The Readiness Of The Stakeholders In The Implementation Of Low Carbon Cities Framework (Lccf) In An Urban Area: Methodology Of Research

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Abstract. In the awareness of global climate challenges, Malaysian local authorities are inspired to apply Low Carbon City Framework (LCCF) to mitigate the carbon emission at city, project and regional scale. Effective implementation measure is believed will enable the private sector to emulate the LCCF implementation at a given scale. However, within the boundary of intense industrialization 4.0, it is observed that the LCCF implementation measures in local authorities are moving slowly. LCCF Checklist is readied, however, its effectiveness is unknown. The aim of this paper is to seek the readiness of local authorities and related stakeholders in implementing the LCCF. The methodology of this research is a mixed method namely qualitative and quantitative approaches. The survey methods are by interview, questionnaire and observation. Town planners, who will be interviewed, are the subject matter expert in managing the planning permission submission for the development control of their areas. Descriptive statistical analysis will be used to show the willingness of the stakeholders namely the developers and planning consultants in implementing the LCCF. Cross-tabulation and correlations tests will be used to improve the understanding of the willingness of the stakeholders. The contribution of this research will gauge the readiness of the major construction industry stakeholder in applying the LCCF at a major local authority in Malaysia. It is also may reflect a large portion perception of industry on the LCCF implementation and its readiness at local authorities’ level. This research is anticipated to be a very useful tool through the LCCF Checklist to assist local authority in achieves sustainable development and environment.

1. Introduction
The current global complex environmental problems have resulted in environmental degradation which has caused, among other things, global warming. Environmental problems have been recognized and acknowledged at the United Nations Conference held in Rio de Janeiro in 1992, which composed in Agenda 21. However the global system of environmental management which focuses on lifestyle and industrialization is moving slowly in the right direction [5]. Among the approach is the Low Carbon City Framework (LCCF). Human activities in cities contribute 80% of greenhouse gas (GHG) emissions which are mainly responsible for the current climate change threat [12]. In this sense, LCCF is one of the most important tools applied in local authorities as guiding blueprint for low carbon cities amongst local authority’s community. Low Carbon City relates to carbon minimization in all sectors by developing a society that emits GHG only in an amount that can be absorbed by nature and achieving a lifestyle that realizes the richer quality of life. Health and interaction with nature as well as promoting nature-friendly technologies such as the utilization of biomass is expected in near future by manifesting...
in LCCF [4]. Despite that, it is acknowledged that challenges exist which recorded in local authority lab report of LCCF implementation [15]. There were also recurrences of reports in planning permission submission stage in this matter [15]. The aim of this paper is to develop the research methodology to study the readiness of the stakeholders in the implementation of LCCF in an urban area with the focus on the implementation by the local authority in processing the planning permission.

2. Low Carbon Cities (LCC)

In general, Low Carbon Cities (LCC) is defined as a city that comprises of societies that consume sustainable green technology, green practices and emit relatively low carbon or GHG as compared with present-day practice to avoid the adverse impacts on climate change [8]. According to the Chinese Research Academy of Environmental Sciences, a low carbon city leads to low carbon economics and society along with a sustainable form of development. There are two aspects in a low carbon city conception, namely; (a) low carbon economies which increase energy, water efficiency and reduce carbon emission based on efficiency in use of resources and green technology; and (b) low carbon consumption which reduce carbon emission from all aspects of city living which include recycling, protecting the natural environment, maintaining green areas in the city and increasing carbon sink [7]. These aspects were translated into LCCF in Malaysia [13].

2.1 The Necessity to Develop Low Carbon City (LCC)

Cities, in general, generate very huge carbon dioxide emission and are responsible for consuming two-thirds of the world’s energy and generating over 70% of its greenhouse gas emissions. About 2.6 billion tCO₂e is generated by the world’s 50 cities annually [14]. Currently, half of the world’s population lives in cities and this is expected to reach 70% by 2050. Also, cities account for over 67% of the energy-related global greenhouse gases, expected to rise to 74% by 2030 [14]. The key to creating low carbon cities in the field of urban planning is to freely come up with ideas to create a complementary and mutually supportive situation in which people’s lives are improved and they have a better environment in which to live [9]. Low Carbon Cities had been implemented globally and defined slightly different names as a reference to a province, city, municipality, or community that pursues a systematic process to achieve GHG emission reductions [2]. There were a few case studies in Asia and Europe. Issues were addressed, the approach was taken contextualized locally. The rapid urbanization causes rapid environmental degradation demanded a new development pattern with less energy consumption. The new concept of Low Carbon City namely the eco-city was among the answer. Implementing the concept require the change in the development mode from only focusing on economic growth to an equal focus on the social and environmental aspects in the planning process had taken place in Shenzhen, China [11]. Thailand’s “Low Carbon City” initiative aimed to help achieve reductions in GHG emissions and catalyse this shift to a low carbon society. Another example was the UK is Oxford City Council. In 2008 City Council created a Carbon Management Plan aimed to reduce the City Council’s own emissions by 25% by 2011 with its measures [10]

2.1 Low Carbon Cities Framework (LCCF) in Malaysian Local Authority

The LCCF is only applied to participating local authority in Malaysia (UPEN, 2016). This is cascading from the Malaysian government is cognizant of the effects of global warming and is committed to combating this global phenomenon. The nation’s commitment was announced to the global community. In order to reduce carbon footprint in Malaysia, the Prime Minister pledged commitment at the 15th United Nations Framework Convention on Climate Change (COP15) 2009 in Copenhagen, Denmark. Malaysia has committed to reducing its carbon dioxide emission intensity based on GDP by 40 per cent by 2020, as compared to 2005 levels; conditional upon transfer of technology and finance from developed nations [7]. Ministry of Energy, Green Technology and Water (2015) proposed strategic planning for green technology as one of the machinery for economic growth which includes the LCCF. Low Carbon Cities Framework & Assessment System (2011) highlights the LCCF is a performance-
based system that captures the actual environmental impact of development in terms of total carbon emission. The framework provides quantitative carbon equivalent as a result of human activities in cities so that there may be awareness towards low carbon emission levels can be reduced. The framework serves as a guide to users on a pertinent element that contributes to the reduction of carbon emission. It comprises for four (4) key elements, 13 performance criteria and 35 sub-criteria which provides information helping the stakeholders to identify areas in which they could target an overall carbon reduction. The construction industry stakeholders had started to explore the existing framework for carbon reduction and established the policy by respective industry stakeholders [3]. The initiative for LCCF had started in 2011 simplified the LCCF is a system developed by the Ministry of Energy, Green Technology and Water (KeTTHA). The purpose of this system is to assist industry stakeholders such as developers, local councils, town planners, non-governmental organizations (NGO’s) and the public to lower the levels of carbon emission in cities towards achieving sustainable urban developments. It serves as a guide that will propel stakeholders for cities, townships and neighbourhoods to re-assess their priorities in the planning and developing of new projects, as well as strategies that can be taken by existing cities, townships and neighbourhoods in reducing their carbon emission levels. Besides serving as a comprehensive guide, the LCCF also has an inbuilt carbon calculator with carbon equivalents that would help stakeholders assess their current baseline levels of the cities, townships and neighbourhood and target their intended levels. Green Technology applications for Low Carbon Cities (GTALCC) is a project to facilitate the implementation of low carbon initiatives and to showcase a clear and integrated approach to low carbon development in Malaysia [14]. Among the evidence is the emergence of green rating tools such as Green Building Index (GBI), Malaysia Carbon Reduction and Sustainability Tool (MyCREST) and Green Real Estate (GreenRE) from various stakeholders of the local construction industry. These are the rating systems adapting to the Malaysian context which upkeeps the LCCF system at larger scale simultaneously. In this sense, LCCF is hoping to holistically strategize the implementation of environmental sustainability in the Malaysian construction industry interlinking green rating tools and green procurement implementation.

2.3 LCCF Assessment System in Malaysian Local Authority
The assessment system of LCCF encompasses carbon calculator guiding user determine their current baseline of carbon emission [7]. Various approaches are recommended in the framework to achieve a certain reduction level to the user. The calculator will be used again to reassess the carbon emission levels to see if the user has obtained a good reduction level. The built-in calculator equipped with carbon emission factors enables the user to calculate based on their requirements. The LCCF is only applying to the local authority who participate which mean not all local authority is obliged. This is among the challenges identified in making LCCF implementation effective. The assessment is carried out by the planning department of the respective local authority specified in the department control unit. It is made by reviewing the planning permission documents requirements submitted by the submitting person of newly developing projects at One Stop Centre (OSC) counter. All pertinent matter was carried forward to the Planning Permission meeting together with primary stakeholders of the proposed projects.

2.4 LCCF Checklist and Planning Permission
The implementation LCCF Checklist in a local authority have a round table session. Interview with the local authorities to get the idea and discussed about issues, concerns and constrains in incorporating LCCF into the process and procedures of development application [6]. The assessment takes place in the development planning permission stage as part of the need statement for the future project undertaking somehow may need revision. In addition, there is a dearth of literature critically discussing the LCCF checklist globally much less the Malaysian LCCF checklist. Vagueness in understanding and implementing LCCF in local authority much less the construction industry is identified in promoting LCCF. In general "planning permission" is a procedure in which the applicant must submit an application to the local planning authority for approval before starting any development on the land or building as provided under section 21A of the [Development Proposal (LCP)] and section 21B [Layout
Plan] (Act 172, 1974). Development control is the process of regulating the use of land and buildings by the local planning authority. Definition of development in Section 2 of the Town and Country Planning Act 1976 (Act 172) is defined as The carrying out of building, engineering, mining, industrial or other operations in, on, over or under land or the making of any material in the use of any buildings or other land or part of or to subdivide or amalgamate the land; and; “development” should be defined accordingly [1]. There are five (5) major local authorities in Malaysia including Putrajaya, IRDA, MPSJ, MPK and MBSA had embraced the idea. These local authorities strike a similarity which is locating at the heart of their municipalities. LCCF only take place in Selangor, Malacca and Johor but not Malaysia as a whole. Rapid urbanisation in these areas and access of information are believed as the driver of these municipalities to join the LCCF.

3. LCCF Checklist
There is no literature discussing LCCF strategy formulation and implementation in other local authority which rapidly urbanising such as Negeri Sembilan and Pulau Pinang or in the Malaysia East states. There is also the recurrence of the report by Submitting Person (SP) on the misunderstanding of LCCF checklist criteria in the planning permission stage. Internally some planning department officers within local authority argue the checklist is not effective. External stakeholder namely planning consultant and developer representative issued the same problems. LCCF Checklist as a tool for planning permission in development control. It depends on the LCCF Criteria. The approach is City Based (mitigating all the criteria as stated within the LCCF) and One System (mitigating one criteria or not all the criterias in the LCCF). The four elements of LCCF are further categorised into 13 performance criteria and 35 sub-criteria, each of which provides specific intents towards carbon reduction targets. The criteria as listed in Table 1 below:

| 4 Element          | Indicator                                    | 13 Performance Criteria | 35 Sub Criteria |
|--------------------|----------------------------------------------|--------------------------|-----------------|
| Urban Environment  | Site Selection                                | 3                        | 14              |
| (UE)               | Urban Form                                    |                          |                 |
|                    | Urban Greenery & Environmental Quality        |                          |                 |
| Urban Transportation| Reduction Use of Private Motorised Transport  | 6                        | 11              |
| (UT)               | on Urban Road Network                         |                          |                 |
|                    | Increase in Public Transport                  |                          |                 |
|                    | Mode Shift from Private to Public Transport   |                          |                 |
|                    | and Non-Motorised Transport                  |                          |                 |
|                    | Use of Low Carbon Transport                  |                          |                 |
|                    | Improvement to Level of Service of Road Links|                          |                 |
|                    | and Junctions                                |                          |                 |
|                    | Utilisation of Transit-Oriented-Development  |                          |                 |
|                    | (TOD) Approach                               |                          |                 |
| Urban Infrastructure| Infrastructure Provision                      | 4                        | 10              |
| (UI)               | Waste                                        |                          |                 |
|                    | Energy                                       |                          |                 |
|                    | Water                                        |                          |                 |
| Building (B)       | Sustainable Energy Management                 | 2                        | 5               |
|                    | Low Carbon Buildings                          |                          |                 |

Source: KeTTHA (2011)

4. Research Methodology
The selected case study area is the Subang Jaya Municipal Council. It is consisting of five (5) zones, namely Subang Jaya, Kinrara, Puchong, Seri Kembangan and Putra Permai. However, this research is only focusing on Subang Jaya, Sunway, Putra Heights, USJ and Puchong. The study will apply an
exploratory research design (non-experimental research design) to achieve the research aim and objectives. Research methods that are applied in this research are qualitative and quantitative approaches. A quantitative data in this study will be collected in the first stage by using the structured questionnaire to identify the emphasized data on local authority and stakeholders, namely developer, consultant, and technical agencies which related with One Stop Centre (OSC) meeting. Respondents for the questionnaire survey which be selected by using stratified sampling. Qualitative data collection is for the interview with town planning officers in local authority and other stakeholders, i.e. developers and consultants. The quantitative data will be analysed with the system using Statistical Packaging for Social Science (SPSS version 16). The descriptive analysis will be used because it can explore the stakeholders’ attention and willingness to implement the LCCF Checklist. This research is going to explore 4 elements of LCCF Checklist, i.e. the stakeholders’ willingness and perception, effort, knowledge and pro-active attitude in implementing LCCF or Low Carbon Cities. Cross-tabulation and correlation tests will be used to further analyse the factors and relationship of the variables. This research is focused to study the criteria and readiness of LCCF implementation by stakeholder and to investigate the achievement of LCCF of the aspects of Economy, Social and Environment.

**Figure 1. Conceptual Framework: Relationship Between Variables**

- **Local Authority**
  - Readiness/Willingness (Provide capacity building, attitude)
  - Time (Process/improve process chart)

- **Developer**
  - Cost
  - Benefit

- **Consultant**
  - Time

- **Technical Agencies & OSC**
  - Participate

- **Economy**
  - Cost save money for example using the bicycle lane, bus as public transport
  - Benefit to resident using the

- **Social**
  - Behavior, Social interaction
  - Healthy

- **Environment**
  - Reduce carbon footprint
  - Green Infrastructure-bicycle lane

- **Low Carbon Cities Framework**

- **Implementation**

- **Achievement**

- **Sustainable Development**
5. Conclusion
In conclusion, this article had reviewed the existing phenomena for the implementation of LCCF in development control. It is compelled that challenges and issues exist in multifaceted of policy implementation of LCCF in Malaysia. Therefore, it is in need of extensive research in this particular matter. Local authority plays a major role of manifesting LCCF in newly develop the project but few challenges must be the highlight. First, LCCF criteria must be studied and detailed to ease the understanding and implementation of local authority and stakeholder of the construction industry. The recurring reports by the practising planner in the participating local authorities and stakeholders of the industry must be heard and look into. This is common in environmental solution by bringing every major stakeholder on board which local authority is the moderator.

Acknowledgements
The authors would like to thank Universiti Teknologi MARA (UiTM) for the support and partly funding the study and publication through the LESTARI research grant [(600-IRMI/MYRA 5/3/LESTARI (K) (237/2017)]. The authors are also thankful to all the departments, organisations, and individual who had contributed to this study.

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