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Success Factors for Clean Development Mechanism Implementation in Malaysia

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Abstract

The Clean Development Mechanism (CDM), established under the Kyoto Protocol, is one of the market-based mechanisms developed to assist industrialized countries mitigate greenhouse gas (GHG) emissions, achieve emission reduction targets, and at the same time promote sustainable development in developing countries. The CDM, which provides flexibility and cost-effectiveness in meeting GHG emission reduction targets, has captured interest globally. CDM implementation is expected to generate benefits, give developing countries a sense of ownership, and share the global load in tackling global warming and climate change. However, CDM implementation faces several complications. The successful participation of developing countries in emission reduction projects presents ongoing challenges, which inhibit their drive towards sustainable development goals. Through a comprehensive review of the literature and theoretical analysis, several factors have been identified as significant to successful CDM implementation in Malaysia. These success factors, which include regulation and a legal framework, competitive advantage, green supply chain, ethical values, financial benefits, and technology transfer, are presented and the importance of each factor is discussed.

Keywords: clean development mechanism, climate change mitigation, Malaysia, success factor, sustainable development

Introduction

As the world's economies continue to develop, future energy demands are estimated to increase dramatically. By 2030, world energy demands are projected to increase by 40% over 2007 levels. Fossil fuels, the main source of energy worldwide, will account for 77% of the demand increase (IEA, 2009), and are the cause of the projected in-

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crease in anthropogenic carbon dioxide and greenhouse gases (GHGs) emissions. The emission increases, according to the Intergovernmental Panel on Climate Change (IPCC), are accountable for the rising of global average temperature, lead to climate change, which will further threaten our environment, economic growth and sustainable development (IPCC, 2007).

Since the industrial revolution, the levels of carbon dioxide in the atmosphere have grown by more than 30% as a result of fossil fuel consumption, deforestation for land use, and other man-made emissions (Labatt & White, 2007; Halady & Rao, 2010). Human activities are the main contributor to emission increases (Halady & Rao, 2010), and evidence of its link to global warming and rapid climate change now seems overwhelming. Globally, temperatures are predicted to rise in the range of 1.4 – 5.8 °C by 2100 (IPCC, 2001), which will threaten the biodiversity and ecosystem upon which our society depends. Additionally, climatic studies indicate that the worst weather-related disaster is yet to come (ADB, 2009). Hence, preventing climate change has become a strategic priority, sustainable development is now a significant concern throughout the world and sustainable development initiatives are being aggressively pursued by nations (UNDP, 2012) in an attempt to reduce the far reaching impacts of climate change.

The international body that drives sustainable development goals, the United Nations, has adopted the United Nations Framework Convention on Climate Change (UNFCCC), which addresses global warming and climate change. The objective of UNFCCC was to reduce emissions that contributed to global warming. In December 1997, the Kyoto Protocol, an international legal GHGs emissions reduction agreement came into force in 2005, was adopted to combat climate change. The major principle of Kyoto Protocol, as stated in Article 3.1, is to "protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities" (United Nations, 1992).

To achieve its objectives, the Kyoto Protocol set emission reduction targets for industrialized (Annex 1) countries, requiring them to reduce 5% of GHG emissions throughout 2008 - 2012 against their 1990 emissions level. To assist the industrialized countries to reduce GHG emissions, three market based mechanisms (Clean Development Mechanism, Joint Implementation and Emissions Trading) which provide flexibility in meeting their emission reduction targets were introduced (UNFCCC, 2007). From the three different flexible mechanisms, this paper focuses on identifying the success factors of Clean Development Mechanism implementation, which is relevant to developing countries like Malaysia.

A market-based flexible initiative, developed to mitigate GHGs (Ganapati & Liu, 2008; Olsen, 2007), the Clean Development Mechanism (CDM) has a twofold purpose: industrialized countries (Annex 1) can achieve their GHGs emission reduction targets through CDM, and at the same time promote sustainable development in developing (non-Annex 1) countries (UNFCCC, 2007). By investing and assisting in GHGs

emissions reduction projects in non-Annex 1 countries, Annex 1 countries earn CDM credits, and thus, meet their GHGs emission reduction commitments. New investments in sustainable development benefit non-Annex 1 countries, they transfer environmentally friendly technologies and knowledge, reduce of air pollution (reduce of fossil fuels combustion), improve land use through reforestation and less land degradation, and make social improvements such as new job opportunities (NRE, 2009).

Global awareness of the devastating impact of climate change due to industrialisation and economic growth has pushed sustainable development to the forefront of governmental issues. Subsequently, priorities support an increase in the distribution of CDM projects (United Nations, 2013). Malaysia, a fast developing nation and one of the substantial carbon dioxide emitter (UNDP, 2007), has been identified as an attractive country for CDM investments due to its high CDM capacity, low costs, and good investment climate (Jung, 2006). Hence, an in-depth understanding of the success factors of CDM implementation will definitely assist Malaysia in sharing the global load in tackling climate change, and improve its potential to become the promising frontrunner in CDM projects. Thus, this paper provides an overview of the CDM current status, and explores the success factors of CDM implementation in Malaysia.

Clean Development Mechanism Overview and Status

Established under the Kyoto Protocol, the principles of the CDM articulate that CDM activities should contribute to sustainable development in the host country (United Nations, 1998). Additionally, as the purpose is to mitigate climate change, the proposed CDM projects must contribute more in GHGs emissions reduction than in the absence of such projects (NRE, 2009).

Across the globe, CDM activities represent trade opportunities for developing countries to acquire the technologies of, and work with, industrialized countries. Developing countries are compensated for hosting the CDM projects that lead to GHGs emissions reduction by selling certified emission reductions (CERs), generated from CDM projects, to the industrialized countries. Therefore, participating in CDM projects seems to be a cost-effective alternative for industrialized countries to meet their emission reduction targets, as the GHGs emission reduction projects in their own countries are much more costly.

The results, as of 31 March 2013, show CDM has prompted the development of 6663 registered projects in 85 developing countries, which are expected to reduce global GHGs emissions up to 6.53 Gt CO_2 equivalent by the end of 2020 (UNFCCC, 2013). At a glance, more than half (61.6%) of these projects are large scale, but they are unevenly distributed across the regions, with the majority of projects hosted in Asia Pacific, as shown in Figure 1. China, India and Vietnam have benefited most in the Asia Pacific geographical region.

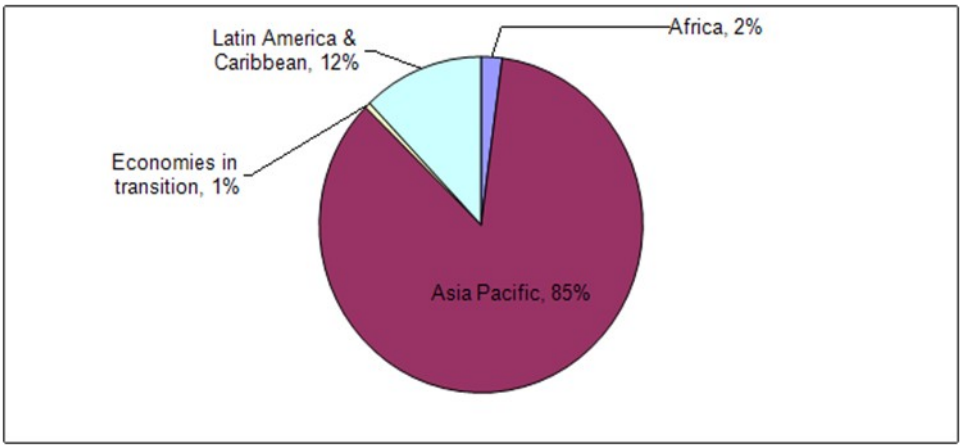

Figure 1. Global distribution of registered CDM projects
(Data as at 31 March 2013, from UNFCCC (2013))

With 85% of the registered projects, obviously, Asia dominates the CDM market, as shown in Table 1. Only two South American countries, Brazil and Mexico, manage to feature in the top ten countries with registered CDM projects. Currently, China hosts 53% of the registered CDM projects, followed by India. Interestingly, Malaysia ranks No.6, and hosts almost 2% of the registered CDM projects. From the current pipeline of CDM projects, energy projects account for nearly three-quarters of the registered projects, followed by waste handling and manufacturing, which constitute of 10.7% and 4.2% respectively (UNFCCC, 2013).

Table 1. Distribution of registered CDM projects by host countries

Country	Registered CDM Projects	Percentage
China	3518	52.8
India	1224	18.37
Brazil	273	4.1
Vietnam	236	3.54
Mexico	171	2.57
Malaysia	131	1.97
Indonesia	128	1.92
Thailand	118	1.77
Republic of Korea	86	1.29
Others	778	11.68
Total	6663	100

Data as at 31 March 2013, from UNFCCC (2013).

The Clean Development Mechanism in Malaysia

Malaysia, a rapidly developing economy, is committed to protecting biodiversity and ecological balance. It ratified the UNFCCC on 13 July, 1994, and the Kyoto Protocol on 4 September, 2002. As a developing country (non Annex 1), Malaysia has no quantitative GHG emission reduction commitments under the Kyoto Protocol. Nevertheless, Malaysia is actively dedicated to combating climate change, and has committed to cut up to 40% of its carbon emission intensity by 2020 from its 2005 levels (Najib, 2009). Through CDM, Malaysia can voluntarily participate in global GHG emission reduction projects.

To support the implementation of these goals, a fully functioning national CDM institutional framework has to be established, and the Ministry of Natural Resources and Environment (NRE) has been appointed as the designated national authority (DNA) to deal with CDM projects. In May 2002, the National Steering Committee on Climate Change (NSCCC) established a National Committee on CDM (NCCDM) and three technical committees for energy, forestry and the agriculture sector. These three technical committees are hosted by the Malaysia Energy Centre (PTM), Forest Research Institute Malaysia (FRIM), and Malaysian Agricultural Research and Development Institute (MARDI), respectively (NRE, 2009).

Malaysia's vast tracts of oil palm are highly suited for the production of biomass energy. Such projects hold the potential to produce a substantial amount of renewable energy and establish themselves as viable sources of energy production, which fit into the sustainable development projects eligible for CDM (NRE, 2009). Furthermore, biomass projects have other benefits. For instance, the sale of oil palm residues generates income; reduces dependency on fossil fuels, improves air quality, and through the renewable energy process, it increases resources and technology transfer (Boyd et al., 2009). Thus, there is significant potential for oil palm biomass energy projects and Malaysia has a great opportunity to create sustainable development through CDM implementations.

When implemented, these projects support Malaysia's capability to supply carbon credits through CDM implementations (Amran, Zainuddin & Zailani, 2012). They place Malaysia on the path towards renewable energy and energy efficiency plans, and tackle both climate change issues and economic development demand. To this end, Malaysia has already initiated a range of energy related comprehensive policies and action plans for environmental impact and sustainability (Hashim & Ho, 2011). Overall, CDM projects in Malaysia are related to renewable energy, waste management, reforestation and efficient technology, and also comply with the sustainable development objectives for energy, agriculture and forestry (NRE, 2009).

Malaysia's entrance into the CDM market began in 2006, and by December 2007, a total of 20 Malaysian-hosted CDM projects were registered with the CDM Executive Board (CDM EB) of UNFCCC (Pedersen, 2008). By February 2013, 98 energy projects were registered with the CDM EB and expected to reduce the GHG emissions by up to 6.8 million tCO_2 equivalent. Out of the 98 projects, 29 projects have already is-

sued CERs, reducing Malaysia's GHG by up to 4.1 million tCO_2 equivalent (GreenTech Malaysia, 2013).

However, Njobeni (2006) believes there is scope for improvement, as the growth in CDM projects has been slow due to the early stage of its development and a lack of knowledge in CDM, which creates confusion for most of the developing countries. Compared to China, India, Brazil and Vietnam (refer Table 1), the number of CDM projects is comparatively low in Malaysia; and recognising the vast benefits of CDM projects bring to Malaysia (NRE, 2009), CDM projects implementation should be further encouraged. Progress can be improved with better CDM knowledge, and, to achieve this, it is necessary to determine the enabling success factors of CDM implementation in Malaysia, identifying the elements that promote investment in projects to reduce GHG emissions and champion sustainable development.

Towards Stakeholders and Transaction Cost Perspectives

An understanding of the significant success factors in CDM implementation requires a theoretical-based analysis. At a glance, political economic perspectives may provide a good general explanation. But after a thorough review, stakeholder theory and transaction cost theory were chosen to characterize and develop an in-depth understanding of the significant factors in successful CDM implementation in Malaysia.

Rich in natural resources, Malaysia is experiencing remarkable economic growth despite its developing country status. Development has resulted in significant GHG emissions, especially carbon dioxide, and according to UNDP (2007), Malaysia contributes 0.6% of global carbon dioxide emissions. To address this, the success of CDM projects depends on their contribution to the national goal for sustainable development. According to TERI (2005), the factors which enable CDM implementation include strong skilled institutions and project developers, availability of data for developing baselines and development of robust, and efficient monitoring methodologies. This paper, using these factors as a basis, seeks to identify the internal and external success factors in CDM implementation in Malaysia, and conducts an analysis underpinned by stakeholder and transaction cost theories.

Stakeholder theory is useful to characterize those individuals or groups impacted by CDM projects, and Freeman (1984, p.46) defined stakeholders as ''any group or individual who can affect or is affected by the achievement of the organization's objectives''. This study characterized three major stakeholder groups; governments, competitors and suppliers. A more detailed explanation of each group follows.

Governments have been identified as one of the most important stakeholders in tackling climate change, global warming, and sustainable development (Kolk & Pinkse, 2007). Of the wide range of initiatives they can implement, new policies and incentives that focus on the utilisation of renewable energy and encourage efficient energy usage were employed recently in Malaysia, in the form of the National Green Technology Policy 2009, National Renewable Energy Policy 2010, and Renewable Energy

Business Fund (Hashim & Ho, 2011). These programs indicate the sense of urgency in the Malaysian government's approach in addressing climate change and energy use.

Climate change policies and the Kyoto Protocol's market based mechanisms (CDM) open up new markets and opportunities in which companies equipped with the necessary skills and technology can compete. But many businesses or companies do not have the experience and capabilities to cost-effectively reduce GHG emissions. This experience gap creates competitive advantages for those who are well equipped; they are able to keep ahead of other competitors. To take advantage of new opportunities, companies must be aware of the need to plan and prepare the resources and knowledge for sustainable development.

However, businesses form part of a larger economic structure underpinned by supply chains (Kolk & Pinkse, 2007). Given the impact of suppliers has grown over the years (Prahalad & Hamel, 1990), businesses, more than ever, depend on their suppliers for competitive success. The sourcing and processing of businesses inputs, the raw materials from suppliers, are increasingly taken into consideration (Handfield, Stroufe & Walton, 2005) in determining GHG emissions and effecting sustainable development.

Another area that can have a significant impact on CDM projects is transaction costs (Michaelowa & Jotzo, 2005). Transaction costs arise "when a good or a service is transferred across a technologically separable interface" (Williamson, 1981, p.1544). Hence, when products or services move from one production phase to another, transaction costs occur, and happen every time when new capabilities are involved. Transaction cost theory presumes that businesses intend to minimize the overall cost, thus, they weigh the cost of performing activities within the organization against the outsourced costs. In the context of CDM for instance, reducing GHG emissions in developing countries may involve lower costs than in an industrialized country. Hence, developed countries may want to participate in the CDM projects that reduce GHG emissions in non Annex 1 countries in exchange for emission reduction credits. In doing so, they not only achieve their emission reduction targets at a lower cost, but also contribute to sustainable development.

Success Factors in Clean Development Mechanism

Regulation and Legal Framework

Meeting legislative requirements is frequently the main driver in the adoption in ecological responsive practices (Paulraj, 2009). As such, government regulations play a key role in enabling and promoting CDM projects in Malaysia through action plans and policies. For instance, whilst there are no CDM specific laws and regulations designed to facilitate CDM activities, there are incentives such as financial assistance through favorable bank loans (Green Technology Financing Scheme, GTFS) and tax exemptions in respect of the sale of CERs with effect from 2008 until 2010 (Curnow & Hodes, 2009).

A variety of studies have investigated the different drivers of organizations that are

willing to embrace environmental management practices (EMPs) and those that are not (Bansal & Roth, 2000; Buysse & Verbeke, 2003; Prakash & Kollman, 2004; Sharma & Vredenburg, 1998). The majority identified regulatory compliance as the key motivating factor contributing in the implementation of EMPs and the most important driver of environmental strategy and practices (Bansal & Roth, 2000; Paulraj, 2009).

The commitment for organizations to obtain the ISO 14001 environmental management certification, according to Arnold and Whitford (2006), provides a systematic approach for organizations to identify and continually improve their environmental impact. And adopting ISO 14001 as a voluntary regulatory approach is appropriate where regulatory agencies do not have the resources to keep up with the changing practices used by industry. As for Malaysia, the government has embarked on a program to develop economic instruments that complement existing environmental regulatory frameworks, which are mainly related to energy, wastewater and air emissions. However, interviews with several EMP practitioners in Malaysia highlighted that the different activities undertaken by the biomass industries to reduce energy consumption and effect cost savings are not linked to regulatory framework or CDM (Jeswani et al., 2007).

Since government is a powerful stakeholder (Mitchell, Agle & Wood, 1997), regulatory and legal frameworks place an urgent requirement on businesses to set up GHG emission targets, which increases the likelihood of CDM implementation and sustainable development leading to climate change mitigation. Thus, regulation and legal framework has been identified as one of the success factors of CDM implementation.

Competitive Advantage

CDM projects provides opportunity for CERs trading and other uncountable benefits, it is very likely that the demand will increase significantly. Stakeholder perspective suggests that competitors as one of the stakeholder groups strive to increase their competitiveness over others by creating competitive advantage based on the experience, resources and capabilities that they develop and possess.

As businesses can and do adopt and implement EMPs to remain competitive in their industry (Clark, 1999), a common approach is to mimic successful environmental friendly projects or practices of the industry leaders or competitors (DiMaggio & Powell, 1983; Guler et al., 2002). As the requirement to adopt ISO 14001 environmental management systems increases, environmental friendly practices are no longer an optional practice, rather they are a competitive necessity for organizational survival (Handfield et al., 1997). Recognizing the trend, Delmas (2002) proposed an institutional perspective to analyze the adoption drivers of the ISO 14001 EMS international standard that affect costs and potential benefits, so organizations can distinguish themselves from their competitors (Sharma & Vrendenburg, 1998). Competitiveness leads to sustained competitive advantage, improving long term profitability (Paulraj, 2009).

Additionally, CDM project implementation helps organizations build corporate reputation, value and competitive advantage (Hart, 1995), and differentiate themselves from their competitors (Sharma & Vredenburg, 1998). Competitive advantage depends on an organization's ability to accumulate and manage resources that are rare, valuable and hard to duplicate (Barney, 1991). Therefore, employing CDM projects that are hard to duplicate and deliver value to the organization, provide competitive advantage in sustainable development related gains.

Green Supply Chain

Apart from legislation and competitiveness, the supply chain activities are also related to the success factors of CDM implementation and affect an organization's total environmental impact (Hart, 1995; Handfield et al., 1997). A study by Handfield et al. (2005) showed that in order to reduce the environmental risks passed on through the supply chains, they determine and support the supplier's environmental capabilities and performance.

As one of the stakeholder groups, suppliers play a significant role to green their supply activities (Rao & Holt, 2005). It is found that reduced environmental impact of inbound activities was linked to reduced impact of outbound activities, which leads to improved competitiveness. Carter, Kale, and Grimm (2000) stated that the link between environmental purchasing practices and organizational performance is positive in terms of net income and return of investment (ROI).

The positive impact of the supplier's knowledge on buyer's manufacturing processes contribute to new materials development, more efficient processing and lower the GHG emissions (Ettlie & Rubenstein, 1981). The influence of suppliers leads to appropriate environmental practices of the buyer. For instance, organizations from the oil palm industry are obligated to address customer demands for reduced impact on climate change. Such pressures, imposed to combat climate change, indirectly force oil palm organizations to become involved in CDM.

Moreover, a study by Eltayeb and Zailani (2009) concluded that organizations who participate in environmental-interest associations have significantly higher adoption levels of green initiatives than organizations that do not participate, and organizations with a large supplier base are found to have significantly higher green purchasing and eco-design than organizations with smaller supplier base. In this sense, suppliers, especially green suppliers, get involved in the green supply chain and can be one of the success factors in CDM implementation in Malaysia.

Ethical Values

Ethical values are an internal success factor that contributes to environmental friendly practices as many organizations believe it is the right things to do (Bansal & Roth, 2000; Suchman, 1995), they have obligations and sense of responsibility, and do not act out of self-interest. Internal ethical values are influencing factors that encourage

organizations to consider their role and responsibilities in society rather than short-term profitability (Paulraj, 2009).

Hendry and Vesilind (2005) argued that organizations who are motivated by ethical concerns are morally admirable, but suggested that businesses are not able to reach to this stage of moral consideration unless they are financially stable. A few studies have examined the effectiveness of voluntary environmental initiatives (Khanna & Vidovic, 2001; King & Lenox, 2000), and found that organisations only implement environmental friendly practices if the said practices help to increase revenues or reduce costs. Hence, it is obvious that transaction costs play an important role in business as in costs always occur whenever there is a transaction.

Financial Benefits

With the CDM implementation, developed countries can invest in low-cost reduction opportunities in developing countries and receive credits from the resulting emissions reductions, thus reducing the cutbacks needed within their own borders. While the CDM lowers the cost of compliance with the Kyoto Protocol for developed countries, developing countries benefit as well, not just from the increased investment flows, but also from the requirement that these investments advance sustainable development goals. Thus, through the CDM implementation, the organizations develop environmental policies and invest in the CDM projects to gain competitive advantage and directly influence current profitability.

A range of studies have suggested that finance is the most widely recognized factors in encouraging environmental friendly practices implementation (Nelson, 2004; The Climate Group, 2005; Dagoumas, Papagiannis & Dokopoulos, 2006; Ellis, Winkler, Corfee-Morlot, & Gagnon-Lebrun, 2007; Greene, 2006; Jung, 2006). From the Transaction Cost theory, every transaction comes with cost, hence, financial return-on-investment is the main industry concern in CDM projects implementation. Based on the available evidence, the potential of organizations to gain financial benefits from CDM projects may be the main success factor.

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Proposed Framework

The discussion so far, based on stakeholder and transaction cost theories, has elaborated internal and external success factors for CDM implementation, see Figure 2. On this basis, the context conditions are empirically examined in next stage with Malaysia as the focus. These theories induce observations that argue better stakeholder and transaction cost analysis leads to successful CDM project implementation in Malaysia.

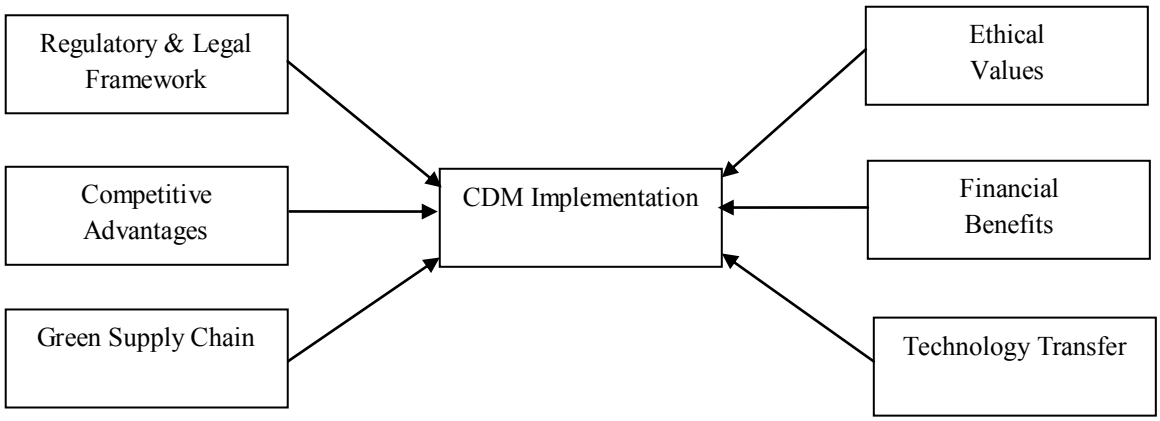

Figure 2. Success factors in CDM implementation

Concluding Remarks

Initially, CDM was developed as a tool to mitigate climate change, it has since been employed and delivered a range of benefits. Its core principle emphasizes sustainable development in the host countries benefiting developing countries with economic growth constrained by environmental concerns. The benefits, tradable carbon credits generated from the CDM projects and financial gains, can be used for future GHGs emission reduction projects.

In the context of this paper, a total of six significant success factors for CDM implementation were identified based on a CDM literature review. Since various stakeholders may have different expectation and interest to be addressed, the stakeholder perspective revealed that regulatory and legal frameworks, competitive advantage, and green supply chain as the external key factor influencing CDM implementation success. On the other hand, ethical values, financial benefits and technology transfer are the key internal factors influencing CDM implementation success.

Since CDM is an international obligation between developing and industrialized countries, the ability of developing countries to be successful in the CDM implementation requires the support of national laws or regulatory frameworks. In addition, it is extremely critical that financial benefits are present. As CDM project implementation generates significant costs for the project developer, known as transaction costs, it has been suggested that high CDM transaction costs is one of the challenges to CDM success (Parikh & Parikh, 2004; Michaelowa & Jotzo, 2005; Shukla et al., 2004; Roy et al., 2002; Chadwick, 2006; Matsuo, 2004; Kallbekken & Westskog, 2005). These costs are related to the formalization and validation of the CDM project, as well as the monitoring and verification of the emission reductions.

In summary, stakeholder considerations and transaction costs are significant factors for successful CDM implementation in Malaysia. These success factors will bring immense benefits such as advanced technology transfer, financial gain and sustainable development to Malaysia; or vice versa, the lack of these factors in turn become barriers to CDM implementation.

Therefore, the establishment of a reliable baseline research to obtain preliminary data is one of the major tasks faced by project proponents in developing countries. The next research stage surveys organizations to examine the criticality and importance of the success factors identified in the literature. The outcome of this research will be a deeper understanding of CDM implementation success factors in a developing country, enabling management to make appropriate decisions to allocate resources required to make CDM implementation a success in Malaysia.

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