Transforming Sri Lanka’s Economy in the Fourth Industrial Revolution (4IR)
SRI LANKA
STATE OF THE
ECONOMY
2019
This report was prepared by an IPS team led by Dushni Weerakoon, Executive Director. Contributing authors to the report are Dushni Weerakoon (Chapter 2), Harini Weerasekera (Chapter 3), Kithmina Hewage (Chapter 4), Nisha Arunatilake and Chathuranga Karunanayake (Chapter 5), Ashani Abayasekara (Chapter 6), Bilesha Weeraratne (Chapter 7), Sunimalee Madurawela (Chapter 8), Priyanka Jayawardena (Chapter 9), Ganga Tilakaratna (Chapter 10), Janaka Wijayasiri (Chapter 11), Manoj Thibbotuwawa and Nimesha Dissanayaka (Chapter 12), Athula Senaratne (Chapter 13), Nipuni Perera (Policy Brief 14), Dilani Hirimuthugodage (Policy Brief 15), Nuwanthi Senaratne (Policy Brief 16), and Wimal Nanayakkara (Policy Brief 17).

The contributions of Gayendri Karunaratne in providing editorial support and Suresh Fernando in preparing infographics, under the overall guidance of Charmaine Wijesinghe and Shihara Maduwage are gratefully acknowledged.
# Table of Contents

## Towards Growth and Stability

1. Policy Perspectives 1

   2.1 Introduction 13
   2.2 Growth, Output and Employment 14
   2.3 Fiscal Policy: Debt and the IMF’s EFF Programme 16
   2.4 Monetary Policy: High Interest Rates and Moderate Inflation 20
   2.5 Exchange Rate Policy: Managing Volatility 22
   2.6 Foreign Debt and Debt Refinancing 24
   2.7 Near Term Economic Outlook 26

3. Global Economic Developments and Impacts on Sri Lanka 28
   3.1 Introduction 28
   3.2 Prospects for the Global Economy 29
      3.2.1 Advanced Economies: Weakening Global Expansion, High Uncertainty 29
      3.2.2 Emerging Markets and Developing Economies 31
   3.3 World Trade and Commodity Prices 32
      3.3.1 Trade 32
      3.3.2 Commodity Markets 34
      3.3.3 Foreign Direct Investment (FDI) Flows 35
   3.4 Implications of External Environment Developments on Sri Lanka 36
      3.4.1 Merchandise Trade Overview 37
      3.4.2 Earnings from Tourism and Remittances 44
      3.4.3 Capital Inflows: FDI and Capital Market Trends 46
   3.5 Concluding Remarks: Sri Lanka’s Positioning 48

## Transforming Sri Lanka’s Economy in the Fourth Industrial Revolution (4IR)

4. Gearing Up for the Fourth Industrial Revolution (4IR) 51
   4.1 Introduction 51
   4.2 What is the 4IR? 51
      4.2.1 What Technologies are Driving the 4IR? 53
   4.3 Impacts of the 4IR 54
      4.3.1 Future of Production 54
      4.3.2 Future of Work 56
      4.3.3 Future of Education 56
      4.3.4 Future of Migration and Urbanisation 57
   4.3.5 Future of Gender Equality 59
      4.3.6 Future of Health 60
      4.3.7 Future of Agriculture 60
      4.3.8 Future of the Environment 61
   4.4 Policy Challenges for Developing Economies 62
   4.5 Sri Lanka and the 4IR 65
      4.5.1 Digital Readiness and Technological Innovation 66
      4.5.2 Human Capital Readiness 69
      4.5.3 Economic Agility 69
   4.6 Conclusion 72
5. **4IR and the Future of Work in Sri Lanka**

5.1 Introduction 73

5.2 How Technology is Changing the Labour Market 74

5.2.1 Effect of Technological Change on Occupation Skill Profiles and Demand for Skills 74

5.2.2 Effect of Technological Change on the Organisation of Firms 77

5.2.3 How Technological Change is Affecting Self-Employed and Entrepreneurs 79

5.2.4 How Technological Change is Affecting Labour Market Policies 81

5.3 How Technology Ready is the Sri Lankan Labour Market? 82

5.3.1 Development of Technology Enabling Institutions and Infrastructure 83

5.3.2 Education and Skills of the Population 84

5.4 How Technology is Changing the Sri Lankan Labour Market 85

5.4.1 Trends in Technology Enabled Jobs 85

5.4.2 Trends in Organisation of Work and Self-employment 87

5.4.3 How Technology is Changing Occupation Skill Profiles in Sri Lanka 88

5.4.4 Equity in Access to Technology Enabled Jobs in Sri Lanka 92

5.5 Conclusions and Policy Implications 94

5.5.1 Labour Market Information 94

5.5.2 Technological Change and Implications for Skills Training 94

5.5.3 Implications on Social Protection 95

5.5.4 The Effect of Technological Change and Inequality 95

6. **Sri Lanka’s Education Sector: Reskilling in the 4IR**

6.1 Introduction 97

6.2 Implications of the 4IR for Education 98

6.2.1 Changing Skills Requirements 98

6.2.2 New Forms of Learning 100

6.3 Current Opportunities for Sri Lanka 102

6.3.1 My Personal Data Analysis 102

6.3.2 Khan-Academy Video Tutorials 103

6.3.3 Smart Classrooms 104

6.3.4 E-thaksalawa 107

6.3.5 Digital Learning Experience Centre 108

6.4 Current Challenges for Sri Lanka 108

6.4.1 Resource and Skill Constraints 108

6.4.2 Equity Concerns 111

6.4.3 Slow and Unsystematic Reform and Implementation Processes 112

6.5 Policy Implications 113

6.5.1 Designing a ‘Future-ready’ Curricula 113

6.5.2 Multistakeholder Involvement 114

6.5.3 Enhancing Digital Fluency 115

7. **Migration and International Travel in the 4IR**

7.1 Introduction 117

7.2 4IR for Travel 118

7.2.1 Platforms, Market Places and Shared Economy for Booking 118

7.2.2 Biometrics and Blockchain for Border Control 121

7.3 Worker Migration in the 4IR 124

7.3.1 Reshaping Employment and Foreign Employment 124

7.3.2 From Migrant Worker to Gig Economy Worker 126

7.3.3 Remittances and Blockchain 130

7.4 Implications for Sri Lanka 130

7.4.1 Travel, Tourism and Border Control in the 4IR 130

7.4.2 Sending Labour and Receiving Remittances in the 4IR 135

7.5 Way Forward for Sri Lanka 141
8. **4IR: A Challenge or an Opportunity for Gender Equality?**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Introduction</td>
<td>142</td>
</tr>
<tr>
<td>8.2</td>
<td>Women and Work in the 4IR</td>
<td>143</td>
</tr>
<tr>
<td>8.2.1</td>
<td>Structural Change</td>
<td>145</td>
</tr>
<tr>
<td>8.2.2</td>
<td>Changes to the Nature and Quality of Work for Women</td>
<td>147</td>
</tr>
<tr>
<td>8.2.3</td>
<td>Employment Relationship</td>
<td>149</td>
</tr>
<tr>
<td>8.2.4</td>
<td>Access to Work Over the Period of Child Bearing and Child Rearing</td>
<td>150</td>
</tr>
<tr>
<td>8.3</td>
<td>Education, Skills and Gender in the 4IR</td>
<td>150</td>
</tr>
<tr>
<td>8.4</td>
<td>Social Implications of 4IR on Gender</td>
<td>155</td>
</tr>
<tr>
<td>8.4.1</td>
<td>Gender Stereotypes and Social Justice</td>
<td>155</td>
</tr>
<tr>
<td>8.4.2</td>
<td>Digital Threats and Online Violence Against Women and Girls</td>
<td>156</td>
</tr>
<tr>
<td>8.4.3</td>
<td>Gender Digital Divide</td>
<td>157</td>
</tr>
<tr>
<td>8.5</td>
<td>Way Forward and Policy Recommendations</td>
<td>158</td>
</tr>
</tbody>
</table>

9. **Health Care in the 4IR**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Introduction</td>
<td>161</td>
</tr>
<tr>
<td>9.2</td>
<td>Transforming the Health Care Landscape with New Technologies</td>
<td>162</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Convergence of Biological, Social, and Digital Systems for Better Health Care</td>
<td>163</td>
</tr>
<tr>
<td>9.2.2</td>
<td>More Precise Diagnoses and Treatments</td>
<td>164</td>
</tr>
<tr>
<td>9.3</td>
<td>Sri Lanka's Health Care in the 4IR</td>
<td>165</td>
</tr>
<tr>
<td>9.3.1</td>
<td>The Health Care System</td>
<td>165</td>
</tr>
<tr>
<td>9.3.2</td>
<td>Importance of Transforming Health Care in Sri Lanka</td>
<td>166</td>
</tr>
<tr>
<td>9.4</td>
<td>A Digital Health Framework in Sri Lanka</td>
<td>168</td>
</tr>
<tr>
<td>9.4.1</td>
<td>Bridging Human Resources Gaps for E-health in Sri Lanka</td>
<td>171</td>
</tr>
<tr>
<td>9.4.2</td>
<td>Reaping the Benefits of Technology in Health Care</td>
<td>171</td>
</tr>
<tr>
<td>9.4.3</td>
<td>Gaps and Challenges for Digital Health</td>
<td>173</td>
</tr>
<tr>
<td>9.5</td>
<td>Way Forward</td>
<td>174</td>
</tr>
</tbody>
</table>

10. **Financial Inclusion in the 4IR: Opportunities and Challenges for Sri Lanka**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1</td>
<td>Introduction</td>
<td>176</td>
</tr>
<tr>
<td>10.2</td>
<td>4IR and the Financial Sector</td>
<td>177</td>
</tr>
<tr>
<td>10.2.1</td>
<td>Blockchain</td>
<td>177</td>
</tr>
<tr>
<td>10.2.2</td>
<td>Artificial Intelligence (AI)</td>
<td>178</td>
</tr>
<tr>
<td>10.2.3</td>
<td>Biometrics</td>
<td>178</td>
</tr>
<tr>
<td>10.2.4</td>
<td>Internet of Things (IoT)</td>
<td>179</td>
</tr>
<tr>
<td>10.2.5</td>
<td>FinTech: Digital Financial Solutions</td>
<td>180</td>
</tr>
<tr>
<td>10.3</td>
<td>Financial Inclusion in Sri Lanka: Current Status and Issues</td>
<td>180</td>
</tr>
<tr>
<td>10.4</td>
<td>Promoting Financial Inclusion through the 4IR in Sri Lanka</td>
<td>183</td>
</tr>
<tr>
<td>10.4.1</td>
<td>FinTech: E-Wallets, Mobile Wallets, Mobile Apps and InsurTech</td>
<td>184</td>
</tr>
<tr>
<td>10.4.2</td>
<td>Biometrics, Blockchain and AI</td>
<td>188</td>
</tr>
<tr>
<td>10.5</td>
<td>Challenges and Way Forward</td>
<td>189</td>
</tr>
</tbody>
</table>

11. **Digital Technologies and the Future of Trade**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Introduction</td>
<td>192</td>
</tr>
<tr>
<td>11.2</td>
<td>How New Technologies Impact Trade</td>
<td>192</td>
</tr>
<tr>
<td>11.2.1</td>
<td>Transport and Logistics Costs</td>
<td>193</td>
</tr>
<tr>
<td>11.2.2</td>
<td>Costs of Crossing Trade Borders</td>
<td>195</td>
</tr>
<tr>
<td>11.2.3</td>
<td>Information and Transaction Costs</td>
<td>199</td>
</tr>
<tr>
<td>11.2.4</td>
<td>Trade Policy and Regulatory Barriers</td>
<td>202</td>
</tr>
<tr>
<td>11.3</td>
<td>Implications on MSMEs and Developing Countries</td>
<td>203</td>
</tr>
<tr>
<td>11.4</td>
<td>Changes in Trade Patterns</td>
<td>204</td>
</tr>
<tr>
<td>11.5</td>
<td>Changing Comparative Advantages and GVCs</td>
<td>206</td>
</tr>
<tr>
<td>11.6</td>
<td>Policy Implications</td>
<td>208</td>
</tr>
</tbody>
</table>
12. Smart Digital Farming in Agriculture: Status and Prospects for Sri Lanka 212
   12.1 Introduction 212
   12.2 Transforming Agriculture with the 4IR 214
      12.2.1 High Impact Agricultural Technologies 214
      12.2.2 Medium Impact Agricultural Technologies 219
      12.2.3 Low Impact Agricultural Technologies 220
   12.3 Why Sri Lanka’s Agriculture Sector Needs 4IR Technologies 221
   12.4 Smart Farming in Sri Lanka: Prospects and Challenges 225
   12.5 Way Forward 229

13. 4IR and Environmental Sustainability in Sri Lanka 231
   13.1 Introduction 231
   13.2 Environment and 4IR: Key Linkages and Promising Areas of Green Technological Applications 232
      13.2.1 Environment and the 4IR 232
      13.2.2 Technological Options Enabled by 4IR Innovations for Environmental Sustainability 234
   13.3 Key Challenges for Environmental Sustainability in Sri Lanka 236
      13.3.1 Climate Change and Disaster Risks 237
      13.3.2 Land Degradation 238
      13.3.3 Rising Scarcity of Water 239
      13.3.4 Loss of Biodiversity and Degradation of Ecosystems 239
      13.3.5 Pollution: Water, Air and Solid Waste 240
   13.4 4IR Technologies for Environmental Management in Sri Lanka: Prospects for Promising Applications 241
      13.4.1 Clean Energy 241
      13.4.2 Transport and Logistics Management 242
      13.4.3 Weather and Disaster Resilience 243
      13.4.4 Water Security 243
      13.4.5 Biodiversity Conservation 244
      13.4.6 Clean Air 244
   13.5 Conclusions and Policy Implications 245

Policy Briefs

14. 4IR and Women in the Workforce: Sri Lanka’s Apparel Industry 248
   14.1 Introduction 248
   14.2 4IR Technologies and Apparel Sector Production Processes 248
   14.3 Impact of Work Reorganisation on Women in the Apparel Sector 250
   14.4 4IR and Implications for Sri Lanka’s Apparel Industry Workers 252
   14.5 Preparing for Change: Investing in Education and Training 255

15. 4IR and Intellectual Property Rights 258
   15.1 Introduction 258
   15.2 IPR Systems and the 4IR: Opportunities and Challenges 259
   15.3 Where Does Sri Lanka Stand? 264
   15.4 Way Forward 267

16. Privacy and Data Protection in the 4IR 269
   16.1 Introduction 269
   16.2 A Growing Need for Privacy in the 4IR 269
   16.3 Implications of Insufficient Data Protection and Privacy 272
   16.4 Why Data Protection is Necessary for Sri Lanka 275
   16.5 Data Privacy Legislation in Sri Lanka 278
   16.6 Potential Concerns 279
   16.7 Way Forward 280
17. Role of Data in the 4IR
   17.1 Introduction 282
   17.2 Data Policies and Building Trust 282
   17.3 Assessing Risks: The Importance of Context 287
   17.4 Why Data Matters in the 4IR 291
   17.5 Summary of Recommendations 292