

LCA in Asian/Pacific Regions

Current Status and Needs for Life Cycle Assessment Development in Asian/Pacific Regions

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1 Introduction

This paper reviews the current regional development of LCA in the Asian/Pacific Region. The information presented in this paper is extracted from the Proceedings¹ of the Symposium on Life Cycle Assessment for Asian/Pacific Regions on November 24 and 25, 1998 in Tsukuba Research Center, Japan organized by UNEP / APEC / NEDO / AIST. Strategies for future LCA advancement in the region are recommended.

2 Status of LCA Activities in Asian/Pacific Countries

Chinese Taipei

The ISO 14040 has been adopted as a national standard late in 1997. LCA activities have been conducted under the banner of the National Science Council, Ministry of Economic Affairs and Environmental Protection Administration. Sponsorships of LCA activities were from the government. The LCA infrastructure was formed and geared towards the development of technologies for sustainable businesses and industries. The academia, research institutes, NGOs have been participating in LCA application and practices quite actively by an indication of the LCA-related conferences and workshops held in the country. However, participation of industries and consulting firms has been very poor and needs to be increased.

Some of the LCA activities in the country range from the development of LCI database, LCA modules for decision making, indices for LCA and risk assessment, LCA applications for marketing and clean technology, and a priority list of LCA case studies.

India

The development of LCA in India is only beginning. An Indian Life Cycle Assessment was formed for the purpose of

providing education to industry, academics and government on how to achieve sustainable growth while remaining competitive internationally. With the establishment of the ILCA, a long-term plan to achieve such goals has been formulated. Participation of professionals from industry and academic institutes has been very favorable. A paper was presented in the symposium on the potential application of LCA to the wastepaper recycling activities in India. Papers on applications of LCA in agriculture, and education and training, were also presented in another coinciding conference. Other LCA activities in terms of LCA applications and practices have yet to materialize. India hopes to gain the cooperation of all the members of the ILCA to reach its goals.

Thailand

The level of awareness of the industries, government and universities about the LCA concept were quite high according to the results of a survey conducted. The ISO 14001 Environmental Management System has been introduced by the Thai government as a voluntary measure for sustainable industrial practices. The Thai government, in association with the Thai Environment Institute, has also started an environmental labeling program (Type III) – Thai Green Label.

Formal LCA activities, however, are non-existent as there is a lack of expertise and clear methodology in Thailand. However, LCA-related activities consist of the use of LCA in EMS, eco-labeling, development performance indicators and cleaner technology. Of primary interest is that LCA will be used for the development of environmental criteria for the Thai Green Label product categories. Currently, the labeling scheme does not use LCA due to the high cost and time-consuming characteristics of LCA studies. Thailand expressed its need for LCA expertise and financial assistance from other countries.

Vietnam

The Vietnamese Ministry of Science, Technology and Environment via the Agency General of Standard Measure and

¹ The first author is a member of the symposium report drafting and editing committee.

Quality has been trusted with the task of implementing an LCA program in the country. The ISO 14040 has also been adopted as a national standard by the government. The motivation for the adoption given by the author was that LCA is needed for increasing its exports overseas.

LCA related research and activities have been carried out in Vietnam. The academia has been active in LCA research (e.g. social-economic effects of LCA, applications in national policy) and the Agency has planned training courses and LCA demonstration projects. The country hopes to receive financial and technological support from Japan and other organizations in order to implement LCA.

Korea

The Korean government has taken serious interest in LCA and has adopted ISO 14040 as a national standard. Government departments within the Ministry of Commerce, Industry and Energy, and the Ministry of Environment, have been one of the main participants in LCA promotional and research activities. Formally, the coordination of LCA activities were performed by the Korean Society for Life Cycle Assessment and its members are from the government, industry, academia and other research institutes.

Various LCA methodological research (especially impact assessment methodology - the Korean version), LCI database development, application of LCA in product development and labeling, and LCA promotional activities have been conducted in Korea. Of particular interest is that their database development effort has been hampered by the lack of data from countries where their imports have originated. Participation by the industries has been very active for the development of product LCAs. Korea expects to further LCA activities and fully utilize LCA information in the near future in areas such as environmental regulations and policies, linking EMS and DfE, and education.

China

The Chinese government has recognized the importance of LCA and has placed the responsibility for LCA development to the National Environment and Protection Agency. The participation from the academia in LCA research has been the most. It was not clear from the report whether the industries participated in the LCA research.

The LCA activities have been very active especially in the LCA research on materials. Many product-LCAs have also been conducted. Software and database developments to address the need of LCA studies are also in progress. Quite a number of seminars and conferences have been held to discuss LCA-related research and future direction. China expects to develop LCA further in areas of database development and LCA methodologies.

Kazakhstan

The paper presented the state of the Kazakhstan environment suffering from industrial pollution and the ineffective manner in which industrial pollution problems are managed. It hoped to understand the LCA methodology and wishes to apply the LCA methodology for the estimation of impacts of industrial

pollution on the Kazakhstan environment. LCA is expected to consequently become the instrument for controlling and managing environmental pollution.

Uganda

The paper described the multitude of problems facing the country which has direct bearing on the local and global environment. The author stresses the importance of effective decision making with appropriate information to achieve sustainable development. The country hopes for help from international agencies that can help steer the national policy towards instituting actions for protection of the environment.

Japan

The key players in the LCA activities are the government, research institutions, industry and academia. The organizational structure of the LCA activities in Japan was not provided.

The cooperation of the industries, government and academia has proven to be very important in advancing LCA activities in the country. With the support of the Ministry of International Trade and Industry (MITI), 250 national, industrial and academic organizations came together in the Japan LCA forum and identified the needs for LCA development in Japan. As a result of the forum, MITI has provided funds and support for a five-year national project on LCA. The national project's objectives are to develop a standardized LCA methodology for Japan, LCA database, networking systems for LCA information, and applications of LCA in various fields (e.g. industrial production, marketing, environmental administration, promotion and popularization). As LCA requires data not only from local sources, Japan hopes to cooperate with other countries in developing LCA databases.

2 Needs for LCA Development in the Asian/Pacific Region

From the reports of the Asian/Pacific countries that have participated in the symposium, it can be concluded that there are twin objectives for those engaging in LCA activities. One objective is to use LCA for reducing the environmental burden of products, activities and services and to move towards globally sustainable practices. The other objective is not to be excluded from the global marketplace as LCA information can be used towards the creation of non-tariff trade barriers. The active participation of many businesses in LCA activities is an indication of this objective. Regardless of the potential effects of LCA, the potential of LCA as an important tool to assess the environmental impacts of human actions has to be underscored and it is important that LCA be developed in the Asian/Pacific Regions. Based on the reports, the status of LCA development in these countries range from being very active to none at all. The discussion focused on the potential strategies for LCA development at the national level.

Need for a multipartnership, institutional framework

The LCA activities in Japan, Korea, China, Chinese Taipei and Australia have been very active. Their LCA activities

are standardization of methodology, database development, applied LCA research, software development and LCA, information-sharing networking. From the local perspective, these countries have a formal institutional infrastructure for the organization of LCA activities. The conglomerate is usually a *multipartnership venture* of industries, government and research institutes/academia. The organizations that have interests in LCA work in collaboration for an advancement towards nationally determined goals. An excellent example is the Japanese LCA forum that has successfully initiated a national project for nationwide LCA development. Another characteristic of these countries is that there is also a *lead organization*, like the Korean Society of LCA, to spearhead and coordinate the LCA activities.

The multipartnership infrastructure has probably allowed for the sharing of information and expertise about LCA at the national level. The form of collaboration allows for the input of many stakeholders into the development of an LCA for the country on a continuous basis. Most importantly, the process of LCA activity development is open and transparent. Some of these countries, like Chinese Taipei and Australia, however, still have to improve in gathering greater participation from the industries.

Need for support from the government

For local LCA development, it is assumed that the support and commitment (e.g. financial resources) from the government are very crucial. The characteristics of the LCA activities in Japan, Korea, China, Chinese Taipei and Australia are that the government plays an active role in the promotion and implementation of LCA activities and projects. The situation in the aforementioned countries is contrasted with the situation in Kazakhstan and Uganda in which LCA activities are non-existent, but there is recognition of the potential use of LCA and the benefits. It is postulated that the existence of groups that are interested in LCA development are not sufficient for an advancement of LCA. The capacity to become LCA experts exists in these two countries, but due to the lack of support from the government, and no institutions from which LCA can be practiced or promoted, LCA cannot be developed.

Need for LCA expertise and guidance

There are also situations where the infrastructure for LCA development exists and there is support from the government, but there is a lack of LCA expertise. Such situations prevail in India, Thailand and Vietnam. In these countries, LCA activities such as LCA training and education, demonstration projects, research on potential uses have been planned (or are already underway). These countries are suggested to be in the early stages of LCA development. The commitment and interest is already present, but the local experts of LCA methodology are not available. The expertise of expensive consultants cannot be depended upon forever, and local expertise and experience has to be developed to ensure the continuous development and advancement of LCA. The presence of local experts on LCA, as illustrated in Japan and Korea for example, is believed to lead to a continuous advancement of LCA.

Need for standardized LCA methodology

The countries that have advanced LCA development like Japan are developing standard LCA methodology, especially for the impact assessment phase. These LCA issues are being resolved at the international level. In order to further develop LCA in the region, it is proposed that a result of research for LCA methodology and applications development be shared with the international community so that more research areas can be covered and more experiences can be shared. A lack of standardized methodology and the perceived problems with data issues can become a major impediment for newcomers to the LCA field. In order to further promote LCA at the national or regional level, the LCA problematic issues such as conflicting LCA methodologies need to be clarified and understood.

Need for international cooperation for LCA data development

The LCA international community and those countries included in this report are still struggling with issues related to LCA database collection and data quality goals. 'Good' LCA information is derived from the availability of good-quality data. The international trade of goods and services makes the collection of LCA data very difficult. Data of materials or products imported for a country is very important in completing LCA databases. It is suggested that international cooperation be initiated for this purpose.

3 Recommendations

From the discussions above, it has been recommended that the cooperation from other Asian/Pacific countries that have advanced LCA development be used to assist other countries in sharing their experience and expertise. It has been proposed that an Asian/Pacific Region LCA forum or Society be established and that the participation of interested countries be gathered. This LCA symposium may be part of the activities of the forum. Through this forum, cooperation for the development of regional and international LCA activities can be established. Issues such as the development of LCA methodology, database, etc. can be addressed in this forum. Another aspect of this forum is that it would also be handling effort to promote the use of LCA in the region. The strategy that could be undertaken is to carry out a "Missionary for LCA Use" project throughout the region. The objective of the project is to educate and raise the awareness of the top government officials, industries and academia on what LCA information can deliver after which a more favorable situation exist for the establishment of multipartnership, institutional infrastructures for LCA activities. The inclusion of top government officials into the LCA promotional project would help to gather the support and commitment of the local governments. It is suggested that local experts be developed before the project begins, initially to further strengthen the basis for LCA development. An Asian LCA demonstration project could be presented as a "success story" for winning the supports of all the stakeholders in the region. After an infrastructure has been established, the next phase of the development would be to have joint LCA research projects so

as to train and at the same time establish cooperative linkages amongst the Asian/Pacific Region community for the exchange and share of information on LCA data at both the regional and international level.

4 Conclusion

In conclusion, LCA that is conducted and used appropriately is an indispensable tool to assist decision-makers in making an informed decision about the environmental impacts of their activities, products or services. A global effort towards LCA use should be encouraged and countries in the Asian/Pacific Regions should not be left out. LCA-related activities reported in the symposium were described

in this report and potential needs and strategies for how LCA can be developed are described.

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Reference

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JLCA Corner

The Progress of the Impact Assessment Study Committee in the National LCA Project of Japan*

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A national LCA Project has started in Japan beginning in October last year. The investigations of this project are performed by 3 committees (Inventory, Database and Impact assessment Committees). The detailed structure of this project has been shown previously (YANO, 1998). Currently, in the field of impact assessment, studies concerned about the establishment of damage functions have been increased to improve the reliability. Such investigations are not enough to apply into impact assessment systematically, because a great number of types of damage (category endpoints) exist and the data which should be collected is huge. In Japan, several methodologies for valuation have been proposed. However, these methodologies are different in many points such as the considered safeguard subjects and impact categories, the number of substances involved and even the basic ideas. It is difficult for an LCA practitioner to identify these above differences because they are not specialists in most cases. Consequently, it is quite important to provide some information for an LCA practitioner to select methodologies in accordance with their goals.

From these backgrounds, the impact assessment study committee (chairman: Atsushi Inaba, NIRE), has investigated the following 2 items:

1. The development of damage functions for respective category endpoints

This first year, we concentrated on collecting basic data to establish damage functions that are related with greenhouse effects, ozone layer depletion, human toxicity, ecotoxicity and the formation of photochemical oxidants. Based on this data, we tried to perform a continuous assessment that connects emission with the damage in these categories above.

In the investigation of greenhouse effects, the type of damage to the ecosystem, the estimation of submerged area via sea level rise and the decrease in plants via the emission of global warming gases has been carried out.

The investigations concern with ozone layer depletion concentrated on the assessment for the increased number and risk of skin cancer and cataracts via the emission of such ozone depletion substances as CFC-11.

In the investigation of human toxicity, ecotoxicity and photochemical oxidant formation, surveyed basic epidemic and pathological data for the establishment of damage functions and a short case study that estimates the increase in patients and diseases via the emission and exposure of toxic substances have been performed.

There are many requirements for compatible assessment. A lot of substances should be involved in those systems. The data which should be collected is quite large and a lot of discussion should be carried out. Future goals of this research are to solve these requirements.

2. The comparison weighting methodologies proposed in Japan

To clarify the characteristics of impact assessment methodologies proposed in Japan, we applied the same inventory data table to Japanese methodologies and compared the results. 4 valuation methodologies have been compared in Japan (considering Local impact, Estimation consumption of time, Questionnaire, I-O integrated).

MATSUNO and INABA (NIRE) subdivided the geographical range of local impact categories like the formation of photochemical oxidants and consequently established the weighting factors in each area.

YASUI (University of Tokyo) proposed a method to estimate the time consumed by the definition of fatality and the time to meet an environmental crisis.

NAGATA (Waseda University) established the weighting factors that are defined by the results of the questionnaire. This questionnaire have been given by various groups.

ITSUBO (JEMAI) introduced the 2 types of simplified damage functions (input related and output related) to classify the environmental impacts into 2 parts. This procedure considers not only the comparison between impact categories but safeguard subjects.

The applied inventory data concerning copying machines is provided by PE/IKP. The results of impact assessment are quite different in dominant substances and impact category. These differences are dependent on the numbers of substances involved and the impact categories considered in methodologies.

Now, the results of this year are summarized. Some of them will be submitted to this journal.

* YANO, M. (1998): Int. J. LCA 3 (2) 69-70