



Research article

# Proposing and Optimizing Indicators for Myanmar Sustainability Assessment

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## Abstract

Around the world, there are various assessment systems/ tools developed to evaluate the performance of development on their reflections on sustainability. Most of the developed countries established their own system; consequently, developing countries are also trying to establish their own system in order to promote the movements of sustainability for the future. Myanmar, one of the developing countries, has also some commitments on persuading sustainability nevertheless there are no developed system and/ or local organizations to appreciate their performances. Therefore, this research intends to appreciate and assist for sustainability assessment in Myanmar both for neighborhood and city level as for the future benefits. The study firstly discusses the framework for Myanmar sustainability assessment by the integration of experiences on the effectiveness of selected tools, empirical aspects of Myanmar case studies and sustainable principles. By using the adapting matrix, the indicators are collected; identified; and selected that would be suit for Myanmar concurrent development. Integrating the extensive sustainable principles and suggested set of indicators, the research shows that the way of indicator selection and conduct optimum indicator selection to suit current Myanmar context both for the neighborhood level and city level. The results would be bring the benefits to Myanmar on their way to sustainability as well to planners, practitioners and scholars to continuously evaluate and monitor on the burgeoning development. **Copyright ©AJESTR, all rights reserved.**



**Keywords:** Sustainability Assessment, Myanmar, Developing Country, Indicator Selection, Sustainable Development, Neighborhood Development, Urban Planning.

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## 1. Introduction

To align the movements of the sustainability, there are so many assessment tools developed in a worldwide to assess the performances of their given developments. Most of the developed countries developed their own the sustainability assessment tools/ systems which become well known internationally; some developing countries are adopted those developed tools to use in their countries as well. In later 21<sup>st</sup> Century, some of the developing countries also developed their own system to suit their countries society, economic and environmental issues for example Malaysia [1].

Among developing countries, Myanmar, located in south-east Asia, is naturally vulnerable to various types of natural disasters by its geographical and geological nature. The country has been subjected to frequent natural disasters in many forms, tropical storms, floods, earthquake, land slide, tsunami and particularly cyclonic storms [2]. Recently, major disasters have included the 2004 tsunami, the 2005 landslides in the mountainous region, cyclone Mala in 2006, cyclone Nargis in 2008 and country wide flood in 2015 and 2016 recently [3]. The low-lying areas are particularly vulnerable, thus placing the population, infrastructure, agriculture, livestock and economic development in a high risk situation. On the other hand, there is no system developing for the practices of neighborhood level and city level sustainability assessment through surveying current development from Myanmar. According to the SHWE previous investigations, when the multi developments from Myanmar are evaluated by the developed countries assessment tools, there is evidence that no assessment tool is perfect and suit to use for assessing sustainability in Myanmar [4].

To address the gap of sustainable development in developing countries, this study conducted to initiate the sustainability assessment in Myanmar. The specific aims and objectives are 1) to introduce the framework for Myanmar sustainability assessment, to provide the optimizing indicators selection 2) for Myanmar neighborhood development and 3) for Myanmar city development. For urban developments, this research is intended to focus not only on the neighborhood level development but also city level development because these all developments have linkage within same urban area. There is impossible to focus only on the some blocks within the city or generally on the city to walk the way of sustainability.

## 2. Previous Investigations

According to the previous several investigations by SHWE, the results reveal that the failures of the sustainability in developing countries are not only relied on their weakness but also lacks of the assessment tool's fulfillment on their duties. Firstly, SHWE examined the three neighborhood sustainability assessment tools and practices in Myanmar neighborhood development [4], [5] and [6]; BREEAM Communities from UK, CASBEE-UD from Japan, and LEED-ND from USA are selected because of their widely and increasingly recognitions as exemplary tools among scholars and practitioners. For the city level, CASBEE-City from Japan is the only developed tool which is investigated and used in evaluating the selected Myanmar secondary city [7]. Some of the outstanding evidences from the research are:



## **2.1 Evaluating the Degree of Incorporation of Sustainability Dimensions**

As known, all the assessment tools have different approaches in their descriptions of sustainability. By using various indicators and different benchmarks, they also made contributions a wide range of sustainability criteria in their assessment framework. Nevertheless, there is a lack of balance between three important pillars of sustainability in most of the tools. More attention has been paid to environmental issues and then averagely followed by society issues with the least target of economy. The further inclusion of the indicators in the systems can strengthen the economic and social dimension of sustainability.

## **2.2 Investigating Tools with Five Core Characteristics**

There are numerous researchers from various disciplines pointed out several frameworks to evaluate and examine the ability of assessment tool. Later, it becomes the facilitators of the tool characteristics to fulfill their duties for monitoring the development. Here, the five core characteristics, which are integrated among dimensions, forward looking for the future, distributional, procedural equity and context-specific, have been gathered and investigated their fulfillment. The methodology applied in this study can be used to investigate the other assessment tools as well.

## **2.3 Highlighting the Effectiveness of Tools**

The research show that the assessment tools are not entirely fulfilled the characteristics of assessment tool. Among them, only BEREAM-Communities perform good effectiveness while the other two tools perform fair enough to be assessment tool. The three tools are similar in the sense that they have all utilized a set of themes and indicators for assessing the sustainability of the proposed developments.

One of the major problems is regarding to the context-specific issues because of the wide variations within developments and countries. All the indicators should be adjusted to apply the mandatory, optional and additional option. To be cited, for the consideration and conservation of water environment especially in CASBEE-UD, it is not possible and practical to create water body in every development thus this should be consider as additional credit. There is some impacts are missed out like as heritage impact consideration that is the most critical issue on development of heritages blossom city. The study also mainly finds out that the important of benchmark level in persuading of sustainability certification. Because of the benchmark and the weighting coefficient are strongly depending on the system' region of origin, the tool cannot reflect for those specific local contexts even though some sustainable practices have been performed in Myanmar case studies.

The final one is public participation in development planning and also in tool developing. From the initial state of the planning to the final one, if the assessment tool demands the public opinion, that would be grate benefits. For developing assessment tool, if the public could be cooperated in what some way, it would be also an effective way for enhancing the awareness of the local residents regarding sustainability.

## **2.4 Practices in Developing Country**

The research can successfully fill the gap of lack of sustainability assessment practices in developing countries using developed countries assessment tools. Here, the practices offer not only targeting on the developments but also focusing on the assessment tools as well. Several results can attempt the strength, weakness, success and failures both of the assessment tools and case studies.



## 2.5 Highlighting Success and Failures of Myanmar Sustainability

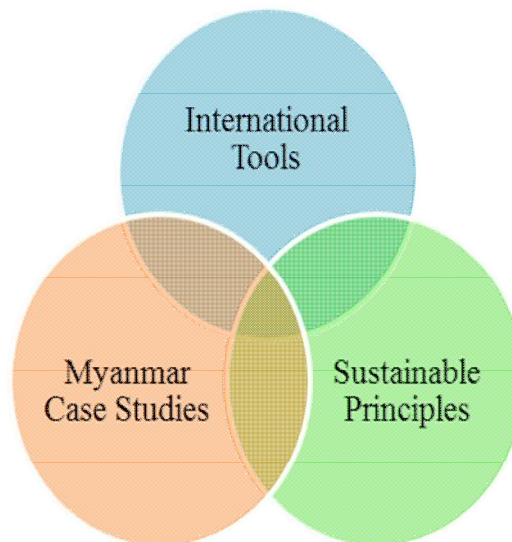
Myanmar case studies can be successfully persuaded sustainability in most of the issue of social performances. The significant failures are physical infrastructure, environmental management and monitoring as a result of the poverty. Even though there have some commitments on persuading sustainability, it is still poor and failed to earn high sustainability certification according to lack of background law, regulations, guidelines and standards. To line on the sustainability path of way, it is critically important in developing country to classify zoning, set related guidelines and ordinances following by law enforcement activities.

## 2.6 Major Challenges of Tools in Myanmar

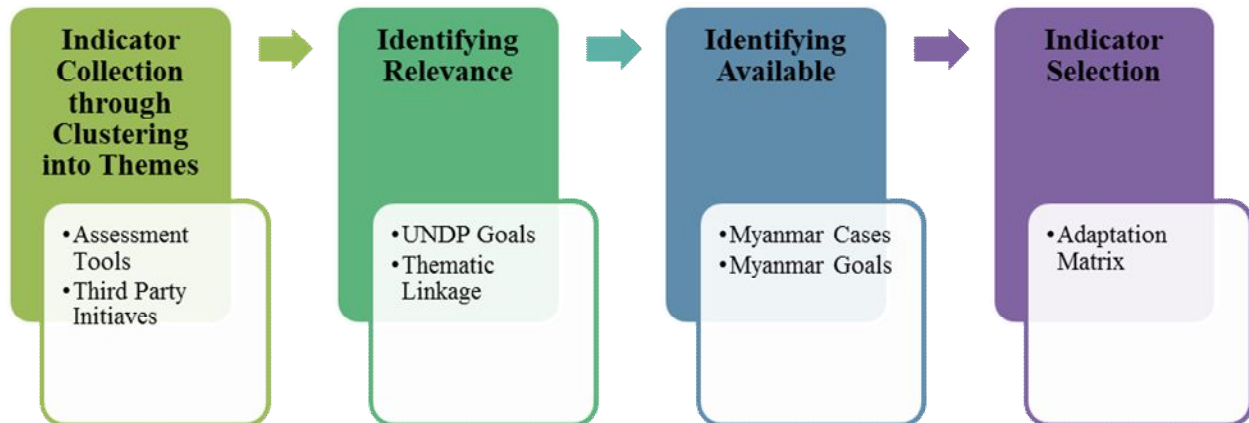
The analysis revealed that there is no perfect tool with which to assess neighborhood development in developing countries by presenting different and opposite evaluation results for specific developments. As of BREEAM-Communities, it is too good to use in Myanmar because each single indicator of the tool is bounded with multiple criteria that make the challenges to earn high score. Mainly in CASBEE-UD, it has the most challenges because of the calculation are bounded to the context of the system's region of origin while some important indicators are missed out. In LEED-ND, their weighted mandatory indicators made the assessment absolutely failed. For city development, CASBEE-City has a little potential to use in Myanmar through the major modification on their indicators and benchmarks.

## 3. Materials and Method

There are many indicators already used in assessment tools and developed by multi organizations. To suit for Myanmar concurrent development, the appropriate indicators need to be optimized from those of massive indicators. Myanmar sustainability assessment framework is proposed by the integration of experiences on the effectiveness of selected tools, empirical aspects of Myanmar case studies and sustainable principles as shown in Fig. 1. For adaptation of those indicators, this research includes the four main contents to target for optimizing of suitable indicators for Myanmar. Fig. 2 shows the four main contents and the step by step research flow.



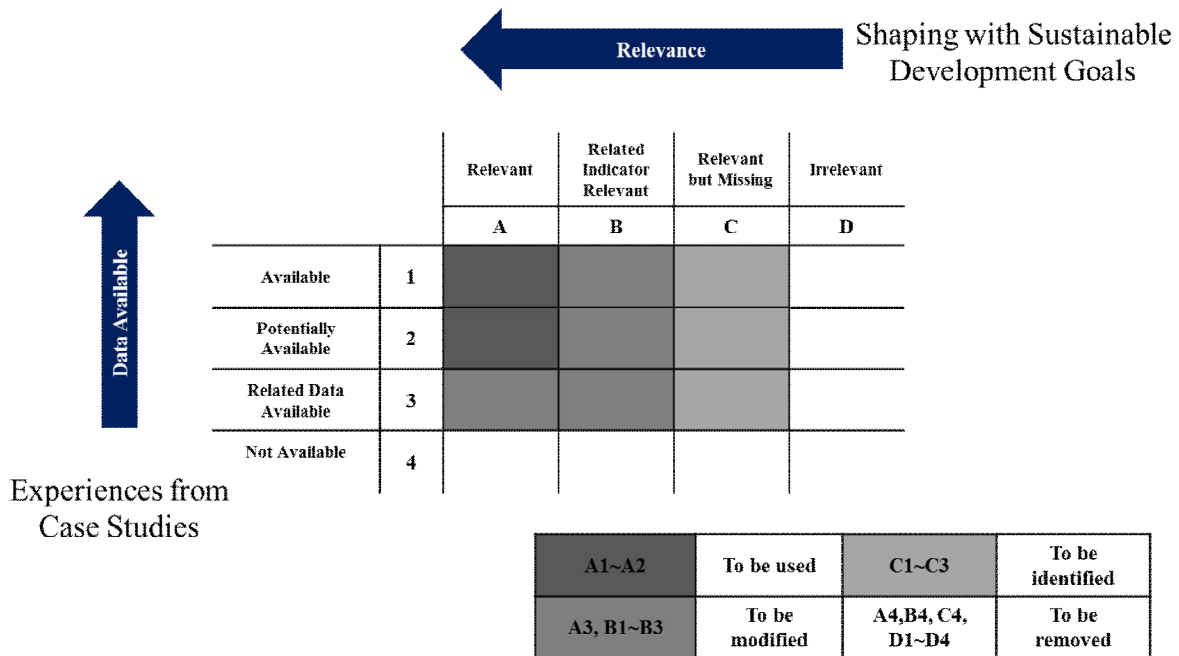
**Figure 1: Key Foundations and Approach for Sustainability Assessment in Myanmar.**



**Figure 2: Flow of Research Contents.**

Firstly, to reduce the massive amount of indicators, the collection compiled from three main sources; goals for national sustainable development strategy of Myanmar, indicators used in selected assessment tools and indicators suggested by third party organizations. To suit the guidelines of United Nations [8], these three main sources are selected in order to be primarily national in scope, relevant to assessing sustainable development progress and broad in coverage of third party initiatives. These sources will be varied according to the different development levels. Those of indicators are categorized into different themes set in framework for Myanmar sustainability assessment. Based on the United Nations suggestions of the guidelines and methodologies [8] for adaptation of sustainable development indicators, the adaptation matrix for indicator selection is applied as shown in Fig. 3 which also consists of another three main research contents.

The simple matrix mainly consists of two dimensions which are data availability and relevance in order to check the suitability and the needs for adjustment. As for first dimension and second research content, data required for the specific indicators are investigated based on the experiences of the selected case studies compiled with information from a variety of institutions and government agencies, census data, data derived from major surveys and so on. Each indicator is classified into four categories of data availability as shown in Fig. 3. The first category, fully available, is apparently the preferred one. The second one, indicators with potentially available data, contains those cases where data could be made available within a reasonable timeframe and with reasonable costs. The third category contains those indicators where important data are missing, but there are data that could be used to compute related indicators.



**Figure 3: Adaptation Matrix for Indicator Selection.**

Relevance is the third research content and second dimension of the adaptation matrix. Here again, all collected indicator are classified into four categories of relevance: relevant, related indicator relevant, relevant but missing, and irrelevant. Most indicators should be relevant and fall into the first category. The second category covers indicators that are not themselves directly relevant for the purpose, but are closely related to relevant indicators. The third category encompasses relevant issues but which are also missing to cover enough. Indicators for these issues would have to be taken from other available indicator sets. The last category, irrelevant indicator, would contain indicators covering issues that are not meaningful in context.

Finally, the indicator selection can be made by the results of adaptation matrix. The indicators which laying in the plots A1 and A2 can be incorporated and used without any changes. The plots A3, B1 to B3 are for those indicators that have to be modified, either because there exist related and more relevant or specific indicators or because data for the original indicator cannot be made available. The indicators within plots C1 to C3 need to be identified and then for the rest are confirmed to be removed. This would be leading the indicators limited in number but remaining open-ended and adaptable to future needs.

## 4. Results and Discussion

Based on the inventory of different tools for assessing sustainability, firstly, the general framework is presented and then delves deeper into selection of appropriate indicators to assess sustainability in Myanmar.

### 4.1 Framework for Myanmar Sustainability Assessment

Grounded to the implications of the assessment tools from previous investigations by SHWE from Reference [4] to [7], the conceptual framework for Myanmar sustainability assessment is presented in Fig. 4 with the aims of persuading and initiating the sustainability relative practices for a better future.



**Figure 3: Conceptual Framework for Sustainability Assessment in Myanmar.**

Since it is the foremost practices and assessment system development in Myanmar, it should be very simple and clear to understand and to evaluate by user and decisions-makers. Even though the goal is modest, there should be integrated with the sustainable dimensions and well coverage. The most important issue is to be able for context-specificity and adaptation in local development that will also lead to fulfill the ultimate goal of this new assessment system for Myanmar. For later improvements in urban development and easy for modification, the system should be integrated future issue with forward looking. Finally, this must be applicability in Myanmar at once by means of very basic researchers' practices.

Fig. 5 presents the key characteristics for sustainability assessment in Myanmar mostly are adopted from the inventory of the assessment practices from previous analyses. For easy application, the overall structure should be composed with optional indicators and additional indicators under different themes like as BREEAM and LEED despite from mandatory indicators. To be better approach from the urban planning point of view, the different themes are proposed for various development levels as shown in Table 1.

**Table 1: Different Themes for Various Development Levels.**

Sr. No.	Themes for Neighborhood Development	Themes for City Development
1	Building	Economy
2	Community/ Society	Education
3	Environment/ Ecology	Energy
4	Economic	Environment
5	Infrastructure	Government
6	Innovation	Health



7	Institution and Management	Society
8	Neighborhood Pattern and Design	Transportation
9	Resources and Energy	Urban Planning and Infrastructure
10	Site and Location	
11	Transportation	

The descriptions of each indicator should be simple and composed with minimum information, facts and figures like as CASBEE indicator. The very important factor is the benchmark selection; it must be adapted from local cases for easy adaptation. Similarly, the system scoring and weighting should be given the primary to meet local needs. For easy understanding, the overall calculations and scores should be based on a hundred score with simple summarizing and straight forward operation. Finally, the presentation of results should be easy to understand with clear graphic presentation.



**Figure 5: Key Characteristics for Sustainability Assessment in Myanmar.**

## 4.2 Indicators Selection for Neighborhood Development

### 4.2.1 Indicator Collection through Clustering into Themes

For the neighborhood development, the outstanding sources collected here are BREEAM Communities [9], CASBEE- UD [10] and LEED- ND [11]. Table 2 presents the different numbers of indicator accounted from three main sources through clustering into eleven different themes.





**Table 2: Different Numbers of Indicator Accounted from Three Main Sources.**

		<b>BREEAM Communities Indicators</b>	<b>CASBEE- UD Indicators</b>	<b>LEED- ND Indicators</b>	<b>Total</b>
<b>1</b>	<b>Building</b>	2	3	4	9
<b>2</b>	<b>Community/ Society</b>	4	7	5	16
<b>3</b>	<b>Environment/ Ecology</b>	8	13	6	27
<b>4</b>	<b>Economic</b>	3	2	2	7
<b>5</b>	<b>Infrastructure</b>	6	8	12	26
<b>6</b>	<b>Innovation</b>	1	-	2	3
<b>7</b>	<b>Institution and Management</b>	4	5	1	10
<b>8</b>	<b>Neighborhood Pattern and Design</b>	6	8	8	22
<b>9</b>	<b>Resources and Energy</b>	3	5	8	16
<b>10</b>	<b>Site and Location</b>	1	1	4	6
<b>11</b>	<b>Transportation</b>	3	1	3	7
	<b>Total</b>	41	53	55	<b>149</b>

#### 4.2.2 Identifying Indicator Relevance

There are totally 149 indicators collected from three main sources under eleven different themes. The scores are given one per each accounted in three main sources, linkage under eleven themes, incorporated with three sustainable dimensions and Myanmar sustainable development goals [12]. The relevance indicators for neighborhood development are identified by the scoring method as shown in Fig. 6. When the similar indicators with some goals are combined, the numbers of relevance indicators are reduced and then prepared to fill into the adaptation matrix as in Table 3.

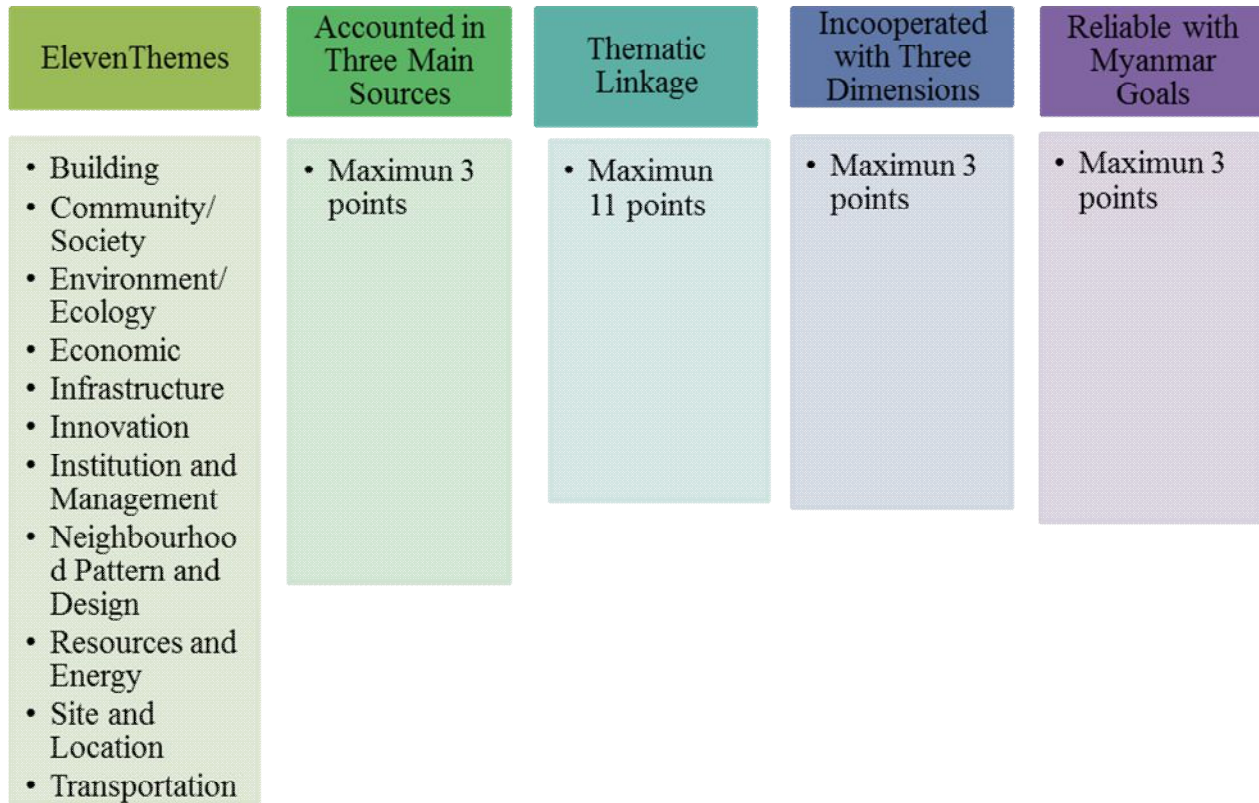


Figure 6: Calculation of Relevance Indicator Identifying for Neighbourhood Development.

Table 3: Relevance Indicators for Neighborhood Development.

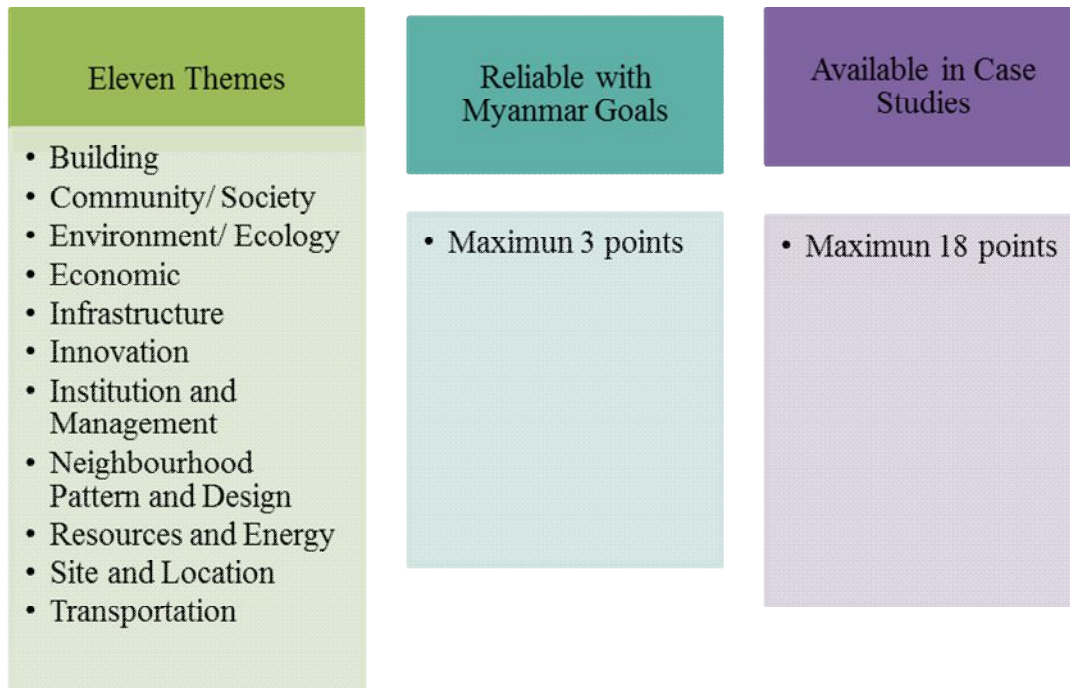
Identification	Column in Adaptation Matrix	Numbers of Indicator
Relevant	A	16
Related Indicator Relevant	B	13
Relevant but Missing	C	18
Irrelevant	D	10

#### 4.2.3 Identifying Indicator Available

To calculate and identify the available indicators in Myanmar, the scores are given one per each accounted in Myanmar sustainable development goals [12] and assessment practices in three major cities. The available indicators for neighborhood development are identified by the scoring method as shown in Fig. 7. Although the



indicators are similar, the benchmarks are different. Therefore, the total numbers of available indicators are remained the same and then prepared to fill into the adaptation matrix as in Table 4.



**Figure 7: Calculation of Available Indicator Identifying for Neighbourhood Development.**

**Table 4: Available Indicators for Neighborhood Development.**

Identification	Row in Adaptation Matrix	Numbers of Indicator
Available	1	9
Potential Available	2	31
Related Data Available	3	60
Not Available	4	49

#### 4.2.4 Indicator Selection

Finally, the indicators of neighborhood development for Myanmar sustainability assessment can be selected by the results of the adaptation matrix in Table 5. To be optimum, the twenty indicators within A1~A2 plots are selected to be used in this system. And then, 35 indicators from A3, B1~B3 plots need to be modified to adjust the available data in locality. Table 6 presents the selected indicators categorized under various themes.



**Table 5: Results of Indicator Adaptation Matrix for Neighborhood Development.**

Identifications	Plots	Numbers of Indicator
To be used	A1~A2	14
To be modified	A3, B1~B3	16
To be identified	C1~C3	11
To be removed	A4, B4, C4, D1~D4	19

**Table 6: Selected Indicators for Myanmar Sustainability Assessment for Neighborhood Development.**

Themes		Indicators	To be used	To be modified
1	Building	Sustainable Buildings		1
		Heat Island Reduction		1
2	Community/ Society	Convenience	1	
		Distance to Medical, Health/ Welfare Facilities	1	
		Distance to Education Facilities	1	
		Distance to Cultural Facilities	1	
		Access to Civic and Public Space within the project	1	
		Access to Recreation Facilities	1	
3	Environment/ Ecology	Disaster Prevention Vacant Space and Evacuation Route	1	
		Light Pollution Reduction		1
		Consideration for regional (Plant local species)	1	
4	Economic	Labor and Skills	1	
5	Infrastructure	Safe and Appealing Streets and Pedestrian	1	
		Connected and Open Community	1	1
		Rainwater Harvesting		1
		Water Strategy		1
		Reduction of Sewage Discharge Amount		1



6	Innovation	Innovation		1
7	Institution and Management	Consultation and Engagement		1
8	Neighborhood Pattern and Design	Compact Development	1	
		Diversity of Housing (Housing types and Affordability)		1
		Local Parking		1
		Local Vernacular Design	1	
		Solar Orientation		1
9	Resources and Energy	Energy Strategy (Reduction of CO2 Emission)		1
		Preservation of Natural Resources		1
		Low Impact Materials		1
10	Site and Location	Land Use (Existing Site Investigation)		1
		Preferred Locations (High Priority Redevelopment Area) (Connectivity)		1
11	Transportation	Access to Public Transport	1	

### 4.3 Indicators Selection for City Development

#### 4.3.1 Indicator Collection through Clustering into Themes

For the whole city development, the outstanding sources collected here are CASBEE-City 2011 version [13], CASBEE-City 2012 version [14], commission for sustainable development (CSD) [8] and ISO sustainable development of communities [15]. Table 7 presents the different numbers of indicator accounted from four main sources through clustering into nine different themes.

**Table 7: Different Numbers of Indicator Accounted from Four Main Sources.**

		CASBEE-City (2011)- Indicators	CASBEE-City (2012)- Indicators	CSD- Indicators	ISO- Indicators	Total
1	<b>Economy</b>	5	3	26	11	45
2	<b>Education</b>	1	1	5	7	14
3	<b>Energy</b>	-	-	3	7	10



4	<b>Environment</b>	6	5	11	8	30
5	<b>Government</b>	-	-	2	6	8
6	<b>Health</b>	1	1	10	7	19
7	<b>Society</b>	10	7	2	14	33
8	<b>Transportation</b>	2	1	3	9	15
9	<b>Urban Planning and Infrastructure</b>	5	4	34	31	74
	<b>Total</b>	30	22	96	100	<b>248</b>

#### 4.3.2 Identifying Indicator Relevance

There are totally 248 indicators collected from four main sources under nine different themes. The scores are given one per each accounted in four main sources, linkage under nine themes, reliable with UNDP sustainable development goals [16] and Myanmar sustainable development goals [12]. The relevance indicators for city development are identified by the scoring method as shown in Fig. 8. When the similar indicators with some goals are combined, the numbers of relevance indicators are reduced and then prepared to fill into the adaptation matrix as in Table 8.

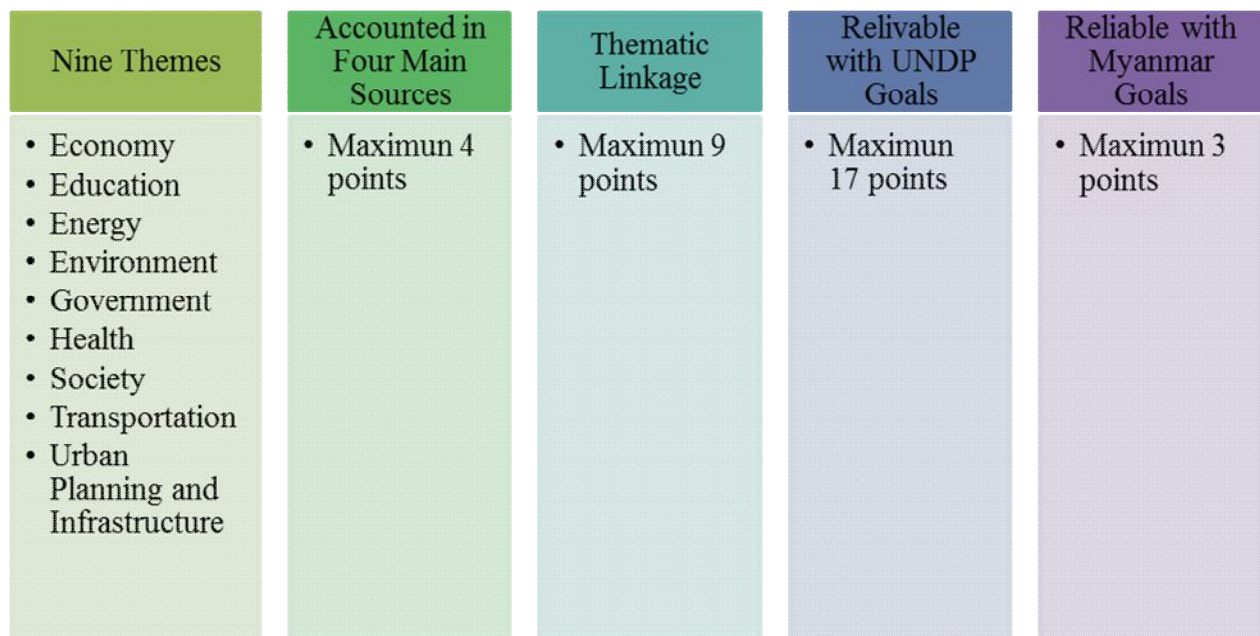


Figure 8: Calculation of Relevance Indicator Identifying for City Development.

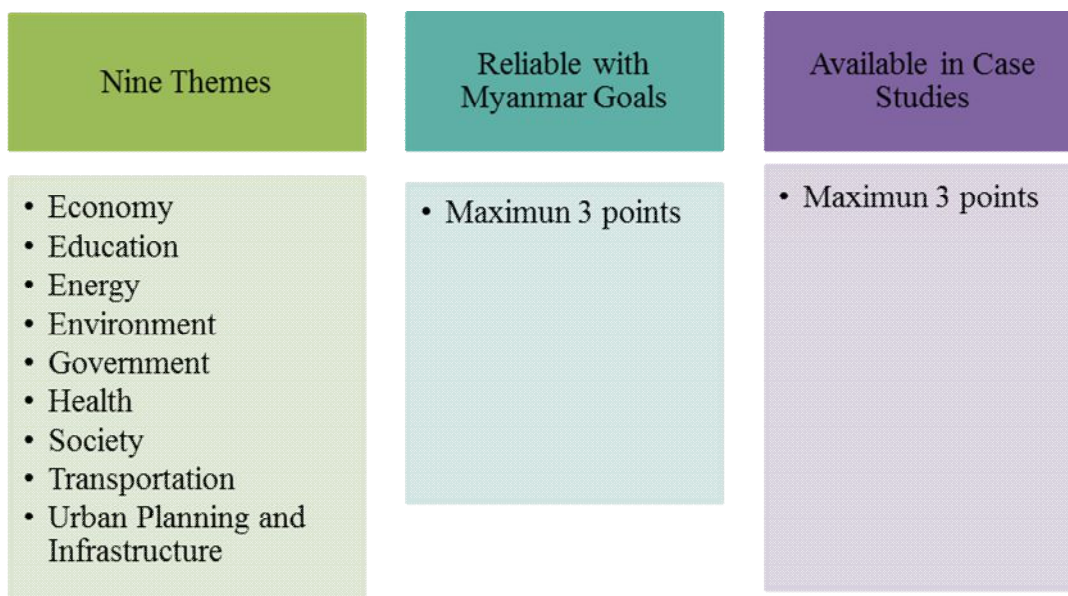


**Table 8: Relevance Indicators for City Development.**

Identification	Column in Adaptation Matrix	Numbers of Indicator
Relevant	A	30
Related Indicator Relevant	B	49
Relevant but Missing	C	82
Irrelevant	D	31

#### 4.3.3 Identifying Indicator Available

To calculate and identify the available indicators in Myanmar, the scores are given one per each accounted in Myanmar sustainable development goals [12] and assessment practices in Patheingyi city. The available indicators for city development are identified by the scoring method as shown in Fig. 9. When the similar indicators with some goals are combined, the numbers of available indicators are reduced and then prepared to fill into the adaptation matrix as in Table 9.



**Figure 9: Calculation of Available Indicator Identifying for City Development.**

**Table 9: Available Indicators for City Development.**

Identification	Row in Adaptation Matrix	Numbers of Indicator
Available	1	27
Potential Available	2	34



<b>Related Data Available</b>	3	<b>52</b>
<b>Not Available</b>	4	<b>79</b>

#### 4.3.4 Indicator Selection

Finally, the indicators for Myanmar sustainability assessment can be selected by the results of the adaptation matrix in Table 10. To be optimum, the twenty indicators within A1~A2 plots are selected to be used in this system. And then, 35 indicators from A3, B1~B3 plots need to be modified to adjust the available data in locality. Table 11 presents the selected indicators categorized under various themes.

**Table 10: Results of Indicator Adaptation Matrix for City Development.**

<b>Identifications</b>	<b>Plots</b>	<b>Numbers of Indicator</b>
<b>To be used</b>	A1~A2	<b>20</b>
<b>To be modified</b>	A3, B1~B3	<b>35</b>
<b>To be identified</b>	C1~C3	<b>50</b>
<b>To be removed</b>	A4, B4, C4, D1~D4	<b>87</b>

**Table 11: Selected Indicators for Myanmar Sustainability Assessment for City Development.**

<b>Themes</b>		<b>Indicators</b>	<b>To be used</b>	<b>To be modified</b>
1	Economy	Gross domestic product (GDP) per capita	1	
		Net Official Development Assistance (ODA) given or received as a percentage of GNI		1
		Proportion of population living below national poverty line	1	
		Employment-population ratio	1	
		Percentage of persons in full-time employment		1
		Share of women in wage employment in the non-agricultural sector		1
		Internet users per 100 population	1	
		Number of cell phone connections per 100 000 population		1
		Number of landline phone connections per 100 000 population		1
2	Education	Adequacy of education services		1
		Percentage of female school-aged population enrolled in schools		1





		Net enrolment rate in primary education		1
		Percentage of students completing secondary education: survival rate		1
3	Energy	Total electrical energy use per capita (kWh/year)	1	
		Percentage of city population with authorized electrical service		1
		Share of renewable energy sources in total energy use	1	
4	Environment	Ambient concentration of air pollutants in urban areas		1
		Water		1
		Noise pollution		1
		Carbon dioxide emissions		1
		Proportion of terrestrial area protected, total and by ecological region		1
		Area of selected key ecosystems		1
5	Governance	Projects and policies for improvement of the environment and biodiversity		1
		Efforts and policies for vitalizing society		1
		Citizens' representation: number of local officials elected to office per 100 000 population		1
6	Health	Adequacy of medical services	1	
		Number of in-patient hospital beds per 100 000 population	1	
		Number of physicians per 100 000 population		1
		Under age five mortality per 1 000 live births		1
		Average life expectancy		1
7	Society	Adequacy of child care services		1
		Crime Prevention	1	
		Disaster Preparedness	1	
		Number of natural disaster related deaths per 100 000 population		1
8	Transportation	Traffic Safety		1
		Efficiency of public transportation		1
9	Urban Planning and	Green area (hectares) per 100 000 population	1	
		Annual number of trees planted per 100 000 population	1	
		Arable and permanent cropland area		1



	Proportion of land area covered by forests	1	
	Percent of forest trees damaged by defoliation	1	
	Area of forest under sustainable forest management	1	
	Proportion of fish stocks within safe biological limits	1	
	Proportion of marine area protected		1
	Area of coral reef ecosystems and percentage live cover		1
	Jobs/housing ratio	1	
	Areal size of informal settlements as a percentage of city area	1	
	Proportion of urban population living in slums	1	
	Number of homeless per 100 000 population		1
	Share of households without electricity or other modern energy services		1
	Percentage of city population with potable water supply service	1	
	Percentage of city population with sustainable access to an improved water source		1
	Total domestic water consumption per capita (litres/day)		1
	Proportion of total water resources used		1
	Proportion of population using an improved sanitation facility		1

#### 4.4 Readjustment in Myanmar Case Studies

This final section intends to test and evidence that the selected indicators are well suit enough in Myanmar urban development sustainability assessment. To be limited in number, the indicators are already selected which can be used directly in Myanmar case and also the indicators need to be modified in addition. Benchmarks are also adopted from Myanmar cases based on the experiences on assessment practices in previous sections. The rank can be assumed that can be given four ranks; POOR, FAIR, GOOD, and EXCELLENT.

##### 4.4.1 Evaluation of Neighborhood Development

The selected three Myanmar neighborhood developments performed different ranking under three assessment tools. Although they have commitments in persuading sustainability, some assessment tools totally ignored their performances. They have diversity characteristics but they can actually reflect well in evaluation by Myanmar Sustainability Assessment. As the evidence as in Table 12, the selected indicators are suitable to be used in Myanmar Sustainability Assessment.



**Table 6.12: Comparison of Myanmar Cases' Rank at Neighborhood Level.**

Myanmar Cases	By International Sustainable Assessment Tools [4]			Myanmar Sustainability Assessment
	BREEAM Communities	CASBEE-UD	LEED-ND	By Selected Indicators
GC	PASS	VERY GOOD	CERTIFIED	GOOD
MM	PASS	FAIRLY POOR	-	GOOD
MKT	UNCLASSIFIED	GOOD	-	GOOD

#### 4.4.2 Evaluation of City Development

The selected Myanmar city, Pathein city also performed different ranking under different versions of assessment tool. By the evaluation of selected indicators of Myanmar Sustainability Assessment, the city performs as FAIR in sustainability while the ranks by assessment tool seem very different. As for situating in one of the developing countries, Pathein city could not be label as very good in their sustainability because of many challenges and issues. The rank earned by Myanmar Sustainability Assessment is evidence that the selected indicators are suitable to be used in Myanmar Sustainability Assessment as in Table 13.

**Table 13: Comparison of Myanmar Case' Rank at City Level.**

Myanmar Case	By International Sustainable Assessment Tools [7]		Myanmar Sustainability Assessment
	CASBEE-City 2012 Version	CASBEE-City 2012 Version	By Selected Indicators
Pathein City	POOR	VERY GOOD	FAIR

## 5. Conclusion

To be summarized, the several results bring the benefits 1) for helping the assessment tools' diffusion in developing countries, 2) the way forward for Myanmar sustainability path, and 3) initiation the sustainability assessment in Myanmar. Essentially, to develop the sustainability assessment tool for Myanmar, it should be cooperation within academia, government and practitioners with highly participation of public vision. This is not possible for time, fund and human resource limitations of dissertation study. Therefore, this research intended to initiate the sustainability assessment in Myanmar and guide the framework with suitable indicators selection. Consequently, the results also pave the way for developing Myanmar sustainability assessment in the future. The results would be bring the benefits to Myanmar on their way to sustainability as well to planners, practitioners and scholars to continuously evaluate and monitor on the burgeoning development.



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