of land located near toll road access points. Some landowners may lose if their land is adjacent to the toll road but nowhere near an on-ramp. They may receive minimal
improvement in access to goods and services while incurring many of the costs like those from air and noise pollution.

If right-of-way acquisition is the responsibility of the private sector partner, the outcomes for the winners and losers can be dampened. Landowners whose land will become part of the road, which may be a loser position if surrounding land greatly appreciates following completion of the road, can use their position to receive greater payments from the private sector than the government who may use their power of eminent domain. One of the mechanisms for this is that negotiations over the cost delay the commencement of construction. Interest may be piling up on the concession company’s debt and the concession company may view a higher price as acceptable if it can open the facility more quickly. The concession company can negotiate with the landowners on where the on-ramps should be. Landowners will have to give up some of their potential gains to receive the benefit of road access so winners may have to give up more relative to government construction.

A.2.9 Environmentalists

Environmentalists do not like many of the negative impacts that accompany roads. They increase air and noise pollution. Depending on the drainage characteristics, water pollution will grow. Roads contribute to sprawl and what environmentalists consider an unsustainable lifestyle as they support low-density land use. Road construction provides an advantage to the car over less polluting mass transit.

While environmentalists would prefer a greater emphasis on travel modes with fewer environmental impacts, roads are a necessary part of the transportation system and the environmentalists will focus on mitigating the negative road impacts. Toll roads are preferable to free roads since it creates an economic incentive to use alternate, more environmentally friendly methods of transportation. Congestion pricing can contribute to this incentive. The concession process can be used to impose environmental regulations and limit some of the negative externalities.

A.2.10 The Automobile Industry

The automobile industry supports policies that increase their profits and the market for their goods. Roads in general improve the advantage of automobiles relative to other travel modes. Toll roads are less preferred than free roads since they increase user costs and create greater incentives to live closer to work. With less driving, people do not need to purchase cars or spare parts as often, reducing profits to the automobile industry. Toll roads are preferred to not having a road at all or increased investment in mass transit. In developing countries with little capital, toll roads may be the best option to increasing automobile ownership within the country if construction of free roads is not feasible.