SUSTAINABLE DEVELOPMENT AND LOCAL INDUSTRY

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Summary

Should developing countries aspire to experience the same development process as industrialized countries have followed, then it is attractive in that process to make innovation leaps, and to skip entire phases. However, serious side effects, such as pollution and depletion, are inextricably linked to such a development. Rather then leaping onto paved technology tracks that proved to be unsustainable, the challenge now is to learn from past mistakes and pave new inherently sustainable paths, while benefiting from advances made. Thus, new sustainable product and process development will emerge with a strong contextual basis that presents appropriate solutions to local problems, where people know their own problems best. Small and medium-sized enterprises (SMEs) exist that are already sustainable and can be further improved. New sustainable enterprises can be established as well, based on values, a mission, or a vision, that clearly indicate the choice to address elementary needs and to select and use resources that are inherently sustainable. Favorable to such a

development is the existence of a societal context that supports the establishment and functioning of sustainable SMEs. The Internet provides useful examples, information, and contacts in support of a global development of sustainable SMEs.

1. Introduction

In response to globalization, there is an increasing interest in localization as a source for the conservation, strengthening and development of local culture. Also, from a sustainable development point of view, the local context is an important source of natural resources, knowledge and solutions. Localization is not only of interest to developing countries—it is just as important for industrialized countries.

In the international debate about sustainable technological development, it has been argued that developing countries should not import or emulate technologies from industrialized countries but rather "leapfrog" those technologies. They should take the latest, the most new and sustainable technologies and go beyond the transfer of technologies, that from an environmental point of view, soon will become obsolete. Although this is clearly wise in some cases, it is also worthwhile to judge first the technology concerned on its sustainable merits. Perhaps the technology that is considered a huge step ahead, is in fact so within a principally unsustainable frame of reference. It might be that by the inclusion of more sustainable principles in its design and development, a similar technology breakthrough may be realized which potentially is much more likely to lead to a contextual and more sustainable jump forward.

Against this background, some views are given in this article of designers in developing countries. They put much emphasis on social and cultural conditions. Then the concepts of sustainable product development and sustainable process development are addressed. Covering product and process development, the practice of sustainable SMEs, which present early signs of sustainable industrial practice, is then dealt with. Finally, international cooperation and networking through the Internet are suggested as strategies for sustainable globalization in support of sustainable industrial development that will be characterized by sustainable localization.

2. Quality of Living through Local Solutions

2.1 The Developing Country Dimension

The affluence and most of the production and consumption systems of the industrialized world are unsustainable by design. The poverty and underdevelopment in developing countries are unsustainable by human moral and ethical standards. Therefore, the debate must begin, research must be initiated, and practice stimulated on the reformulation, restructuring, and redesign of production and consumption activities. But, more fundamentally, totally new and inherently sustainable industrial practice and consumer lifestyles must also be developed, in order to achieve sustainable production and consumption patterns.

This is what the *Human Development Report 1998* (UNDP 1998) is all about. Its central theme is "Human Consumption Patterns and Human Development." The report states

that consumption must be "shared," ensuring basic needs for all, "strengthened" by building human capacities, and "sustainable," without mortgaging the choices of future generations. The report recommends developing and applying technology and methods that are environmentally sustainable for both poor and affluent consumers. Sustainable growth of consumption and production depends on major advances in cleaner, material-saving, resource-saving and low-cost technologies that meet the requirements of the poor. One of the challenges is, for example, to achieve the widespread practice of sustainable cooking. Of the estimated 2.7 million deaths each year from air pollution, 2.2 million are from indoor pollution, and 80% of the victims are the rural poor in developing countries.

According to the UNDP, the real issue is not consumption itself, but its patterns and effects. Well over a billion people are deprived of basic consumption needs. Underconsumption and human deprivation are not just the lot of poor people in the developing world. More than 100 million people in rich nations suffer a similar fate. The global population is projected to be 9.5 billion in 2050, with more than 8 billion in developing countries.

Poor countries need to accelerate their consumption growth—but they need not follow the path taken by the rich and high-growth economies over the last half of the twentieth century. If poor countries can leapfrog in both consumption patterns and production technologies, they can accelerate consumption growth and human development without the huge cost of environmental damage. They can incorporate many of the available technologies that are not only less environmentally damaging, but also cleaner—such as the use of solar energy, less energy intensive crop production, and cleaner paper technologies.

Although globalization of principally unsustainable production and consumption systems is taking place, there are also trends that focus on the importance and potential of localization. At the International Symposium for the Launch of the Human Development Report 1998 in the Hague on 9 and 10 September 1998, the Minister of Culture and Tourism of Mali (Mrs. Aminata Traore), stated that local indigenous knowledge has often been ignored or put aside in development processes.

For sustainable product development, local indigenous knowledge is always important as it is closely linked to the harmonious and sustainable use of the physical and ecosystem conditions concerned. The social and cultural dimensions also are part of the holistic, systemic and integral approach that sustainable product development presents. In the subsections below, some views of people from developing countries will be presented.

2.2 Small Industries

For current and future markets in the developing world, it is necessary to create small, decentralized industries of a new kind, using local resources and clean technology to increase productivity, and to make products and provide services that satisfy the fundamental needs of local people without destroying the environment.

Ngahu (1996) emphasizes the important role of small-scale enterprises (SSEs) that have characteristics that justify promoting them in a development strategy. They create employment at low levels of investment per job, lead to increased participation of indigenous people in the economy, use mainly local resources, promote the creation and use of local technologies, and provide skills training at low cost to society.

Guimaraes (1998) from Brazil, considers product design as addressing "design by the poor for the poor," which requires a down-to-earth approach and a wider definition of design. Product design in the context described is regarded as an activity related to manufacturing enterprises, but not exclusively to mass production. It is perceived as a process that is not the sole domain of professionals, such as engineers, architects or professional industrial designers. The "professional boundary" debate is secondary, as products produced and consumed by socially vulnerable groups are designed, copied or adapted by workers, by microentrepreneurs themselves, or directly by the poor community.

In the majority of developing countries, the development assistance process has ignored the innovative capacity and technical knowledge of poor people. There is a bias given to formally trained people to the detriment of the informal sector. Guimaraes concludes that industrial design should be understood as a tool for development and part of a wider strategy, which brings together all actors involved in enterprise development. Enhancing the internal capability of design in such a context would put the innovative firm in an advantageous position in the market, thus augmenting its change of survival and potential for growth. The gains to the manufacturer of having this advanced ability is evident, ranging from the better use of raw materials, and a reduction in the costs of production, to a reduction in development time, and a consequent increase in profit margins. There are also advantages for the user such as wider variety of products of better quality available in the market, designed to satisfy local needs, and accessible to the low income consumer.

2.3 Local Capacity

According to de Carvalho (1995) a more coherent and pragmatic form of cooperation must be conceived that has greater respect for the environment and is more active at a local level. A fresh look must be taken at ways of intervening, developing human resources, and conducting analyses leading to the formation of governmental, industrial and commercial strategies. This is necessary, not just to take account of (in this case) their African setting, but also, to encompass a concept of development which is sustainable at a global level.

A new approach to cooperation leading both to an adaptation of the tools used and to mutual and responsible enrichment must, therefore, be implemented: "We must encourage the evolution of new attitudes and of a willingness to accept the modern world in a way which genuinely increases the capacity to act but does not lead to a culture breakdown for the people benefiting from it. We must create conditions under which abilities and initiatives at a local level are encouraged. At the same time, individual communities and forms of management need to be respected and allowed to expand at their own pace."

Daniels and Vencatesan (1995) argue that traditional ecological knowledge; a system that has been tried and practiced over a few thousand years, cannot be ignored altogether. What is needed is an emphasis on carefully collected and analysed data which is scientifically scrutinized and interpreted. Warren and Rajasekaran (1993), argue that indigenous knowledge in Third World agriculture is considerable and too often overlooked.

On the cultural dimensions of development, in 1995 at an international seminar in New Delhi, a declaration was formulated on an "Information Model for Integration of Endogenous Cultural Dimensions into Development." The objective was to redefine development and integrate endogenous cultural dimensions into it, to make humans and nature arrive at a harmony: "The need of the hour is decentralization of development planning and people's participation at the grassroots level. This alone can lead to the growth of a culture-friendly development model. And this has to be based on local knowledge of nature and the environment, social perceptions and traditions, and the significance of religion in the integration of community life" (Akkara, 1995). Akkara is of opinion that under the overwhelming influence of western civilization, many people in the Southern countries have developed a feeling of inferiority. They underestimate and consider the values of their own traditional cultures obsolete, and not refined enough, for modern times.

2.4 Indigenous Knowledge

The potential value and possibilities of application that local indigenous knowledge has for sustainable development is also recognized and promoted by the international Indigenous Knowledge Network and is summarized as follows:

- Indigenous knowledge of resource management provides a valuable information base which could be used in the management of natural resources for sustainable development.
- Use of indigenous knowledge in the planning of development projects generally facilitates the participation of the beneficiaries.
- The knowledge developed by communities over centuries can be integrated with modern scientific knowledge in order to create appropriate technologies leading to sustainable development.
- Indigenous knowledge can facilitate communication by providing a better understanding of how people perceive their environment and develop their perceptions.

These approaches provide an alternative to the globalization and homogenization of industrial development and its products, systems and services. Not only do they acknowledge and value local knowledge but they are also aimed at exploring, reporting and conserving the local treasure of experience, practice, examples and ideas. The importance of biodiversity for the global community has been well recognized internationally. However, the fact that cultural and knowledge diversity is as important for the prospects of a sustainable future, is being overshadowed by the Northern endeavor for economic globalization.

In relation to teaching, ownership is a very important aspect of sustainable product development as, indicated by Henevald and Thomas (1993, cited in Knutton), who write that for ownership to exist, "the key participants...must feel responsibility for the success or failure of their enterprise." This means involving interest groups in the "preparation of a project, assigning responsible tasks to them and respecting their results, and providing them with resources...and letting them get on with implementation." Along similar lines, Boateng argues that an African centered approach is a critical perspective that uses African ideals rather than those of alien cultures to study and appreciate Africa and the African heritage. An African-centered curriculum challenges the universality of Eurocentric concepts. The African-centered curriculum is based on the premise that human actions cannot be understood apart from the emotions and cultural definitions of a given context.

A strong argument for such an approach was made by Soemarwoto (1997), from Indonesia, at a workshop on "The Sustainable Technological Development Approach," in 1997:

> Sustainable technology should be looked at in a holistic way, because sustainable technology alone cannot solve the predicament we are facing. It has to be blended with the culture where it is to be used. Even more important the development of sustainable technology should also aim at helping to change the culture and behavior of non-sustainable lifestyles of the people into sustainable ones.

Soemarwoto also stresses the importance of empowerment:

> The sustainability of technology depends very much on the success of empowerment of the people. It depends on the need of people for the technology, its introduction and its successful adaptation to the people's culture and socio-economic institutions and conditions that finally will lead to the adaptation of the technology. The final test of success is that after the project of introduction has been terminated, the technology is spreading to other places and communities, and innovations are being made by the people to improve it. Experience has shown that this is not easy, even when the so-called bottom-up approach has been carried out. Bottom-up development implies that we can communicate well with the people and understand their needs and social institutions...We still have much to learn how to carry out bottom-up development well. Long term human resources development is the only answer.

2.5 Participation

In India, Participatory Rural Appraisal (PRA) was used as a new way of tackling problems of development and environmental improvement. PRA "facilitators" hand the planning initiative over to local people. They are encouraged to use their first-hand knowledge and expertise of practices and priorities to construct charts, maps and matrices, all of which yield information making it easier to plan for the future. This analysis often uses highly visual pattern languages unique to particular communities. In many cases, the problem-solving strategies that result are innovative, successful and sustainable.

As in local communities, it is argued, the sustainable use of renewable resources has been woven into the fabric of everyday life, what is needed is to rediscover these resources. This would mean that their properties and uses should be reevaluated in relation to the needs of the people. El-Mously (1997) from Egypt, expects that this will provoke a new wave of creativity that can contribute to the endogenous development of local communities. Since renewable resources are within the reach of local communities, El-Mously argues that they do not need sophisticated technology and the associated intervention of government or transnational corporations. Thus the use of renewable materials would provide a strong dimension of autonomy and local participation. Renewable resources are widely distributed, and each local community will have its own share or mix of renewable resources. The establishment of new industrial activity near the renewable resources will change the consciousness of those involved in the primary activity related to these resources. Any subsequent improvement in their economic status will change their relation to those resources. This, El-Mously anticipates, will motivate people to rationalize their use or increase their production, which would then lead to increased resource sustainability and better industry economics. Cultural values relate to labor, local forms of collectivity and social organization, and familiarity with the resources. Wide-ranging knowledge and skills have been transferred from generation to generation. Then there is the free availability of renewable resources and existing infrastructures for production. According to El-Mously, this will all guarantee a new local and regional sustainable industrial development.

Rabah, of the Green Africa Network, stresses the gender aspect of design: "No one knows the realities of over-exploitation of the land than women who till it, carry its waters, use its trees for fuel, harvest forests for healing herbs and medicinal plants and use their traditional knowledge for the benefit of the community, in preserving species and ecosystems. Paradoxically, however, they are rarely integrated as partners in the design, management and follow-up of development programs, but are instead seen simply as the recipients of benevolent assistance packages."

2.6 Artisans

Masera (1998), in a Ph.D. study on small-scale enterprises in the Purepecha Region of Mexico, with a focus on furniture enterprises, concluded that there is an imperative need to explore new design and production approaches such as ecoproduction. This should then consider more than just profit margins, and take into account all the environmental and social implications of every activity. New approaches must allow better income opportunities for artisans without destroying the natural resources.

A similar approach can be found in the program of the Inter-Regional Volunteer Programme for Artisan Support (IVPAS) in Noida, India, the objective of which is to catalyze an international volunteer movement for the promotion of a sustainable model of development that is artisan led. The program emphasizes the social, economic and environmental advantages of artisanal production and distribution systems. For that purpose they form linkages and networks between existing national and subregional artisan networks and communities, through sharing and exchanging information.

Taylor of Veld Products Research, Botswana, is working with rural communities to assist them to develop their own strategies to utilize and manage their renewable natural resources sustainably. A major impact is foreseen on self-employment and product development in rural areas of Botswana in the area of craft development. The plan is to tackle the need by establishing "village resource centers," which will be nothing more than a few huts where people can receive training for the production of crafts as well as obtain any raw resources.

2.7 Natural Products

Arda (1994) of UNCTAD sees opportunities for the competitiveness of "natural products with environmental advantages." The following distinctions are made between product types:

- Products with relatively large and established markets such as reusable and recycled materials/products, biomass fuels, and organically grown products (both food and agricultural fibers such as cotton).
- Products with considerable potential but rudimentary markets such as agricultural fibers, alternative wood sources (rubber and coconut trees) and wood substitutes (agricultural crops and agricultural wastes).
- Niche products: some non-food forest products used as food (such as fruits and nuts), industrial inputs (such as bamboo and rattan), and health care ingredients.

Whereas these ideas of Arda are mainly presented within the framework of traditional international trade, El-Mously (1997) takes a different approach in suggesting that developing countries may develop their own authentic response to the environmental crisis by beginning with their own traditions and formulating their own forms of modernity.

According to Guerra, at the core of the sociocultural dimension of sustainable production lies the lack in developing countries of an environmental awareness of most of the population, which results in a lack of demand for "Green Products and Services." The media, Guerra suggests, are crucial in helping to create this new culture.

Much potential exists, as indicated by Ben-Dak (1995) in a key article on unique product development in the South. Ben-Dak argues that the logic of South-South cooperation is much more relevant to copying success stories from the South than looking for major success stories in the North. Providing the right incentives and signals to local and external entrepreneurs more often than not appears to be the key to harnessing local capacities—both human and environmental—to the marketplace.

Nahar from India, stated that the appropriateness of solutions lies in the fact that people know their own problems best, even though they are not always in a position to articulate them. As far as design is concerned, Nahar thinks that there is a need to redefine the cultural context to the extent concerned with quality of living in general, and to develop local solutions to local problems, while connecting present product design to indigenous traditions.

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Biographical Sketch

Johannes Cornelis van Weenen is professor in Sustainable Product Development at the University of Amsterdam where he has worked since 1976. He was appointed in 1999. In 1990 he obtained a Ph.D. in

technical sciences at Delft Technical University. The subject of his thesis was waste prevention theory and practice. He set up and coordinated a EUREKA-Ecodesign Working Group and organized several international ecodesign workshops from 1990 to 1995. In 1988 he published a book on the environmental aspects of advanced materials. In 1993 he was invited by the UNEP-IE/PAC to organize a working group on products—the UNEP-Working Group on Sustainable Product Development (UNEP-WG-SPD). In 1994 he was appointed director of the UNEP-WG-SPD International Centre, at the University of Amsterdam. In 1997 he edited a book on an EU-project concerning ecodesign in small and medium-sized enterprises (SMEs)—Life Cycle Design. A Manual for Small and Medium-Sized Enterprises. Since 1998 he has been involved in the establishment of a new Expert Centre for Sustainable Development at the University of Amsterdam. In May 2000 he joined the research Institute for Biodiversity and Ecosystem Dynamics (IBED) of the University of Amsterdam.. A recent study dealt with Renewable Material Resource Systems central to sustainable product development and sustainable consumption in developing countries. His consultancy is called IDEA—International Design and Environment Activities. IDEA-studies published by the European Foundation in Dublin concern design for sustainable development "concepts and ideas," and "guides and manuals," followed in 1999 by the study "practical examples of SMEs," on sustainable enterprises and in 2000, jointly with EDEN, "crops for sustainable enterprise." From the outset Hans van Weenen was involved in the concept development of the first sustainable elementary school of the Netherlands, "De Sokkerwei" in Castricum. In 2000 he was involved in the building process as sustainable building advisor.