

RELEVANCE OF LIFE CYCLE ASSESSMENT IN DEVELOPING COUNTRIES

PROFESSOR SUREK BORDIA

Professor & Head

Department of Mining Engineering

PNG University of Technology

Lae, Papua New Guinea

OBJECTIVES

- ☰ To draw a global picture which can mirror the problems of metals production, use, recycling and environmental effects anywhere in the developing world – be it in PNG, Brazil, Chile, India, China, etc.
- 2. Present a few case studies as to the presence or otherwise of LCA and LCI studies in developing countries.

MAIN DISCUSSION TOPICS

- ➡ Economic Realities
- ➡ LCA and LCI DEFINITIONS
- ➡ LCA in Developing Countries
- ➡ Metals Life Cycles
- ➡ Secondary Metals Production
- ➡ Conclusions

ECONOMIC REALITIES

According to my analysis, after the collapse of communism in most parts of the world, there are now two realigned economic blocs:

- ➡ Developed Bloc
- ➡ Developing Bloc

DEVELOPED BLOC

- Consists of rich/advanced countries
- Government provides basic Social Security (or Welfare) Support System (SS Net) for its population.
- This bloc consists of about 20 countries located in North America, Australia, New Zealand and relatively well-off countries of Western Europe.

DEVELOPING BLOC

- Consists of those countries where there is no or almost no SS Net.
- In these countries, when a person is unemployed, the government does not provide basic human survival needs in terms food and shelter.
- Unemployed people have the immense problem of providing food and shelter for themselves and their families.
- People care the least about quality of life, sustainable development, environment, LCA, etc.

DEVELOPING COUNTRIES

This Non-SS Developing Bloc consists of all remaining countries in:

- Africa
- Asia
- Latin America
- Central and Eastern parts of Europe
- They number over 200 countries

LCA AND LCI DEFINITIONS

ISO has defined LCA as follows:

- ☞ LCA is a technique for assessing the environmental impacts associated with a product, by:
 - Compiling an inventory of inputs/outputs of a product system.
 - Evaluating the environmental impacts associated with those inputs/outputs.
 - Interpreting the results in relation to the study objectives.

LCA AND LCI DEFINITIONS

☞ LCA studies the environmental impacts throughout a product's life (i.e. cradle-to-grave).

LCA involves two main parts:

- LCI or audit to determine the mass and energy inputs/outputs of a production chain.
- Assessing these data in term of environmental impacts.

LCA IN DEVELOPING COUNTRIES

- ➡ Japan has been very active. In 1998, a national LCA project was started.
- ➡ Not much happening in other developing countries.
- ➡ Financial constraints on governments, universities, research institutions and Industries have been the major barrier to LCA and LCI activities in the developing world.

METALS LIFE CYCLES

- The demand for metals/minerals is very high.
- The production of metals/minerals is rising with the economic wellbeing.
- Recycling of metals and plastics is also a thriving industry.
- For example in India, nothing is wasted, each and every piece of metal and plastic is recycled.

METALS LIFE CYCLES

- ➡ In rich/developed countries, it's a common sight to see broken down TVs, ovens, etc. thrown into rubbish bins.
- ➡ In countries like China or India, everything is either repaired or recycled.
- ➡ Environmental safeguards in the recycling industry are very difficult to enforce because of corruption and political influences.
- ➡ Therefore, most of the developing countries have no interest in Basel Convention.

SECONDARY METALS PRODUCTION

- ➡ Most of the environmental impacts associated with LCA impinge on secondary production (recycling, reclamation and reuse).
- ➡ To gauge the extent of this problem in developing countries, it's proposed to divide these countries into two groups:
 - Large countries – population > 10 million.
 - Small countries – population < 10 million.

LARGE COUNTRIES

- Secondary metals production forms an important part of economic activity in large developing/poor countries.
- For example: Indian Metal Production Data for 1998/99

Metal	Primary	Secondary	% Secondary
Steel (Mt)	10.5	12	53
Lead ('000t)	31	19	38
Copper ('000t)	200	47	19
Zinc ('000t)	170	10	5.5

LARGE COUNTRIES

- From the environmental damage angle, the main culprit in these secondary production is lead.
- In India, there are many “backyard” smelters, which recover hardly 50-60% of the lead but damage the environment and impair workers’ health.
- Efforts are on to help genuine recyclers, who have the requisite pollution control equipment and stop backyard smelting from used batteries, waste oil, etc.

LARGE COUNTRIES

- In spite of these adverse impacts, secondary metals industry employs/supports very large population in these large countries.
- There are environmental protection laws and regulations.
- When the government inspectors come to have a look at these backyard smelters, they will not close these smelters because of the
 - humanitarian,
 - economic,
 - social,
 - corruption factors.

LARGE COUNTRIES

- ➡ If they force the closure then millions of workers will be on the streets without any jobs and no social security to support themselves and their families.
- ➡ In countries where there is no social security, any job is a passport to lifelong wellbeing for an individual and his/her extended family.

LARGE COUNTRIES

- Therefore, the sources of these jobs, even if these sources are polluting in nature, will continue their trade because of sheer economic necessity.
- This scenario is similar in all large developing countries like China, India, Indonesia, Brazil, etc.

SMALL COUNTRIES

- ➡ In many small countries, like Papua New Guinea, there are no backyard smelters.
- ➡ Scrap is collected and exported to those countries who smelt them.
- ➡ Small countries are therefore generally free of polluting influences of secondary metals production cycle.

CONCLUSIONS

Following points emerge from this Presentation:

- ➡ Very little work is done on LCA/LCI in developing/poor countries.
- ➡ Due to the economic and societal factors, secondary metals production is an important sector of economy in most of the large developing countries.

CONCLUSIONS

- ➡ Adverse environmental impacts of the backyard smelters are generally overlooked in favour of job and profit creation.
- ➡ Basel and other conventions have no meanings for these countries.
- ➡ Small developing countries are usually free of environmental impacts because scrap is exported to those large countries who smelt them.
- ➡ LCA/LCI activities in developing countries will slowly increase as the economies of these countries improve.