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Framework of Sustainability Assessment (FSA) method for manufacturing industry in Malaysia

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Abstract. In recent years, our planet faced massive social, environmental and economic challenges. Moreover, Environmental Democracy Index (EDI) published that Malaysia has been ranked as the second worst environmental democracy among 70 countries in May 2015. This is due to lack of participation in sustainability compliance and less awareness on sustainability by Malaysia's business partners. By combating and achieving these, the Sustainable Development Goals (SDGs) defines global priorities and inspirations through Agenda 2030 that recognize by United Nation. This paper attempts to propose Framework Sustainability Assessment (FSA) to assess sustainability for the various sector in Malaysia. This framework will give an overview to reduce the noise from wide data collection to a single element. Lastly, it will integrate the current performance with the linkage of the SDGs and the sustainability elements by dividing into three phase which is baselining, clustering and correlation. Now it is time for business to take action especially every sector or industry in Malaysia and it will improve the awareness and enhance Environmental Democracy Index to a better rank in future.

1. Introduction

All sectors have significantly contributed towards strengthening the economy of many countries especially in Malaysia. From Gross Domestic Product (GDP), economy performances in Malaysia are depending on five main sectors which are services, manufacturing, agriculture, construction and mining & quarrying but exclude on import duties [1]. The various industry creates job opportunities, alleviates poverty and improves healthcare as well as education especially in rural areas [2]. In fact, based on the previous statistics from Department of Statistic Malaysia (2017), Malaysia's economy remained its uptrend momentum since second quarter of 2016 up to now [3].

From early 1990s, sustainability assessment has gradually become a new important appraisal method for supporting decision making and policy in a broad of sustainability elements in many sectors all over the world. The first serious discussions and analyses of Sustainability emerged during 1983 at new World Commission on Environment and Development (WCED)[4][5] by Norwegian prime minister Gro Harlem Brundtland. In the report titled "Our Common Future", sustainable development is define as, "…the development that meets the needs of the presents without compromising the ability of future generations to meet their own need" (WCED,1987)[6]. The persistence of this report is to provide long-term environmental strategies, to define shared perceptions of long-term environmental issues and to concern into greater co-operation among developing countries and between countries at different stages of economic and social development that interrelationship between people, resources, environment and

development [7]. After recent year, sustainability always be a hot debatable issue over the world, constantly being discussed in huge number of professional and growing realization among leading scientists, the public and politicians. Thus, it is growing concern about the long-term future in many industries in Malaysia.

Although sustainability is drastically developed since 1987 all over the world up until now but from World Resources Institute (WRI) with the Access Initiative, Malaysia has been ranked as the second worst environmental democracy among 70 countries in Environmental Democracy Index (EDI) evaluation. Therefore, government, business and civil society together with United Nation have started to mobilize efforts to achieve the sustainable development agenda by 2030 in every country. The agenda calls for universal and inclusive action by all countries to improve the lives of people everywhere [8]. In 2015, countries adopted the 2030 Agenda for sustainable Development and its 17 Sustainable Development Goal (SDG). On 1 January 2016, the 17 goals of the agenda 2030 agenda for sustainable development officially came into force. These goals universally apply to all and demand countries to mobilize efforts to end all forms of poverty fight inequalities and tackle climate change and ensuring no one left behind the process. By growing the SDGs, it is an opportunity for business-led solutions and technologies to be developed and implemented to address the world's biggest sustainable development challenges. The SDGs will help to connect business strategies with global priorities especially to industry in Malaysia.

Since every company in Malaysia was registered under Bursa Malaysia, it is compulsory for them to return the sustainability reporting of their business to Bursa Malaysia [9]. A key of Bursa Malaysia's success today is by advocating their business with sustainability concept. Sustainability is a holistic approach to business management, incorporating economic, environmental, social, and governance considerations. Thus, it can support business continuity and long-term value for stakeholders and society at large. From Stubbs et al. [10], they measured the performance of sustainability at Malaysia. The majority companies in Malaysia which 77% is aware about the sustainability but only 40% embed a sustainability concept on their overall project or business. Thai et al. with their research on companies that are listed in Bursa Malaysia review that predicting the business can help corporation or investors in prudent decision-making either in terms of financial, management and others [11].

To remain competitive among other countries around the world, Malaysia was prioritized and escalates the number of key growth alternative to the support policy. Thus, the Economic Transformation Programme (ETP) was announced in Tenth Malaysia Plan or "*Rancangan Malaysia Ke-10*" (RMK 10) that focus on twelve National Key Economic Area (NKEAs) such in healthcare, greater Kuala Lumpur/Klang Valley, wholesale, financial services, education, palm oil & gas, business services, communication, content & infrastructure, oil & gas (energy), agriculture, tourism and electrical & electronics [12]. Therefore, this paper propose a framework of sustainability assessment in Malaysia's Industry by linking the SDGs and sustainability elements. As a result, develop a sustainability assessment's framework and tool to indicate the level of sustainability compliances with current world development using baselining, clustering and correlation method. At the same time, to promote sustainability practice as the effort have been made by Department of Statistic Malaysia specifically to Malaysia's Industry.

2. Methodology

The development of Sustainability Assessment Framework is to quantify the current sustainability performance industries in Malaysia. This methodology based on the real data from the survey by considering any related criteria that assume to improve the framework of Sustainability Assessment. Thus, it will presenting the best sustainability concept for industry in Malaysia. The Framework of Sustainability Assessment (FSA) will amend to the performance of sustainability business in Malaysia's Industry. Table 1 below, show the general framework of Sustainability Assessment.

Table 1. Proposed Framework of Sustainability Assessment (FSA) in Malaysia's Industry.

Phase	Tool	Purpose	Deliverables
Baselining	Survey	• Collecting the respondent information	Variety of respondent from different sector
Clustering	Ward's algorithm agglomerative and Pairwise linkage ration	• Minimize the variance data collection • Fit the hierarchical clustering model due to the data collection from survey	Form a single element in data respondent for correlate to the policy
Correlation	SDG Compass	To link the data respondent to the business action and policy.	Epistemology the current practice to an existing Malaysia's policies.

2.1. Baselining phase

In this proposed framework, the baselining is the initial phase of the entire framework. This study made use of a survey research based on the quantitative approach using industries exist in Malaysia. The population in the baselining phase was referring to Gross Domestic Product (GDP) which is using random sampling technique for collecting population with different sectors in Malaysia. Based on the previous researcher, the good practice in conducting survey will give the best result in related case study. Therefore, there are three elements should be considered in this survey such descriptive research, analytical studies and evaluation research. From that three elements it can make the survey on track by giving the estimation on specific parameters in the targeted population and to describe the association. In addition, the illumination for a specific problem will be solved through focused data and the effect of one set of variable can be analysed. Lastly, the data collection will ascertain the effects of a planned change onward [13].

In the baselining phase it will more focus on constructing a survey. The survey's questions consist of three parts: (1) the demographic or respondent background, (2) the employees, attitude or concern about the organizational effort with the current practice of the company, and (3) the employees' attitude or opinion about the situation that related to the GPM and the SDGs. For part 1, there are several industries in Malaysia that recognized by Department of Statistic Malaysia in Gross Domestic Product (GDP). Baselining phase is to obtain as much as possible the feedback answers from the survey by targeted population of respondents. The structure of surveys made by concerning the objectives and the related factor of the study. In addition, there are several question touch on the linkage of the SDGs with elements in the Green Project Management (GPM) P5 Standard for sustainability. These linkage are based on a more detailed analysis available on the SDG Compass [14] and all twelve elements in Green Project Management (P5) were map to the 17 SDGs. The performance was measured by providing several situations that related to those linkages.

The outcome of this phase is to identify the awareness level of respondent about sustainability according to various sector in Malaysia. Since random sampling are chosen while conducting this survey. Thus, the random sampling allows the results to be generalize to the larger population and statistical analysis will be perform if appropriate [13] and to make reduce the noise. A clustering phase will be prepared in the next sub section.

2.2. Clustering

After baselining process which is data collection phase, an analysis of data should be done for the complete study. The data analysis has to identify the homogenous groups of respondent based on the deliverables from agglomerative hierarchical cluster analysis and pairwise linkage ration. This analysis, generally will reduce the dimensions' number of variables and minimize the multi collinearity effects by determine the distance between the sets. The distance between a pair of clusters or set is equal to how much will the error sum of square (ESS) increase by merging them in grouping process identifying. This step will use pair wise linkage ration. Lastly, the significant test is applied to check the fit goodness of the model by delivered the variances value[15]. The hierarchy within the final cluster has the properties as follow:

   i.   Clusters generated in early stages are nested in those generated at later stages.
  ii.   Clusters with different sizes in the tree can be valuable for discovery.

2.2.1. Ward's algorithm agglomerative

This is a tool for clustering method by using variance by determine the distance between set of cluster. The ward error sum of square hierarchical clustering method has been very widely used since 1963 on its publication by Ward [16]. There are some process involve in Agglomerative Ward's hierarchical clustering as in figure 1 below:
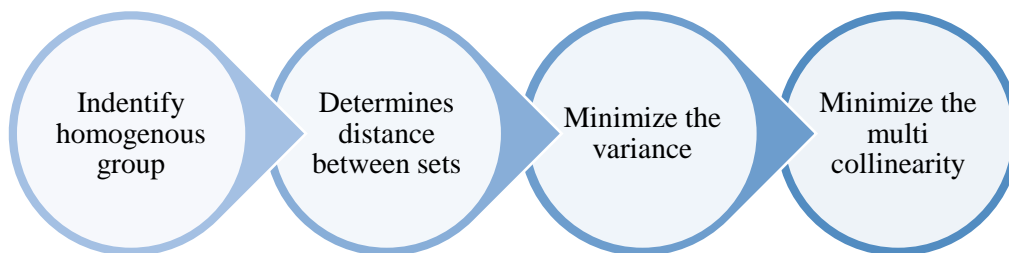

Figure 1. Process involves in Agglomerative Ward's hierarchical clustering phase

    Lastly, there are some processes by performing the clustering method. Figure 2 below show the flow chart on performing a single element from the data respondent as the current practice that can be incorporate with the existing policy:
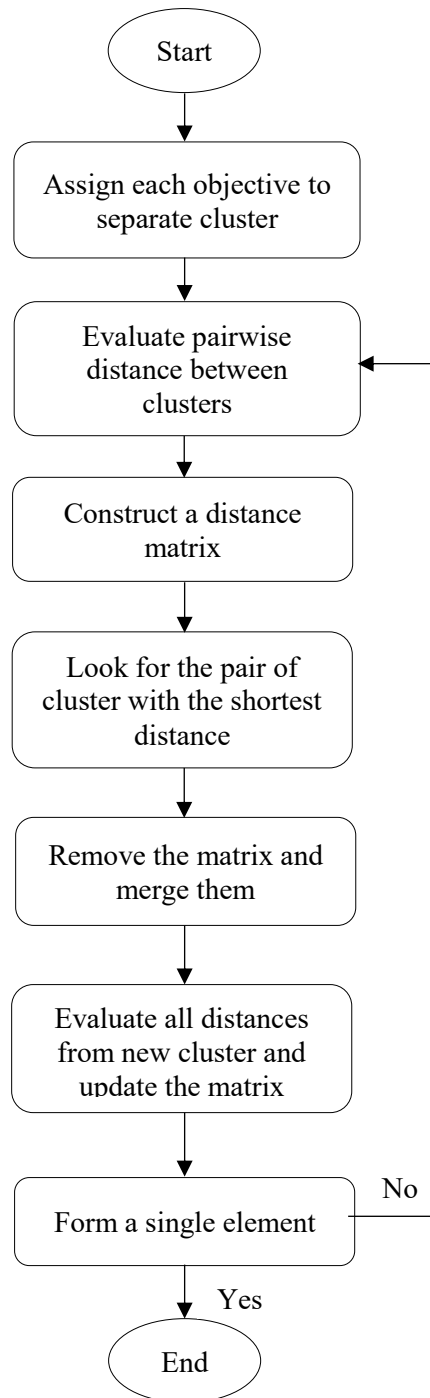
Figure 2. Flow chart for the clustering method.

2.3. Correlation

Since, a single element from data respondent is collected, the correlation process between that element with the Sustainable Development goals (SDG) and Sustainability element are determined. From SDG Compass, it will guide business especially industry in Malaysia on how to align their business strategies as well as measure and manage their contribution to the sustainable development goals.

There are five steps of SDG Compass rest on the recognition of the responsibility of all companies to comply with all relevant legislation, respect international minimum standards and address as a priority all negative human rights impacts. From this correlation, it will guide an industry to organize their business and evaluate their own level in sustainability with comply the policy indirectly. Figure 3 shows the 5 steps that can be apply to set or align their course, depending on their current level of ensuring that sustainability is an outcome of core business strategy.
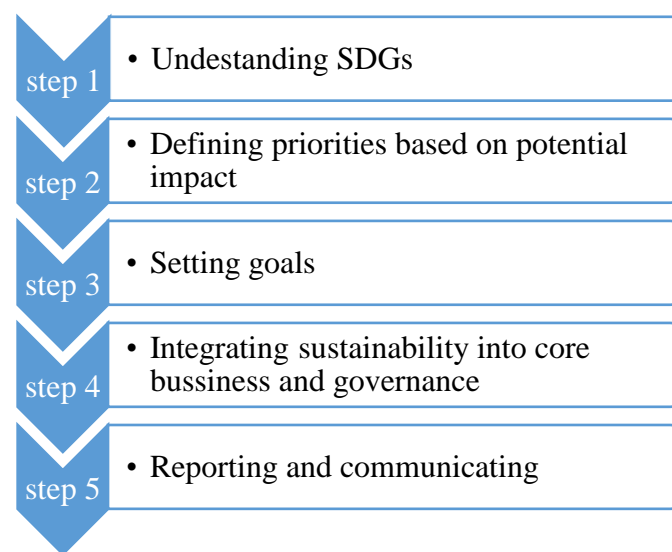
step 1	• Undestanding SDGs
step 2	• Defining priorities based on potential impact
step 3	• Setting goals
step 4	• Integrating sustainability into core bussiness and governance
step 5	• Reporting and communicating

Figure 3. Steps that assist bussiness contribute to the SDGs.

Lastly, the baselining, clustering and correlation phases in this Framework of Sustainability Assessment (FSA) will be as a catalyst on sustainability practice in Malaysia's industry. It is also recommended for the document to be made as a strategic tool in business. Therefore, it has high priority with respect to the business objectives of the company and the policies in Malaysia to be integrate by referring this framework.

3.   Conclusion

In order to encourage the sustainability practices for every sector in Malaysia, incentives and reward should be awarded to the rightful party who practices sustainability. Since, government is an important role in solving sustainable development challenges. The awareness and the enforcement of the rules and laws must be abided by the end user which are all sector that contribute to the destruction of environment, economic and society directly or indirectly. But, at the same time they are an agent to uptrend the momentum in Malaysia's economic. Because of that, the best initiative should be proposed to avoid terrible causes and effects in future but will enhance a good benefit to the country and also the future generations.

This paper proposes the framework of sustainability assessment (FSA) to the Malaysia Industry by integrating the current level of sustainability to the linkage between SDGs and the sustainability elements. A questionnaire survey is conducted to collect a data to be analysed. Three factor are investigated; Factor (1) the working area, job designation and the working sector, Factor (2) current level of awareness on sustainability, and Factor (3) their perception on the sustainability according to

the attitudinal theory. It was found that since the framework on sustainability assessment is developed, the correlation between the current business practice and the existing policies are not aligned together. Therefore, there are several phase to correlate the current practice in different sector in Malaysia to the sustainable development goal and sustainability element such as baselining, clustering and correlating phases. The integration between them were based on the business core value, the current policy in Malaysia and the world demand.

As the recommendation for the future study, the indexes for every sector would be generated by focusing the sampling population in every sector in Malaysia. In addition, the indexes will give a number that will be measured and compared to the current business practice due to the sustainability development practice. Subsequently, an improvement of the business especially industry's performances in Malaysia are growing up and able to compete with other developed countries.

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