The Feasibility Study on Clean Development Mechanism (CDM) in Malaysia

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***Abstract*— The Clean Development Mechanism require the Annex 1 countries to assist Non Annex 1 countries in achieving sustainable development in addition to its function as an emission reduction compliance mechanism for the Annex 1 country parties. Malaysian industries has familiarise with the clean development mechanism and started to register in order to join the sustainable development. This study includes the statistic of Malaysia's projects registered so far, and reviewing the project design document of waste handling and disposal projects. A survey on sustainability is conducted and shows that the organizations in Malaysia are aware of sustainable development.**

Keywords*— *clean development mechanism, Kyoto protocol, carbon credit, carbon trade.

I. Introduction

As the world is rapidly urbanizing, many studies regarding reducing pollutants and harmful effects to the environment. Clean Development Mechanism (CDM) is one of the most significant effort introduced in the Kyoto Protocol by the US government. The main purposes of CDM designed are to:

i- Help to lessen climate change
ii- Assist the urbanizing countries to achieve sustainable development
iii- Assist the urban countries to achieve quantified emission limitation as well as reduction commitments [1]

The objectives of this study are including:

- To analyze and come out with a conclusion of the CDM projects status in Malaysia
- To see how far the CDM can grow in Malaysia

Clean Development Mechanism

CDM has become the main income of the UNFCCC, as it is the most acclaimed mechanism in urban countries. Furthermore, it involves technology transfer that enhances the environment through sophisticated technology. Many emission reduction projects been provided by CDM to come with Certified Emission Reductions (CERs) by generating carbon credits, each credit is equivalent to one ton of carbon dioxide. The investing urban countries receive the CERs by emission trading scheme to help the countries meet their emission target [2]. The developing countries that are hosting the project as well as the agreement of contribution to sustainable development must approve the developed countries that yearning credits from CDM project.

Malaysia became a member of UNFCCC in 1993 and voluntarily joined CDM as a developing country [5]. Since then many CDM projects are successfully registered in Malaysia [8]. This had motivated other corporate sectors in the country such as power manufacturing, waste management, forestry, oil and gas manufacturing, agriculture and transportation sectors to proactively participate in CDM projects applications [3][7]. The Malaysian industries are aware of CDM projects and the benefits it could bring to the country. It is important to know the current benchmark of the proceeding projects and to put a predictive on how much it can be carried out in Malaysian ongoing issues and market demand.

Carbon Trade

Carbon trade is a transaction that transfers carbon credits between two parties under the Kyoto Protocol [1]. It is an exchange of credits between nations designed to reduce emissions of carbon dioxide [9]. The buyer pays the seller cash in exchange for carbon credits, thereby allowing the purchaser to emit more carbon dioxide into the atmosphere [2]. The standards for this agreements are outlined by the International Emissions Trading Association. The carbon trade allows countries that have higher carbon emissions to purchase the right to release more carbon dioxide into the atmosphere from countries that have lower carbon emissions.

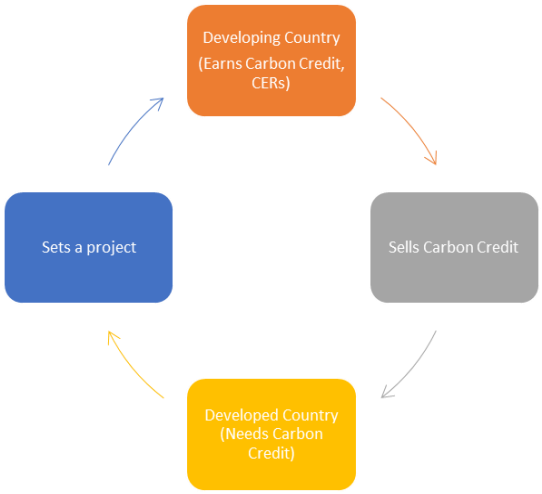

Figure 1: The idea of carbon trade cycle.

Types of Projects under CDM listed in the UNFCCC

Malaysia has been extensively active in these CDM activities, having registered total of 203 CDM projects until the year 2013. Through participation in the CDM, Malaysia has benefited from the GHG emission reduction projects thus leads towards the improvement of environment in general [7], parallel with its national sustainable development goals [2].

The UNFCCC has categorized CDM projects into several sectoral scopes below;

Sector 1: Energy Industries (renewable/non-renewable sources)
Sector 2: Energy Distribution
Sector 3: Energy Demand
Sector 4: Manufacturing Industries
Sector 5: Chemical Industries
Sector 6: Construction
Sector 7: Transportation
Sector 8: Mining/ Mineral Production
Sector 9: Metal Production

Sector 10: Fugitive Emissions from Fuels (solid, oil and gas)
Sector 11: Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride
Sector 12: Solvent Use
Sector 13: Waste Handling and Disposal
Sector 14: Afforestation and Reforestation
Sector 15: Agriculture

II. METHODOLOGY

As a starting data collection plan and preparation of this thesis, it is appropriate to consider to take only the CDM projects which had been registered by the executive board [10]. The goal is to focus on fully implemented projects, or is at final stage of implementation. Therefore, a list of registered projects is identified. It is aimed to concentrate on a bigger group of projects which the content and characteristically similar, yet would be internally different in various ways at the same time regarding the conditions associated with.

The subsequent strategy was to carefully read the respective projects PDD's and validation reports, in order to identify and contact the specific companies that had been involved in the technology related aspects of the biomass projects. This also involved to address different CDM related stakeholders in the Malaysian context, which could provide this kind of information, including the relevant Annex 1 country embassies, the Malaysian DNA, consultant companies, and more. Subsequently, an initial round of telephone and email correspondence was undertaken with employees from these companies in order to attain a tentative or preliminary understanding of the companies' roles in the projects and to identify additional relevant companies.

III. RESULTS AND DISCUSSION

Strategy 1: Extraction of PDD

Number of CDM Projects in Malaysia

Analysis from figure 1 shows waste handling and disposal sector contributes the most number of CDM projects in Malaysia. This is possibly because Malaysian waste generation is over 5 million tonnes per year [6] and it involves methane reduction and recovery. The second most sector that Malaysia hosted the CDM projects is renewable and non-renewable energy industries. There are a lot more energy industries projects in Malaysia, however, only 66 projects registered with CDM.

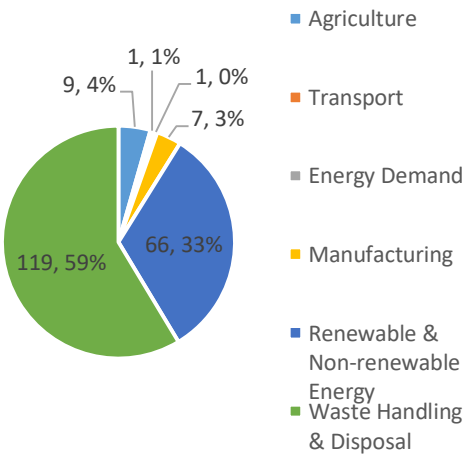

Figure 1: Numbers of CDM projects in sectoral scopes.

Malaysia should invest more in sector 1 to conduct technology and knowledge transfer along with CDM projects. This way, a significant amount of carbon dioxide reduction would be obtained and leads to sustainability. It is relatively in the same portion of the chart that sector 4 and sector 15 projects less contribute in Malaysia's CDM. While sector 3 and sector 7 have one project contributed each sector. More studies and knowledge transfer needed in these sectoral scopes in order to increase the number of projects. Other than that, these minor sectors should exhibit and educate the community about their experience and benefits they contributed to the country.

Countries of Partnership

United Kingdom of Great Britain shows an obvious highest frequency of CDM projects partnership with Malaysia as shown in figure 2. By a major number of projects, 70 of them, leads the following countries; Denmark by 38 projects, Switzerland by 34 project, Japan by 29 projects, Canada and Netherlands by 17 projects each. While other minor annex 1 countries that have partnered with Malaysia are France, Australia, Sweden and Ireland contributed technology transfer for less than 10 projects each country.

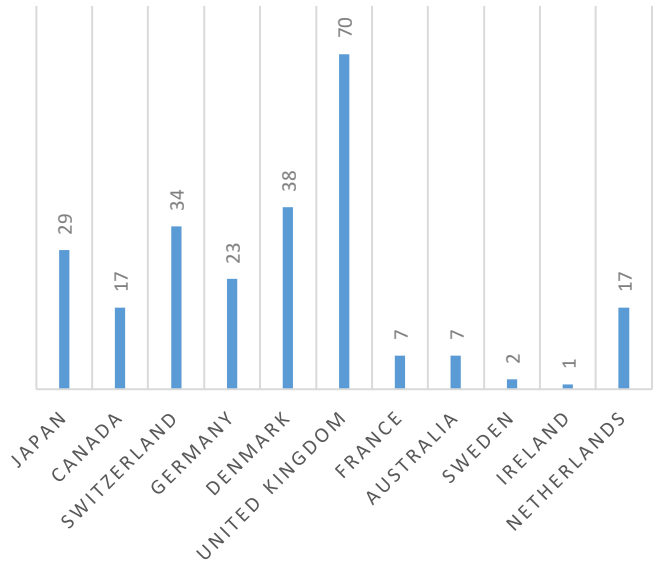

Figure 2: Number of projects according to countries of partnership.

From the top of the chart in figure 3, it shows that Netherlands partnered with Malaysia, 17 numbers in total for waste handling and disposal projects only. While Ireland contributed one project in sector 1. Sweden partnered with Malaysia for two projects; one in sector 1 and one in sector 13. France contributed the technology transfer for sector 13, 4 and 1.United Kingdom of Great Britain, the major contributor country, and Denmark partnered with Malaysia in 4 sectors; sector 13, 4, 1 and 15. Germany, Switzerland and Canada contributed to sectors 13, 1 and 15. Although Japan is not is the major contributor to the number of CDM projects in Malaysia, It contributed to all sectors available. It could be said that Malaysia has formed a bond in with all the annex 1 countries above in terms of experience, methodology and technology transfer, and it would be easier to receive more transfer of knowledge and technology to perform CDM projects in the future.

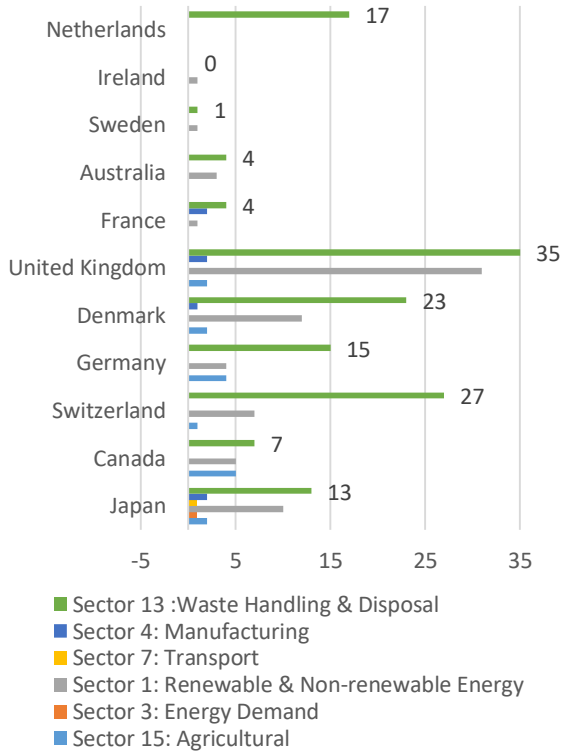

Figure 3: Number of projects in sectoral scopes according to partnership countries.

CDM Malaysia Registration Years

In figure 4, sectors 13, 4, 1 and 15 projects started the registration in Malaysia in 2006. In 2007 the only year that sector 3 registered for CDM and there is no more so far. Sector 13 stated the highest number of projects in 2009. Sector 7 registered only one project so far and that is in the year 2012. In 2013 only sectors 13 and 1 registered for CDM project and that is by far the latest projects registered by Malaysia.

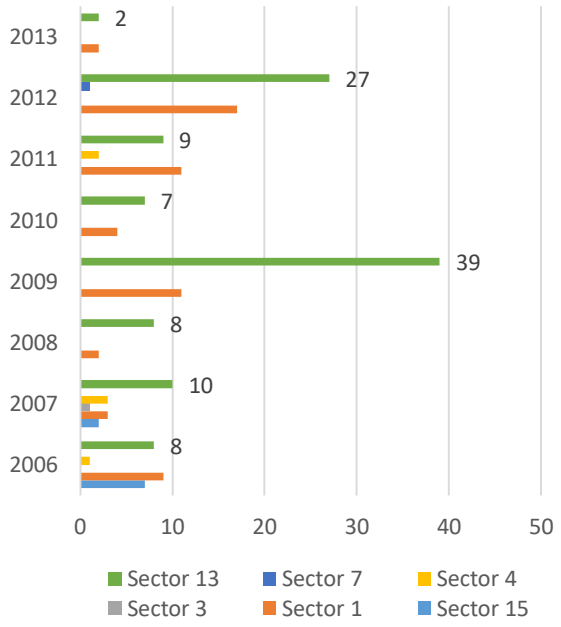

Figure 4: Number of CDM projects according to registration year.

The trend shows that the registration activity has decreased. Officially, Malaysia has stopped registering for CDM in 2013. The reason regarding this activity is unclear and further studies could be continue from this finding. However, it could be said that CDM Malaysia is inactive since then.

Sector 13 – Amount of Reduction

Since sector 13, waste handling and disposal project counted the highest number of CDM participation, further studies are carried out. The PDD data from this sector is extracted a pie chart (figure 5) is constructed to show the total amount of CO2 reduction according to the methodology used in sector 13 projects. The highest amount of reduction stated in figure 5 above is by method AMS I & AMS III with a total amount of 2,040,465 metric tonnes CO2 equivalent per annum. While the lowest CO2 reduction for sector 13 is by method AM0057 with an amount of 68,250 metric tonnes CO2 equivalent per annum.

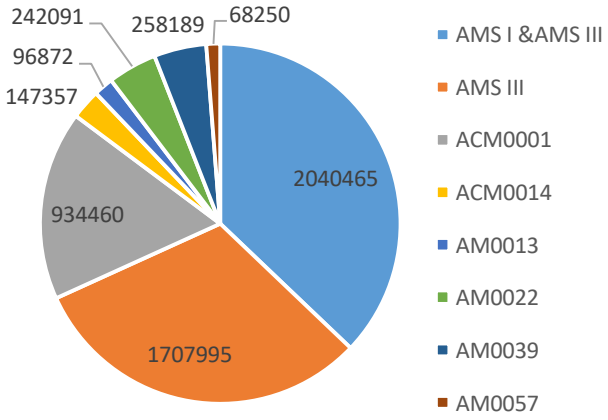

Figure 5: Amount of reduction for sector 13 projects (tonnes of CO2 equivalent per annum) according to methodology.

Sector 13 – Projects Location in Malaysia

The location of sector 13 projects across Malaysia is also recorded. Thus, it is clearer to show the percentage of projects according to the states in Malaysia in figure 6. It is a majority amount, 31% of sector 13 projects is conducted in Sabah, and 5% in Sarawak which located in Northern Borneo. In peninsular Malaysia Perak and Pahang leads the number of sector 13 projects followed by Johor, Selangor and Negeri Sembilan. Other states of Malaysia locate the other balance amount of projects. However, there is no sector 13 project conducted in Perlis.

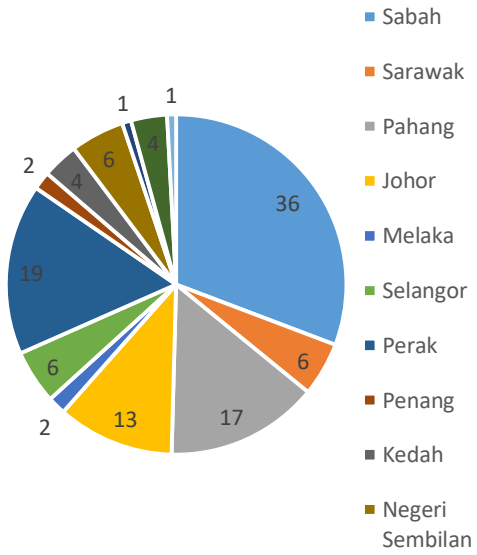

Figure 6: Number and location of sector 13 projects in Malaysia.

Strategy 2: Questionnaires by survey

Sector 13 is chosen to conduct a further studies. A set of questionnaires is sent through email. These survey is conducted to determine how the CDM projects in Malaysia have contributed to sustainability. Below are the response from the project managers.

Figure 7 shows the trend of responses in rating the projects to provide the best sustainability. Rates: 0 (strongly agree), 10 (strongly disagree). In high amount of vote from 8 to 10, the CDM projects managers of sector 13 in Malaysia mostly agree that these projects are at the best in sustainability. This shows that Malaysia is at good place of this kind of contribution.

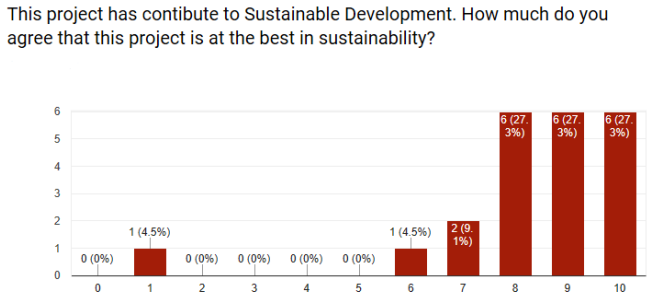

Figure 7: Response for "best in sustainability".

The managers were asked to rate the records of inventories related to sustainability. Figure 8 shows the rating trend: 1 (strongly disagree), 5 (strongly agree). The answers are varies, however, most organization agree of keeping their sustainability related inventories. This is a positive response because the inventories are one of the key knowledge for Malaysia to pursue further studies knowledge transfer in the future.

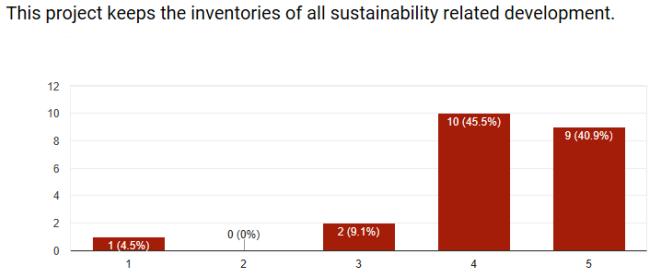

Figure 8: Response for records of sustainability inventories.

The survey received a solid response on aspect of sustainability. Total response voted on contribution in environmental aspect for sector 13 projects (figure 9). The organizers may contribute to other aspects as well, however they may have contribute the most for the environment. The following question (figure 10) is produced to identify whether there are more aspects that are qualified to discuss on. However, environmental aspect is the proudest contribution for the managers in sector 13 projects.

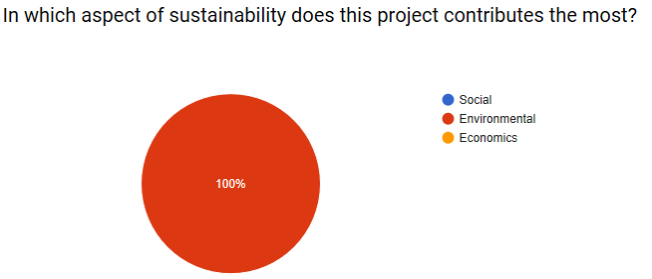

Figure 9: Response for sustainability aspects.

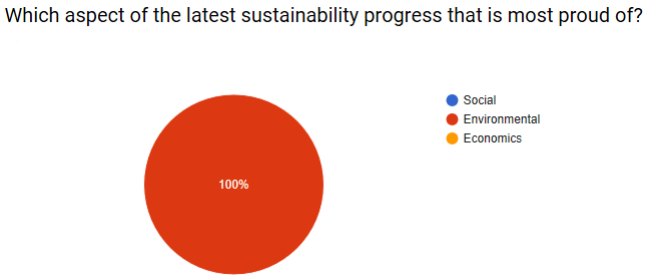

Figure 10: Response for the proudest and latest sustainability progress.

The next question is suitable for every response received earlier since it is related to environmental aspect (figure 11). Sector 13 is the waste handling and disposal projects scopes and it is asked on which environmental aspects that the organizers may have contribute the most. Sector 13 projects have majorly contribute to greenhouse gas reduction according to the response.

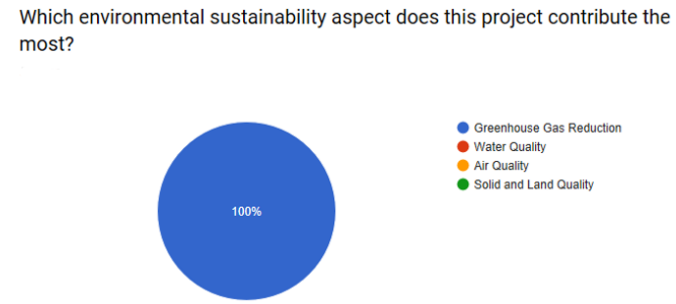

Figure 11: Response for environmental sustainability aspects.

Figure 12 shows the organizers of sector 13 projects mostly agree that Malaysia should increase and improve more projects in the sectoral scopes. Logically, sector 13 projects have a good potential in achieving the CDM objectives. Therefore Malaysia should invest more to provide researches in conducting more improvise projects.

Figure 12: Response on opinion to improve the sector 13 projects in Malaysia.

Competitions usually is the key for every organization to push forward and improvise the projects. Many projects voted that they are relatively stands forward among their competitors as shown in figure 13 (rates: 1 - far behind, 5 – far forward). It shows that these projects have achieved a very good knowledge and technology transfer.

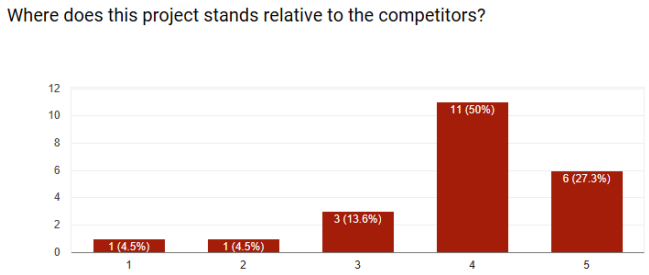

Figure 13: Response for relativity standard among competitors.

Every CDM projects are invested with an amount of budget. The following response shows the budget sufficience for sector 13 projects (figure 14, rates: 1 – insufficient, 5 – very sufficient). Majority of the respondents voted relatively to very sufficient. This shows that Malaysia may have a very good investment to conduct the CDM.

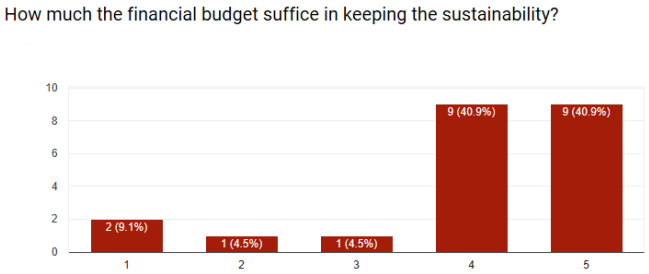

Figure 14: Response for sufficience of budget.

The survey also includes a question on how suitable the knowledge of the technology used for local research. Figure 15 shows the response received (rates: 1 – strongly dis agree, 5 – strongly agree). Majority of the respondent agree for local researchers to pursue study in the technology and knowledge transfer. There are some disagreement from the response but very little. It shows that further study is possible and encouraged in this field.

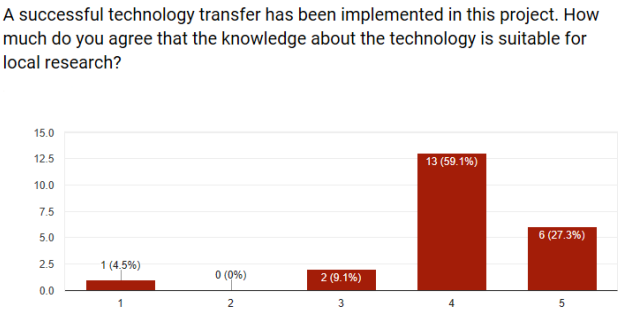

Figure 15: Response for suitability of knowledge transfer for local research.

Most projects in Malaysia would create employment opportunity to carry out a good work. However the CDM projects involve high knowledge and technology and may require high-skilled personnels. Figure 16 shows that most managers agrees with this statement (rates: 1 – strongly disagree, 5 – strongly agree). In terms of employment opportunity the CDM projects require mainly qualified technical persons to work in the field.

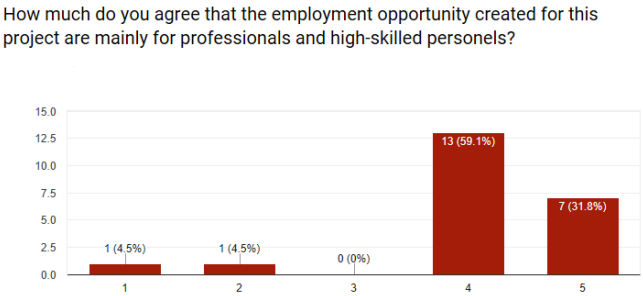

Figure 16: Response for employment opportunity created by CDM projects.

Waste handling and disposal projects must have implemented a system to reduce odor nuisance. The following question (figure 17) asked on how satisfied the surrounding community according to the number of complaints received (rates: 1 – unsatisfy, 5 – very satisfy). The project managers mostly voted satisfy to very satisfy. This shows that sector 13 projects in Malaysia is carried out in a great condition with least complaints reported.

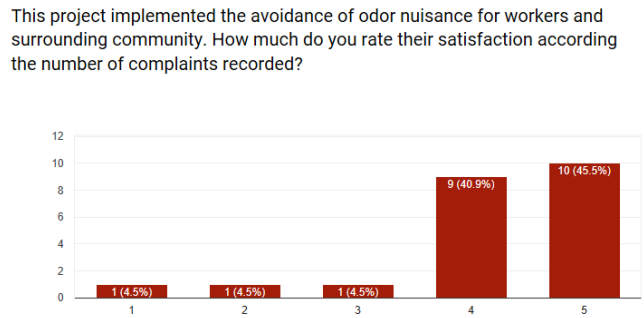

Figure 17: Response for survilliance satisfaction on odor nuisance avoidance.

It is important for employees of the organizations which proceeded CDM projects to be educated on sustainable development, also to be engaged in possible ways to bring out the best results and sustainability. The organizers rated on this issue as shown in figure 18 (rates: 1 – strongly disagree, 5 – strongly agree). High amount of votes received for agreeing that their employees are well educatated on sustainable development and very engaged in this workfield. This shows that most Malaysian employees received good training and education in CDM and sustainability matters.

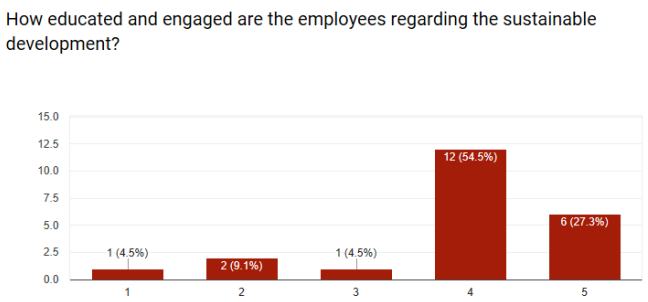

Figure 18: Response for employee education and engagement to sustainable development.

After conducting CDM projects for several years, it is expected for the employees to improve the value of work in their job scopes. Figure 19 shows the managers rating on how much their employees have increase their capability and credibility (rates: 1 – very little, 5 – very much). Most project managers have voted from much to very much improvement. This result shows that CDM projects have given benefits in employees experience and improvement on capability and credibility.

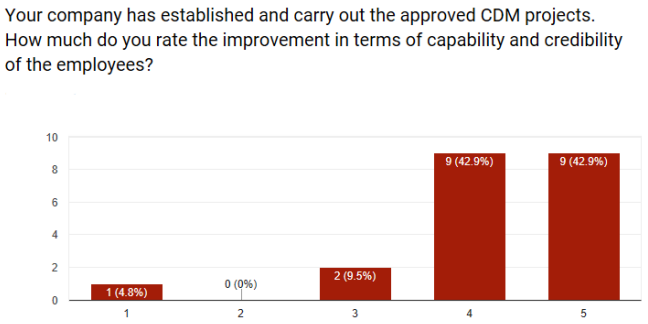

Figure 19: Response for improvement on employee capability and credibility.

The following question asked on the opinion of project managers regarding society, whether they feel the sustainability of the project has reach their expectation. Figure 20 shows the opinion from the organizers (rates: 1 – not confident, 5 – very confident). Major votes received rating they are very confident that the society expectation about the projects sustainability is at meet. It could be said the society aclaim the waste handling and disposal projects is carried out in good environmental condition.

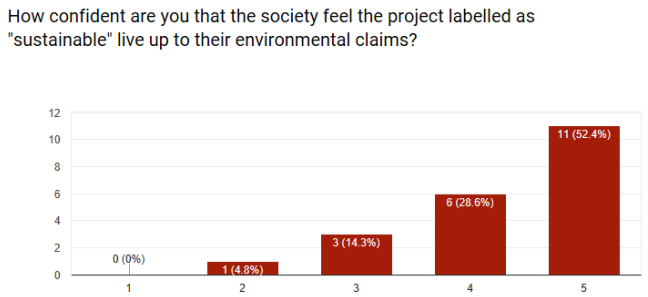

Figure 20: Response for the meet of society environmental claims.

The next question asked whether the organization have set improvement goal (figure 21). Majority have answered yes and some may have set so. These improvement goals play a crucial role for the organizers and partnership countries to perform better CDM projects. Malaysia seems to be at comfortable state to set for improvement goals and should carry out better performance projects in the future.

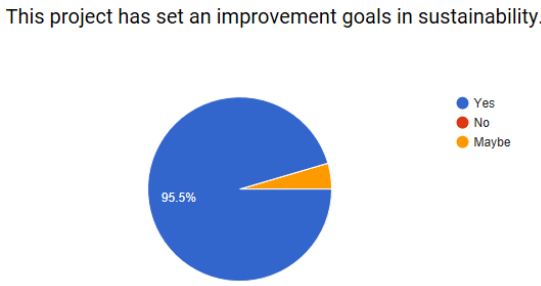

Figure 21: Response for setting an improvement goals in sustainaility.

There are several key use identified for organizations sustainability:

- Defining national policies
- Influencing national budget allocations
- Reviewing the impact of national policies
- Adressing pressure factor that leads to unsustainability
- Helping to balance economic, social and environmental pillars in policy making
- Guiding development cooperation

These factors are provided for the project managers to choose any two factors from the above and result is as shown below (figure 22). Many votes received choosing “adressing pressure factor that leads to unsustainability” and “Helping to balance economic, social and environmental pillars in policy making”. CDM organizers in Malaysia are aware of the importance of sustainability and would be as much try to maintain sustainable development.

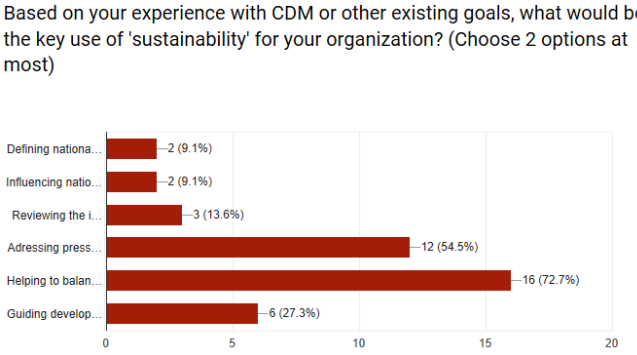

Figure 22: Response for organizations key use of sustainability.

IV. CONCLUSION

CDM only plays a role in relation to the transfer of technology and knowledge from Annex 1 countries to Malaysia in one registered and implemented CDM project in Malaysia. The transferee company have access to look over completely into fundamental aspects and principles of the technological system, and thereby accumulates technological capabilities necessary to handle implementation of the technology. There seems to be a very good feedback in terms of capability at the company level to handle implementation of landfill gas recovery and waste handling utilization systems in Malaysia. However, it can be concluded that the registration of CDM in Malaysia is inactive at the moment.

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