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# REDEFINING URBAN ASSESSMENT CRITERIA TOWARDS SUFFICIENT FUTURE CITIES

*Rostam Yaman[a*], Suwattana Thadaniti[a], Hamimah Adnan[b] & Noraini Ahmad[c]*
*[a*]Chulalongkorn University, Thailand*
*Email: rostamyaman1@yahoo.co.uk*
*[b]Universiti Teknologi MARA, Malaysia*
*[c]International Islamic University Malaysia*

## ABSTRACT

*Urbanized areas are typically the most significant sources of environmental degradation, thus, an urban assessment criteria tools aiming at sufficient/self-sustain of the natural environment needs to be firmly embedded in benchmarking planning and design framework. The theoretical model of Sufficient Future Cities (SFC) criteria framework of both qualitative and quantitative evaluation and benchmarking will be develop toward urban sufficient/self-sustain. The SFC sets out a vision for sustainability within the built environment and provides guidance to deliver sustainable townships through six primary dimensions of environmental design and planning. The SFC framework runs on four primary methodology process and sequence in order to optimize urban sufficiency and self-sustaining criteria. Even though the SFC framework is one of the many methods in which to evaluate and benchmark tools to be developed for a comprehensive sustainable township, the principal argument is that comprehensive sufficient/self-sustain is certainly possible if it is properly conceived and implemented through responsible urban design and planning developments.*

***Keywords:*** *sufficient, urban assessment criteria, cities.*

## INTRODUCTION

The world is experiencing the largest wave of urban growth in history and this process is mainly a domain of developing countries. With approximately 3.4 billion people (in 2009), more than 50 percent of the world population living in cities and both human activities and the use of energy also concentrated in cities, the urban areas have become the root cause of orientating societies toward mass production, mass consumption and mass dumping of waste (Yantovski and Gorski, 2010). The mainstream of sustainable development was progressively developed through the World Conservation Strategy (1980), the Brundtland Report (1987), and the United Nations Conference on Environment and Development in Rio (1992). The aim of the World Conservation Strategy is to help advance the achievement of sustainable development through the conservation of living resources and provide policy guidance on how sustainable development can be carried out (IUCN, 1980) The concept of 'Sustainable Townships' are liveable places that meet the diverse needs of the community, both now and in the future (GBI Malaysia, 2010; McGregor & Roberts, 2010).

The need for integral systematic rating systems is recognized in order to evaluate the performance of Green Township and promote the regenerative development. However, the current available assessment framework is based on low carbon city (LCC) and low carbon society (LCS), the future of green township development should beyond LCC + LCS; and toward zero carbon and regenerative city. The idea of sufficient and sustainable modelled on 'bio-mimicry' regeneration system is way to the future. In recent years there has been a proliferation of urban regeneration initiatives focused on the health and

well-being of urban citizens and the urban fabric – the 'inner-urban environment' (Girardet, 2010). While major sources of environmental degradation, deterioration, and depletion on Earth are irrefutably embedded in urban areas there appears to be an unjustifiable absence of research and development aiming for the comprehensive sufficient / self-sustaining criteria of assessment framework through improved urban planning, management and development.

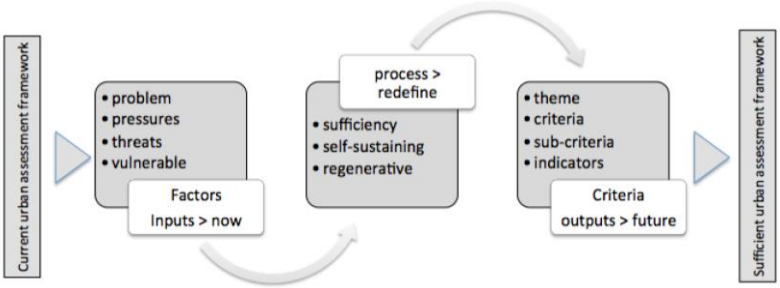


**Figure 1:** Development Process of Sufficient Future Cities Framework

## LITERATURE REVIEW

Sufficient by definition is adequate for the purpose; enough: sufficient proof; sufficient protection. 2. Logic. (of a condition) such that its existence leads to the occurrence of a given event or the existence of a given thing. 3. Archaic. competent. A self-sufficient city is a defined perimeter, inside which lies a population that is self-sufficient: i.e., the economy within the city fully employs the population, and the services and cultural infrastructure within the city are sufficient supply for the population. As definition suggest, sufficient urban development meaning the ability of the cities to self-sustaining. A city which not depend on imported energy and resources from the hinterland. Hence, sufficient is regenerated own resources and beyond sustainable. The relationship of the terms is denoted as in figure 2. Regenerative and degenerative actions subdivided into conceptual diagram below;

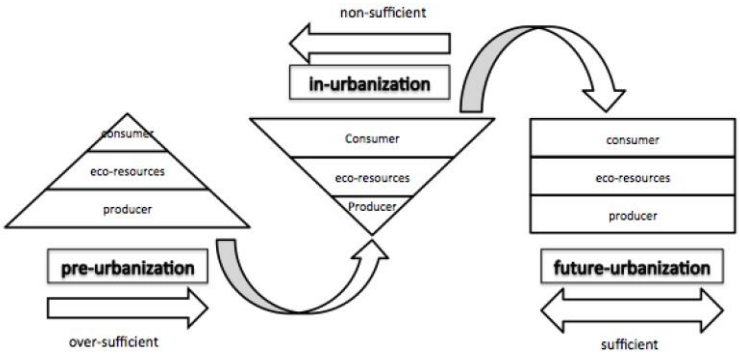


**Figure 2:** Sufficient concept of urbanization vs ecosystem service

The concept sufficient derived from basic ecosystem services (Figure 3), where the energy from sun is converted by producer (i.e.: plants, algae) into biomass energy or resources, then it was consumed by the consumer, the waste will be decomposed and go into inorganic nutrient pool whereby it was consumed by producer. This process of circular metabolism continues over-sufficiently in pre-urbanization and maintain the ecosystem services pyramid where producer is at the based, eco-resources at the middle and consumer at the tip. Urbanization somehow reversed the pyramid where consumer is bigger than producer, hence, non-sufficient and environment degrade. The future of urbanization suggested to be sufficient; producer, eco-services and consumer should be equal and balance, we cannot go back to the state of over sufficient pre-urbanization but at least we are not urbanized more than we should and need. Thus, urbanization have to be sufficient.

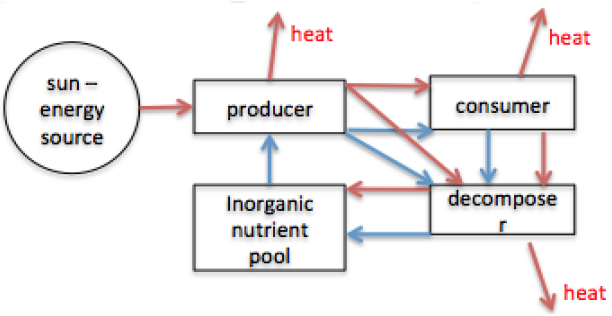


**Figure 3:** Basic Ecosystem Services

The city development scenarios and challenges today is no longer just to create sustainable cities but truly regenerative cities: to assure that they do not just become resource-efficient and low carbon emitting, but that they positively enhance rather than undermine the ecosystem services they receive from beyond their boundaries. A wide range of technical and management solutions towards this end are already available, but so far implementation has been too slow and too little (Girardet, 2010). The current approach of how city works is very much linear in operation. This linear, open loop approach is entirely unsustainable. In an urbanizing world aiming for long-term viability it cannot continue. The environmental externalities of urban resources use can no longer be ignored. Unless we learn from nature how to create circular systems, an urbanizing world will continue to be an agent of global environmental decline.

Bio mimicry or emulating nature is how to moved forward. Bio mimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies (Benyus, 2002). Similar to nature's organisms, cities as 'eco-technical super-organisms' have a definable metabolism – the trans- formation of resources into vital functions (Girardet, 2008). Nature essentially has a circular zero-waste metabolism: every output by an organism is also an input, which replenishes and sustains the whole living environment. In contrast, the metabolism of many modern cities is essentially linear, with resources flowing through the urban system without much concern about their origin, and about the destination of wastes. Inputs and outputs are considered as largely unrelated.

One of the primary tasks at the start of the 21st century is to try and map out what is necessary to create a sustainable city that emulate nature. The challenge is to find ways of making cities function differently from the way they do today without increasing the costs to financially challenged city administrations. The new task facing of city planners, engineers and managers, in close cooperation with the general public, is to create spatial structures that satisfy the needs of city people whilst also assuring their ecological and economic resilience (Girardet, 2004). Efforts consolidated need to provide secure habitats that allow people to move about in the cities efficiently, and the need to provide pleasant spaces for work, recreation and human interaction. What needed are urban environments that are free from pollution and waste accumulation. But also at the same time need to get to grips with the impacts of cities beyond their boundaries especially the medium that makes cities operable and functions. Cities should be seen as the places where solutions to the world's environmental and climate problems can most easily be implemented because as places where most people live closely together they have the potential to make efficient use of resources. It is also in cities where people interact most strongly and where key decisions, and particularly financial decisions, are being made all the time. This is where the concept of regeneration and urban forestry or an 'Eco-polis'; the ecologically as well as an economically restorative city (Downton, 2009).

The framework in determining the positions of green, sustainability and regenerative related to key terminology of below displayed. It is written in a simplified, clarified and depoliticized manners as three main listed terms;

i. 'degenerative': to decline in value or worth
ii. 'sustainable':3 to maintain; to keep from failing
iii. 'regenerative': to give new life, strength, or vigour

The tier-relationship of the terms is denoted as in figure below (Figure 4). Regenerative and degenerative actions subdivided into twofold spheres of activity on a gradient measure, with the point of neutral set at in between spheres where lies the concept of sustainability. Other used terms that are assigned with clear, simple definitions are: 'living': alive; having animation and vitality; not dead; and 'environments': surroundings or places.

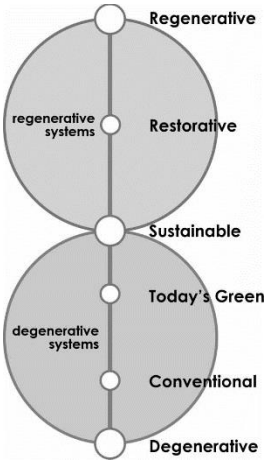


**Figure 4:** Degenerative and regenerative spheres. Source: Jossette, 2012.

The term living environments was used to avert the distinction concerning human centred, dominated environments and 'nature'. It is likely to be counterproductive to segregate humans and man-made developments isolated from nature. All dwelling environments comprise all or any kind of places. Be it a project of a one particular building, a path system in any national park, a swamplands restoration or a regional urbanization, it would all be life-supporting schemes (Reed, 2007 and Benyus,1997).

The conception of inter-twining sequential between green, sustainable and regenerative methods and viable transition from existing comprehension is the overall ideation of regenerative development. There are varies definitions of the term 'sustainability' used today, but the most conveyed concept is of where humankind is co-exist within the carrying capacity of the planet Earth (Gibberd, 2003). By virtue, therefore, the key notions in sustainability discussion will contain the ever-going relationship of mankind and nature systems. Sustainability by concept underpins; that people are integral parts of ecosystems and that a dynamic interaction exists between them and other parts of ecosystems, with the changing human condition driving, both directly and indirectly, changes in ecosystems and thereby causing changes in human well-being (Millennium Ecosystem Assessment, 2005).

The significance in assuring the condition and integrity of nature eco-systems and the adverse impact cause by human act on it is very vital. The main issues in notioning regenerative framework is as listed below;

> *Within the regenerative literature, 'sustainability' is often presented as an intermediate stage between green and regenerative – a 'neutral' state that, once attained, provides the necessary base condition that permits regenerative capabilities to evolve (McDonough and Braungart, 2002; Pedersen Zari and Jenkin, 2008).*

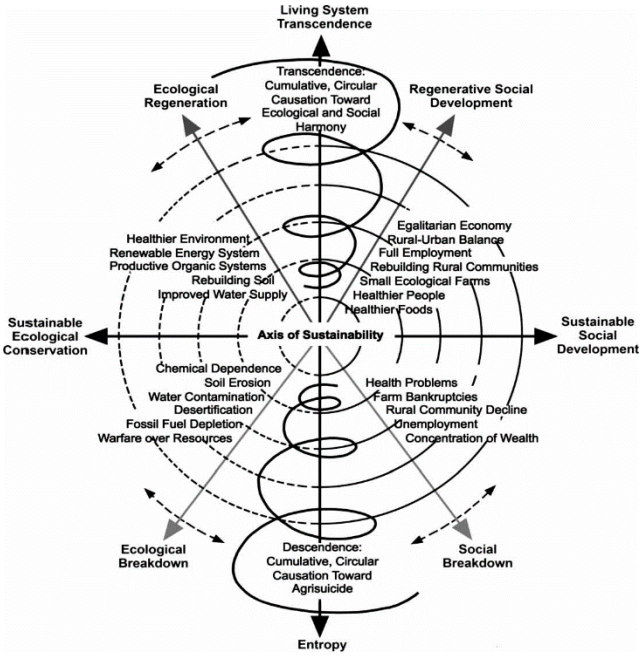


**Figure 5:** Living systems model of community development. Source: Larrick (1997)

Few frameworks were surfaced in an attempting to grasp the fundamental factors or citeria of regenerative conception. One of the earliest graphic on regenerative conception is by Larrick (1997), it offers a degenerative and regenerative processes and actions and their consequence for human and natural systems (Figure 5). Larrick statuses pre-eminence of ecosphere as the 'basis source of all benefits, thus of entire wealth' conclude that, the superseding goal of an ecological society must be to maintain the critical order of the natural world.

Larrick line-up of key significance criteria of regenerative concept in his model are:

- *The right and left halves of the framework represent the human and ecological domains respectively that must be brought into harmonious coexistence (Larrick, 1997).*
- *The lower and upper halves represent degenerative and regenerative actions and consequences. The degenerative consequences of consuming or polluting at rates greater than productive and assimilative capability speed up entropy. By contrast, the shift that both human and non-human life has made toward more complex and integrated levels of existence is premised on 'using unique regenerative powers to resist entropy' (Larrick, 1997).*

Larrick's model framework also suggests a basis to begin in defining regenerative conception, to clarify and position the green, sustainable and regenerative conceptual approaches (Jossete et al, 2012):

- Regerate - upper half circle of the ecosphere embraces the sustainable state, with an apparent recognition of the roles of ecological and social regeneration as necessary attributes, along with their harmonious co-evolution, required to attain it. Here, continual evolution through regeneration is presented as a primary requirement of sustainability.
- Degenerate - lower half characterizes an unsustainable state, where human activity has initiated degradation of natural systems. Provided Larrick's model conviction regarding the dependence of human 'wealth' on the 'critical order of the natural world,' both increasingly degenerate.

Green township planning and design is a compulsory consideration in reducing this degeneration. As therefore, it's practical to imply that both 'green', as presently delineated, and regenerative planning and development discourses are essentials to support the moulding of future cities concept. The outlining of the discussion of urban design as indivisible from sense of locale: place, conveys the insinuation that it is equally important, proviso not more than, to comprehend how development design, construction and purpose positively impact the social, environment and economic wellbeing of the context setting where it exist within it.

Within that context, this research is motivated by several driving questions:

i. At the largest outset, how can the sufficient future cities assessment framework be successfully developed and incrementally implemented?
ii. If such guiding sufficient framework is not aimed for, is it likely to ever arrive on its own?
iii. What are most significant urban framework assessment criteria on the environment?
iv. How can these criteria be implemented through urban redevelopment?

At this juncture, the necessities of sufficient assessment framework have to be brought to the forefront of contemporary academic as well as professional research and development. Overarching argument of this inquiry is that sufficient framework is not only theoretically possible but also practically feasible if it is responsibly planned and designed for. This research seeks to develop an economically, socially and environmentally balance and responsive approach to Green Township Indexing Criteria, i.e. Sufficient Future Cities (SFC) framework, by which the principles and strategies of assessing and benchmarking are positioned to facilitate sufficiency and self-sustaining criteria through incremental improvements in green urban indexing. The SFC methodology is conceived to address a critical yet currently non-inclusive aspect of Green Township Indexing Criteria, that is, an exclusive focus on the sufficiency and self-sustaining criteria through urban growth and redevelopment. While the SFC framework (Figure 6) is not the only possible venue to implement broad based and widespread sufficient/self-sustain criteria it does form a foundation not only for other urban research and developments to follow but also for countless other regenerative efforts to transform the current urban realities.

This research is to redefined and develop an urban framework based on sufficient/self-sustain criteria, which is intended to stimulate public policy as well as private implementation toward urban regenerative at varying scales of community development and urban redevelopment. The sufficient principles and strategies that shape the Sufficient Assessment Framework hold great potentials to provide feedback in public and private processes of policy- and decision making based on scientific analyses. Perhaps more importantly, these principles and strategies aim to incrementally bring neighbourhoods-scale redevelopments that will culminate in large-scale transformations of urbanized areas. The alternative – lack of regenerative action – is certain to lead to the future consequences of current development patterns, which do not aim at recovery or rehabilitation of natural balances within the living biosphere of the Earth.

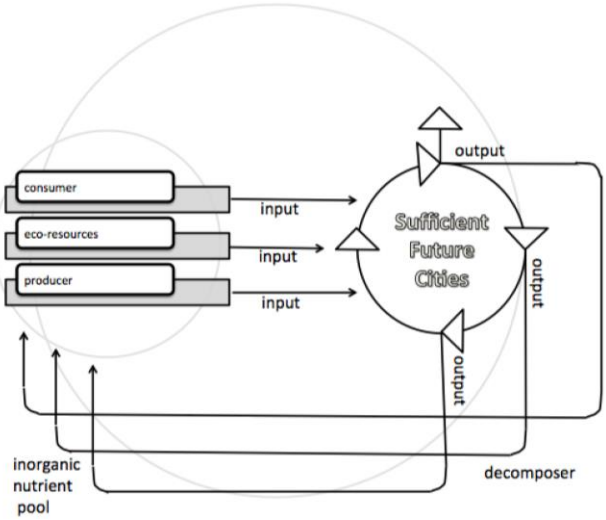


**Figure 6**: Conceptual Framework of SFC

## RESEARCH DESIGN

The SFC Framework is designed to evaluate the key sufficient indexing criteria impacts of urban development by using Climate, Energy and Water (CEE); Ecology & Environment (EEC); Community Planning & Design (CPD); Transportation & Connectivity (TRC); Building & Resources (BDR) and Business & Innovation (BSI), as well as generation and consumption of food, energy, and wastes. Improving on the existing theory, knowledge, and technologies of green township indexing criteria, the sufficient/self-sustain methodology is intended to facilitate transformative contributions toward the comprehensive regenerative urban development through sustainable township indexing scores.

## A. Methodology: Mixed Method Scenario Sequencing

The SFC Framework Assessment tools employs a mixed method scenario sequencing methodology that has been inspired by the green township framework and tools development (GBI, 2010) based on comparative analysis, expert focus group discussion, stakeholders survey forecast and pilot project studies. It also using estimated simulations using Building Energy Intensity Tools (BEIT), MS Excel, and Autodesk REVIT. The four mixed method scenarios sequencing of sufficient framework development are (See Figure 7):

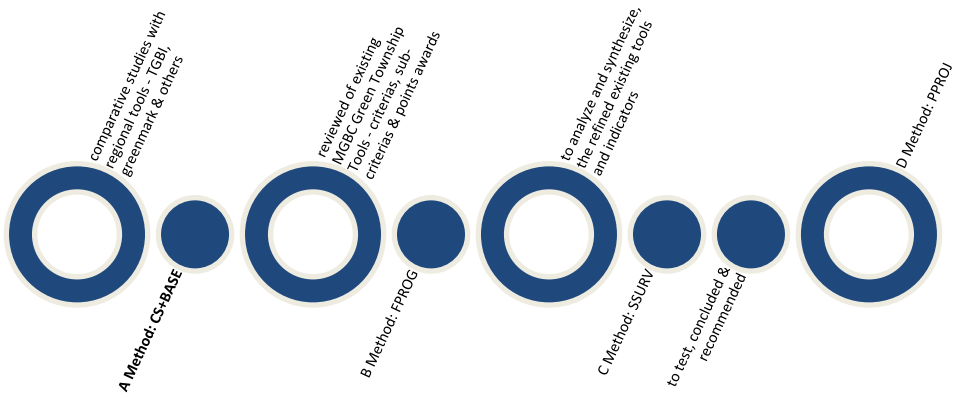


**Figure 7:** Final deliverables of Mix Method Scenario Sequencing

## B. Data Analyses

Consistent through all six dimensions, the analyses start with comparative analyses in determining of criteria for CC+S Baseline (CS+Base) and beyond on all indicators (See Figure 5). This data set represents the baseline criteria, which can be either available criteria researched and compared to exist before or ideal or presumed conditions that are preferable (beyond CC+S or redefined sufficient). The indicators, which are simply not be applicable within a particular study area, may be either left out or assumed to be within normal range for analysis purposes. Second step is the collection of previous and present data representing the green township scoring impacts for the same set of indicators (See Figure 6). For the required and redefined criteria in Expert Focus Group Discussion Progression (FProg) method at least two reference states of criteria are needed, the baseline criteria and the beyond. These reference states are flexible, however, they are expected to represent the refinement and sufficient shift from recent available tools conditions and suggest regenerative principles and values. At this stage the SFC Framework Tools development is preliminary draft.

And, upon, as for the present stage, the preliminary draft will be available for end users and stakeholders perceptional appraisal and comments. Targeted qualified green township industry stakeholders are the policy maker (public authority), building professionals and other similar professionals involved in an urban development projects. When there are gaps in the available data appropriate statistical methods can be applied to interpolate the lacking data. The Stakeholders Survey (SSurv) method is estimated by non-regression analyses based on the data from stakeholder perceptional survey conditions (See Figure 5). The calculated values from these analyses provide a valuable input on applicability and workability of preliminary draft tools that are used for the purposes of evaluating results and optimizing sustainable township indexing scores. The Pilot Project Projection (PProj) method is to appraised the workability, to test and commissioned the redefined Green Township Indexing Criteria based on Sufficient Future Cities Assessment Frameworks. The differences sustainable township indexing scores between the existing tools and newly developed tools are targeted for minimization and offsets. The sufficient criteria conditions are determined by the level of minimization and offsets applied in this step, thus suggest for future recommendation.

## C. Data Collection, Interpretation, and Application

This research is conceived to rely almost entirely on secondary data and is not intended to collect or generate new primary data in the form of traditional surveys or questionnaires. Generation of new data is typically limited to data obtained from presumed conditions that are preferable (beyond CC+S or redefined sufficient) of from the BEIT software calculations and reports in the modelling/simulation process. The GBI Indexing data for the indicators analysed in the SFC Framework are typically supplied by freely accessible, non-classified, online public sources. Some of the most popular ones include Ministry of Science, Technology, & Innovation (MOSTI), Ministry of Natural Resources & Environment (NRE), Department of Surveying & Mapping (JUPEM), Malaysian Institute of Planners (MIP), Malaysian Green Building Confederations (MGBC), Singapore BCA Greenmark, Thailand Green Building Institute (TGBI), Geo-Data.gov, data.gov, esri.com, and so forth. Depending on the location of the study area, it is possible to run into breaks and gaps in the coverage of publicly available data, in which case statistical estimations may be utilized.

In addition to the norms and standards reported in the published literature, the SFC Framework development relies on secondary data for most of its data analyses. There is ample amount of public green township indexing data electronically and digitally available to be used for comparative analyses as long as the selected case studies fall within well-developed metropolitan areas. Majority of local jurisdictions i.e. city, county, or regional governments and planning organizations offer the kinds of data that SFC Framework requires. For most of the qualitative analyses in the SFC Framework, the need to collect new data through onsite measurements, focus group discussions, surveys, and/or via questionnaires. Open source secondary data such as online photographs, satellite imagery, and other

geospatial visualization are adequate for most evaluations. Nevertheless, a moderate level of difficulty in collecting, combining, and synthesizing appropriate parcel data for the entire study area is to be anticipated.

## D. Application of SFC Assessment Framework: A Pilot Study

The application area of the SFC Assessment Framework can show significant and appraised the workability of the developed tools. From a theoretical urban regenerative perspective, of course, the more advanced assessment criteria the better outcomes will be for future urban development. The breadth and depth of real-world applications are also highly likely to be clouded by various social, cultural, economic, and political circumstances unique to each locality. The population, area, development density or demographic composition of the study area can be anywhere within a wide spectrum. While the actual size and locations of study areas are expected to be different typically there are several research advantages to selecting a large neighbourhood or a small township within a relatively well-developed metropolitan area. Studying these areas not only ensures the availability, reliability, and generalizability of inputs and outputs but also contributes to the spread of knowledge, experience, and expertise for sufficient/self-sustaining principles within urbanized development.

# EXPECTED RESULTS AND DISCUSSIONS

The results of this research are expected to inform and improve the current assessment criteria in Green Township Indexing Tools in Malaysia. Following are a few ways that the expected results provide contributions to redefined Green Township Indexing Criteria.

## A. Findings Data Analyses

The expected result upon the completion of the research is to identify, compare and understand the conception of sustainable township assessment framework for tropical climate region; to revise and develop sufficient township assessment criterias for tropical climate region and to promote and introduce the redefined (sufficient) Green Township Assessment Tools for future urban development in tropical climate region. In the criteria dimension analyses of the SFC Assessment Framework, the normalized or standardized scoring on each indicator is estimated for each parcel of the study sub-criteria under both CC+S Baseline (LC+Base) and expert focus group discussion progression (FProg) methods combined. During the consensus process, depending on the intensity level of scoring impacts in each sub-criterion, each indicator receives a numerical assessment score ranging from minimum 1.0 to maximum 8.0 where a score of 1.0 represents most basic applicable (closest deviation from baseline) and a score of 8.0 represents most intensive sufficiency (furthest approximation to baseline). The assessment criteria weight is determined by the standard weight factors assigned in the SFC Assessment Framework for each criteria indicator of the sufficiency requirement and refinement. The sub-criteria of assessment criteria and weighting determines the assessment scores for indexing classification.

## B. Evaluation of Results

One of the most critical parts of this research is to redefined the criteria and the evaluation of assessment scores for each indicator via the CS+Base and FProg methods. Since the end goal of the SFC Assessment Framework is to produce a single set of green township indexing criteria for future urban development or redevelopments. The mutual consensus from these two methodologies are finalised and critically evaluated in order to determine which aspects of the redefined criteria can be optimized so that expected results from assessment score is optimum alas highly sufficient. All analysis is represented qualitatively in visual representation. The results from all indicator categories are expected to remain within the

sufficiency criteria spectrum, and to require a certain level of refinement in order to achieved high sufficiency scoring impacts. At this juncture, the sufficiency measures – such as increased efficiency in CEW, EEC, CPD, TRC, BRD and BSI – are introduced to mitigate the environmental impacts and improved urban sustainability

## C. Optimization of Benchmarking Criteria Assumptions

The next important step in the process the optimization of benchmarking criteria assumptions and appraise workability of the PProj methodology. The initial evaluation results from the previous step are expected to be continually redefined until the most optimum sufficiency concept conditions – furthest to the baseline conditions – are achieved. The strategies to be used in optimization of benchmarking criteria assumptions can be found in a wide range of concepts that are in practice today, which focus on sufficient and self-sustaining of natural ecologies within urban development. Strategies most relevant to restoration can be found in Green Urbanism, Resilient Cities: EcoVillages, Eco-Cities, Living Buildings, Neighbourhoods and Cities, Regenerative Design principles.

The ultimate goal of sufficient and regenerative urban developments may cover beyond efficiency in climate energy and water such as aim for zero net carbon emissions – by maximising passive design principles, minimising the impact of heat island effect, minimising energy consumption, adopting onsite energy generation, utilising renewable energy technologies such as co-generation and micro-generation. It also suggests water neutral – through the reduction of mains water consumption, rainwater harvesting and greywater recycling. Sufficient urban development strives for environment and ecology conservation; the natural cycles and balances within urban ecology would be to integrate number of possible categories of plants and animals, which can naturally coexist within a well-balanced urban community. Cycles of growth from birth to decay in such urban ecology also needs to be carefully considered to approximate the natural cycles and balances as closely as possible. Environment and ecology criteria highlight sensitive to the needs of the local ecology & biodiversity and aims to preserve and enhance the ecological value of the natural environment. It assists in stabilising land – subsidence by reducing the impact of flooding and erosion. Reduction of consumption; Reuse and recycling of local resources; Green Infrastructure; Climatically appropriate passive technologies; Optimization of land uses and redevelopment (interconnectedness and compactness); Protection and rehabilitation of open space, farmland, grassland, and ecosystems; Expanding biodiversity, vegetation cover, wildlife species and habitats; Ecosystem restoration and integration in open lands, grasslands, watersheds, bioswales, wetlands; Minimization of non-renewable consumption; Reliance on local generation of renewable energies; Management of resources and wastes; Diversified modes of transportation (walkability, bicycle, streetcar, bus transit, light-rail, commuter, and heavy rail).

## CONCLUSIONS

One of the key conclusions is expected to be the realization that sufficient assessment framework is not only possible but also highly achievable if properly adapted, applied, designed and planned for. This research is designed to heighten the future goals of ecologically responsive and environmentally responsible urban development practices. Another expected outcome is the development of a viable redefined green townships assessment tools for guiding and referencing environmentally sufficient urban agenda. And finally, through pilot project studies the SFC Assessment Framework is tested, commission and recommended for sufficiency significance and effectiveness. The sufficiency considerations include such significant interventions as management of urban growth and expansion, infusion of renewable materials and energy, expansion of open space and resource conservation policies despite formidable limitations and constraints. Improving on the existing theory, knowledge, and technologies of urban design and planning, the sufficient methodology is intended to make transformative contributions toward the comprehensive regenerative urban co-existence with natural environment, which aim to identify significant SFC Framework Criteria of Green Township, redefined scoring impacts & definitions originated in core criteria & sub criteria, form a cluster criteria of ecologically responsive and environmentally responsible urban development sustainable benchmark and

build a green township assessment tools of sufficient redevelopment.

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The manuscript should be within the range of 5000 – 7500 words in Times New Roman font, 12 point-type. Authors are requested to state how many words their paper contains. The manuscripts should be typed and single spaced on one side of A4 paper only, with 4 cm margins on the sides, the top and the bottom. All text should be set aligned justified throughout. The pages should be numbered in order.

***Title Page***

The first page of the manuscripts must contain the full title, name of author(s), designation(s) of affiliation(s), highest academic qualification and the present address(es) with the telephone/fax/e-mail contact information listed.

***Abstract and Keywords***

The abstract must not exceed 250 words and should summarise the paper including the main conclusions. There shall be not more than 5 keywords.

***Text***

The order when typing manuscripts: Title, author(s), highest academic qualification, Affiliations, Abstract, Keywords, Main Text (Aim, Problem Statement/Issues, Methodology and Analysis), Conclusion and Recommendations, References, Acknowledgment and Appendix (if any). Simple language, short sentences and a good use of headings are encouraged. Headings should be numbered and the use of more than three levels of heading should be avoided. Headings and paragraphs should be separated by two carriage returns. Text following a heading should not be indented.

***Illustration***

Photographs, diagrams and charts should be referred to as "Figure(s)" and numbered in the order in which they are referred to in the text. Maps and diagrams should be submitted in a form ready for reproduction, all in legible digital format. Please note that illustrations in the journal shall be printed in black-and-white or grey-scale.

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All measurements and data should be given in metric units or, if other units are used, then the metric equivalent should be given in parentheses.

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*Book*

Malcolm Taylor (2000) *Avoiding Claims in Building Design: Risk Management in Practice*, Blackwell Science Ltd, London

*Conference Proceeding*

Hamzeh, F.R. (2011). The Lean Journey: Implementing the Last Planner System in Construction, Proceedings of the 19th Annual Conference of the International Group for Lean Construction, IGLC 19, 13-15 July, Lima, Peru, pp. 379- 390

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