DEVELOPMENT OF AN IMPROVED CRITERIA TO EVALUATE ACCESSIBILITY TO PUBLIC BUS TRANSPORT SYSTEMS IN A SUSTAINABLE PERSPECTIVE

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198066D

Degree of Master of Science

Department of Civil Engineering

University of Moratuwa

Sri Lanka

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DECLARATION

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

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T. Thilakshan

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

Name of the supervisor: Prof. J.M.S.J. Bandara

Signature of the supervisor: Date: 28th May 2021

ABSTRACT

Sustainability is a universal concept applied in all industries and services to instigate a base of responsibility in an individual and collective manner. The need to promote the concept and hold stakeholders responsible and answerable is the current core in terms of incorporation of sustainable practices.

The concepts of sustainability in transportation especially with respect to accessibility is evaluated using available tools that are more biased towards qualitative measures and comparisons between routes, transit systems or cities and regions are difficult or biased towards opinion. The study deals with the relationships in relation to the SDGs and more precisely the 169 targets which elaborate the SDGs in a focused manner. The analysis provides rise to relationship/links directly and indirectly in identifying targets related to sustainable transportation and linking the targets more precisely with the five dimensions of sustainable transportation as stated by the United Nations for better understanding and relationship establishments.

The need for a better measure for the context of understanding accessibility levels to transportation mainly in the context of public transit (bus) services in cities in an urban environment was identified and this study evaluates the factors that needs to be concerned in affecting the concept of 'ease of access' in a sustainable platform. The evaluation of the available sustainable transportation measures, models and tools give a comprehensive understanding of the avenues that had been considered and the quantitative and qualitative disparity that exists among the existing indicators. Thus, the need for a more representative and quantifiable measure of accessibility to public transit services in the urban context is identified. The research study presents a critical review in existing literature and identifying research gaps in paving the path in achieving a quantitatively enriched index with qualitative support.

Sustainable Urban Transit Accessibility Scorecard (SUTAS) is proposed considering all available parallels in developing a more effective measure for policymakers and researchers to identify the accessibility quotient to public transit systems available while improving the measure further to accommodate different regions, cities, routes into respective levels of comparison. The incorporation of the indicators was done in line with highlighting the accessibility quotient and striking a fine balance with giving a fair space with the other dimensions of sustainable transportation. This inclusiveness has facilitated further strengthening the scope of the improved criteria to be with strong quantitative outcomes. A number of majorly qualitative indicators are also incorporated which enhance the scope of the improved criterion. The indicators have been set to provide a single SUTAS value for analysis. The study in detail further elaborates on how every indicator can be improved to increase the validity of their individual score in highlighting their parameters. Thus the developed SUTAS is able

to assess the accessibility quotient to public transit (buses) in an urban context both in terms of individual city assessment through a timeline and in comparison amongst cities.

The pilot phase of the scorecard has been carried out using case studies and the outcomes have been informative and hence applicable. The scorecard is further refined along with real case applications to introduce a comprehensive procedure that will be a standard method in terms of evaluating accessibility to public transit systems in the urban scenario. Thus, the purpose of SUTAS is to support urban zones to improve sustainable transportation and its related challenges through proper analysis and understanding in a platform where cities of different context can be compared and contrasted to support each other.

Keywords: Sustainable Transportation, Accessibility, SDGs, Scorecard, Indicators

DEDICATION

I dedicate this dissertation to **Prof. J.M.S.J. Bandara**, my research supervisor and mentor who gave me this opportunity and guided me throughout the research study until completion.

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LIST OF ABBREVIATIONS

MDGs – Millennium Development Goals

SDGs – Sustainable Development Goals

SUTI – Sustainable Urban Transport Index

STPI – Sustainable Transport Performance Index

SUTAS – Sustainable Urban Transport Accessibility Scorecard