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論文題目	Study on Sustainable Low Carbon Society in Malaysian Regional Development (マレーシアの地方開発における持続可能な低炭素社会に関する研究)		
<p data-bbox="188 495 448 528">(論文内容の要旨)</p> <p data-bbox="172 580 1422 954">Chapter 1 is an Introduction, and describes research background and research objectives. To reduce effectively CO₂ emissions while keeping the economic growth, many countries have begun searching for a new development path; among which Low Carbon Society (LCS) has become a widely advocated one. The goal of this research is to create a suitable scenario approach, where low carbon society (LCS) policies can be implemented in Local Authorities (LA) in Malaysia. This research presents the case study which records the feasibility of implementing methodology in two different local authorities in Malaysia. They are 1) Iskandar Regional Development Authority (IRDA), a regional level LA and 2) Putrajaya Corporation (PJC), a city level LA.</p> <p data-bbox="161 1005 1422 1462">Chapter 2 is a Malaysian outlook and a definition of the LCS. Malaysia is forwarding to become more competitive with other global economies. The 10th Malaysian Plan indicates the population of this county to be about 28.3 Million in 2010 with a population growth rate of 1.3% (2006-2010), and has a GDP growth rate of 5.7% per annum (2006-2008). The urban population consists of about 63% of the total population. More than a half of the total land area of Malaysia (59.9%) is forests which functions as a carbon sink. Together with the current national development plans and strategies, Malaysia is also committed to a reduction of 40% in CO₂ Emission Intensity by year 2020 compared with its 2005 levels, as delivered by the Malaysia Prime Minister in COP 15 in Copenhagen, Denmark in 2009. Here, LCS defined as 1) Carbon minimization in all sectors, 2) Towards a simpler life style that realizes richer quality of life, 3) Coexistence with nature.</p> <p data-bbox="172 1514 1422 2011">Chapter 3 is describes the methodology of this research in two parts. The first is a quantification methodology and the second is an implementation methodology. Two modelling tools, “Extended Snapshot Tool (ExSS)” and “Community Extended Snapshot Tool (C-ExSS)”, were used for illustrating quantitative future snapshots of the target areas. These tools are multi-sectoral static models formulated as a set of simultaneous equations and calculate, 1) Socio-economic activity level of the sectors in future, 2) Environmental load emissions, and 3) Counter measures necessary to achieve targets. Community Extended Snapshot Tool (C-ExSS) is applied to communities or towns which do not have large industrial sectors. As for an implementation methodology, Focus Group Discussions (FGD) is used to connect the quantitative calculation with a real life implementation procedure. And this reseach showed a guideline as to how meetings or discussion sessions need to be undertaken.</p>			

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<p>Chapter 4 describes a case study of Iskandar Malaysia Region. The quantitative methodology identified the CO₂ emission estimation and energy demand for the years 2005 and 2025 in this region with the Extended Snapshot tool (ExSS). Year 2025 was set as a target year, because the Comprehensive Development Plan of the regions published by Iskandar Regional Development Authority (IRDA) defines the time line set. An emission target set for this research is; 1) Per capita CO₂ emissions from fuel combustion will be reduced to 30% in 2025 compared to ratio in 2005, and 2) Total CO₂ emissions from fuel combustion will be reduced to 50% in 2025 compared to that of 2025 BaU. The reduction potential of energy efficiency improvement, in industry sector by introducing high energy efficiency machinery and appliances, is about 43% of the whole reduction potential, it is the largest one. The reduction potential of fuel shift by converting into low-carbon fuel, is about 15% of the whole reduction potential.</p> <p>Chapter 5 is a case study of Putrajaya. The target of Low-Carbon (LC) Putrajaya is to reduce CO₂ emission intensity (CO₂ emission per economic activity) by 60% compared to the levels in 2007. To achieve this, current and future levels of CO₂ emission in Putrajaya were calculated using “Community Extended Snapshot (C-ExSS)” tool. The CO₂ emission increases 7.31 times compared to 2007 in 2025BaU (Business as Usual) case. In the 2025CM (Counter Measure) case, the CO₂ emission decreases 57% from that of the 2025BaU case. CO₂ emission per economic activity is reduced 40% in the CM case compares with that of the BaU case. As the implementation part, this study introduced an use of Focus Group Discussion (FGD), and applied to Putrajaya region. With the FDG, the quantified results were translated into six low carbon actions which can be implemented by Putrajaya Corporation, a local government who manages the regions. The proposed six low carbon actions contribute to about 77.2% of the total CO₂ emission reduction in Putrajaya, the rest of the emission reduction comes from the managing of solid wastes and so on.</p> <p>Chapter 6 is the conclusion. A comprehensive methodology of implementing Low Carbon Societiy Scenarios by a Local Authority(LA) was developed in the study. And this methodology shows the consistency and feasibility when it was implemented in two study areas in Malaysia.</p>			

(論文審査の結果の要旨)

本論文は、これまで日本などの先進国都市において開発されてきた低炭素社会計画策定手法を途上国や新興国の都市にも適用可能な手法として適応的に改良し、その手法を新興国の中でも発展の著しいマレーシア国の二つの地域に適用することによって、その実用性を検証したものであり、次の成果を得ている。

1. 本論文は、温室効果ガス排出量削減のみでなく、急速な社会・経済成長に伴う様々な都市環境問題にも対処しなければならない途上国や新興国の都市を対象とし、関連情報の整備・体系化が不十分な状況においても適用し得る低炭素社会計画の策定手法として、「低炭素社会シナリオアプローチ」手法を考案したものである。本論文で提案・工夫された手法は、社会・経済的な合理性及び社会・経済的变化に対する頑健性に富み、新興国における低炭素社会計画の策定手法として有効であると判定できる。

2. 本論文では、提案手法を今後急激な社会・経済変革が見込まれるマレーシア国ジョホール州イスカンダル地域開発計画およびマレーシア国中央行政都市として低炭素社会化に強い意欲を持つプトラジャヤ地域を対象に適用した。その結果、適切な施策を実施することによって西暦 2025 年には、イスカンダル地域においては一人あたり CO₂ 排出量を 2005 年比で 30%削減することが可能であり、プトラジャヤ地域ではエネルギー集約度を 2007 年比で 60%削減可能であることを、工学的・経済的可能性に関する定量的かつ詳細な設計により提示した。

3. さらに、こうして策定された低炭素社会計画の社会的受容性を高める手法として、政策決定者、地域住民、研究者らを構成員として行うステークホルダー会議運営の手順と、地域政策決定者による施策検討のプロセスを提案するとともに実施した。

以上のように、本論文は、新興国における低炭素社会計画を策定するにあたり、社会・経済的な合理性、社会・経済的变化に対する頑健性及び社会的受容性に富む手法を提案・検証したものであり、社会的重要性が高い研究である。これらの理由から、本論文は、学術上、實際上寄与するところが少なくない。よって、本論文は博士（工学）の学位論文として価値あるものと認める。また、平成 24 年 1 月 25 日、論文内容とそれに関連した事項について試問を行って、申請者が博士後期課程学位取得基準を満たしていることを確認し、合格と認めた。