Editorial

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In a definitional context, sustainable development has different and multiple categories, which do not move in a unilinear direction. The papers in this issue pry into areas that hitherto had not been given prominence in attempts to understand the impetus for and understanding of sustainable development. Examples are given which point to activities that advance the concept and reality of sustainable development. Williams provides an intriguing discourse on the concept of innovation as it relates to the prime ingredients of sustainable development, namely, sustainable economic growth. Innovation involves the creation of new design, concepts and ways of doing things, their commercial exploitation, and subsequent diffusion throughout society, thus giving rise to economic growth, productivity and per capita income.

To prove his premise, Williams utilised the study by the Council on Competitiveness, which evaluated the competitiveness and innovative capacity of San Diego and compared it with other metropolitan regions. According to the Council on Competitiveness, if a region was to be prosperous, the firms in the region must continuously innovate and upgrade. To test this assumption, Williams studied patents as a measure of innovation because patents both at national and regional levels are a way to register innovation. Patents are a way of registering new products or a change to an established process. Although Williams' study utilised the Council on Competitiveness, his study is different because it defines innovative cluster by the level of patent acquisition and compared their economic characteristics to non-innovative clusters. To clearly understand the analysis in this study one has to keep in mind the direct impact of innovation on economic growth, and the indirect impact on the environment and equity, which influence sustainable development.

Targeting organisations that received ten or more patents between 1990–1999, he matched 275 organisations to the Standard Industrial Classification (SIC) code and found that 66% of these had been awarded patents. Companies awarded patents were assigned to one of San Diego's 15 industrial clusters based on the companies' SIC codes. Industrial clusters are groups of complimentary, competing and interdependent industries. Williams analysed in great detail the following clusters:

- Biotechnology & Pharmaceuticals
- Defense & Transportation Manufacturing
- Computer & Electronics Manufacturing
- Communications
- Biomedical Products
- Environmental Technology
- Software & Computer Services
- Horticulture
- Recreational Goods Manufacturing
- Business Services
- Medical Services.

While the Biotechnology and Pharmaceutical cluster had the largest share of patents awarded within the period in review, he noted that Environmental Technology cluster, which manufactures products with environmental applications, had the potential to have a direct impact on the environment and sustainable development. To identify the most innovative clusters, he calculated the ratio of patents per 1,000 employees for the 11 aforementioned clusters. Clusters considered innovative are those that have a ratio of patents per 1,000 employees greater than the regional average of 4.0 while those that are not innovative have a ration of less than 4.0.

The results of his analysis present a mixed picture of the impact of innovative clusters on employment and thus sustainability. He observed that Defence and Biomedical Products clusters contracted during the period under investigation produced the mixed result. *Did these clusters experience a cyclical downturn? If not, does it mean that all innovative clusters eventually contract? Is it possible that clusters that are innovative today will not be categorised as innovative in ten years? What would national statistics reveal since this study was based on San Diego region?* These are questions that Williams raised, the answers to which would require future and further investigation. He asserts that although a region may be innovative, it does not necessarily mean that it fully benefits from the opportunities presented by this innovation. A region must work to capture the economic value of the productivity generated by the innovation. The ability of a region to commercialise new ideas and technologies will determine its ability to improve its prosperity and standard of living. Williams cites an example of the symbiotic relationship between the University of California San Diego and local companies which has resulted in the revitalisation of the region by its utilisation of innovations generated by the university and its research and development institutes. This is indeed a living example of the role of universities in sustainable development.

Williams found that the innovative clusters received the lion's share of funds, thus, they were more likely to have strong economic characteristics, which is more likely to lead to sustainable development. In aggregate the technologically innovative clusters have a positive impact on the San Diego economy with faster business formation, higher average wages, and faster growth in wages than that observed in the non-innovative parts of the economy. Well-established research capabilities, a fully developed network to incubate new businesses, an ability to attract funds and venture capital from investors all point to an opportunity for economic growth and sustainable development. There is indeed a better chance for sustainable development if innovation is present.

Carrying Williams finding on the import of innovation forward, Isa and Yau examine the adoption of advanced manufacturing technology in Malaysia to explore this adoption and the types of costing and performance measurement practices in the Malaysian firms. Here, innovation or advancements in technology and trade liberalisation have significantly intensified competition in the domestic and international markets. One of the strategies for manufacturing to become agile and responsive to market changes is to innovate, which often results in drastic changes in the production cost. In response to the escalation in market competition, manufacturing firms are constantly reviewing, innovating and revising their manufacturing strategies to stay competitive.

New manufacturing strategy often involves the adoption of new technologies, and changes in the organisational structures and practices, such as Total Quality Management that may result in radical changes in the adoption of advanced technologies and the integration of various computer applications in the production planning and processes. Advanced manufacturing technology applications include computer integrated manufacturing, computer-aided design, computer-aided engineering, flexible manufacturing systems, material requirements planning, manufacturing resource planning, and enterprise resource planning.

While traditional accounting practices of costing products, value inventory, measure performance, are still useful under certain circumstances, the innovative or new manufacturing environment has posed new challenges to those traditional management accounting systems. The changes in today's competitive environment and innovativeness in manufacturing technology have implications for accounting, for example, changes in cost patterns and cost behaviour, reduced inventory and reduced emphasis on inventory accounting, declining relevance of standard costing systems, changing nature of capital investments, and the increasing importance of non-financial performance indicators. These point to the need for innovative or new management accounting practices to meet the challenges of the new manufacturing environment. According to Isa and Yau, these considerations give rise inescapably to two important questions: *what is the current level of advanced manufacturing technology adoption between the manufacturing firms in Malaysia? Is there any significant difference in the level of advanced manufacturing technology adoption between users and non-users of certain costing systems, performance measurement indicators and other innovative management reports?* To answer these questions, Isa and Yau sent questionnaires to 1,000 manufacturing firms randomly selected from the 2001–2002 Federation of Malaysian Manufacturers Directory. The respondents were asked to rate the level of application for each item on a scale of 0–5. 0 represents (not used at all) while 5 represents (very widely used) and to the corresponding importance of that application to the firm's operation on a scale of 0 (which represents not applicable/not used at all) to 5 (extremely important). A weighted measure of each advanced manufacturing technology adoption was computed by taking

the square root of the product of the rating score for the level of application and rating score for its importance. 22 weighted measures were added and averaged to obtain an index of overall advanced manufacturing technology adoption for each firm. A high score of index indicates high level of advanced manufacturing technology adoption. 122 responses were received, which represents a rate of 12.2%.

The results provide empirical evidence on the influence of the level of advanced manufacturing technology adoption in certain management accounting and reporting practices of firms in Malaysia. Isa and Yau indicate that their study provided mixed support for the contentions that high level of advanced manufacturing technology adoption would lead to high adoption of certain management and reporting practices. Furthermore, their study shows that traditional standard costing and variance analysis techniques are prevalent among the manufacturing firms in Malaysia; that while these methods are widely used by the firms with high level of advanced technology adoption, these firms are also supplementing the traditional approaches with new costing approaches. Similarly, both financial and non-financial performance measurement indicators are widely used. However, the firms with the higher advanced manufacturing technology adoption tend to use them more extensively as compared to firms with lower advanced manufacturing technology adoption. Isa and Yau conclude that the use of other innovative management reports, such as supplier's performance, customer profitability, product-line profitability and benchmarking are more prevalent among firms with the higher advanced adoption.

Harping on this same note of innovativeness, Hensler and Edgeman, search for and indeed posit innovative paradigm to provide prosperity for future generation. Not only do they want to *develop* but also *deploy* a paradigm that integrates well-known tenets of business excellence and sustainable development to do this, Hensler and Edgeman employ *BEST Paradigm*. *BEST* (Biophysical, Economic, Social & Technological) sustainability, is an acronym for elements that must synergistically create a sustainable society in an environmentally sustainable world.

To clearly understand the import of BEST Paradigm, Hensler and Edgemen view it through the Total Quality Management (TQM) lens because TQM asks and answers useful questions: *what is quality? Quality is satisfying customer wants and needs continuously. What is quality management? Quality management is satisfying customer wants and needs continuously, at low cost. What is total quality management?* Total Quality Management is satisfying customer wants and needs continuously, at low cost, by involving the whole of the organisation's human resource. An organisation acting within the TQM culture, will listen to the voice of the customer and will implement that voice. Use of the human resource, improved processes, and reduction of waste and other non-value added activities of all sorts will deliver more value to the customer and thus, increase customer satisfaction. In short progress is a key aim of those in the quality profession and sometimes progress involves innovation or change from a dominant paradigm to that which incorporates a modified view of the world. This conception undergirds 'business excellence', which is an overall way of working that balances stakeholder interests and increases the likelihood of sustainable competitive advantage and hence long-term organisational success through operational, customer-related, financial, and marketplace performance.

Business excellence portrays leadership as responsible for development and deployment of a balanced stakeholder-driven master plan. The policy and strategy capture the fulfilment, which is attained through deployment of various resources,

including human capital and by formation of strategic partnerships. Organisational processes transform these, yielding informative results along dimensions that include people, societal, customer, and financial. Communication is the shadow behind all of this and the overriding result that is desired is sustainable comparative advantage.

Business Excellence or BEST, paradigmatically conceived, therefore, is fundamentally ecosystem-oriented and regards the environment as an essentially closed system where consumption of non-renewable natural resources must be at a rate at or below replenishment through renewable substitutes. Economic/Business Sustainability concentrates in the improvement of the human condition, particularly at the individual level, but is generally promoted through corporate and governmental policies and practices. Various widely accepted constructions promoting such sustainability exist, with the most familiar being those proffered by the European Foundation for Quality Management and America's Malcolm Baldrige National Quality Award model. Social Sustainability points to improvement of the human condition at the societal level and as such many of the key considerations are ones for government entities. Technological Sustainability is concerned with the built and technological environment and, to a large degree, focuses on construction, maintenance and humanisation of lasting facilities that strengthen urban infrastructure and do not contribute to the so-called urban sprawl.

Deploying the BEST Paradigm, Hensler and Edgeman employed the image of *kyosei*, a Japanese representation of a tree with many branches. The interpretation of *kyosei* is that all people roost on the various branches of the tree, some higher, some lower, some closer to the trunk and more stable, others out on a limb. The common and uncommon construction of *kyosei* suggests that any attempt at symbiosis that is not consensual will be seen as a threat to those holding power. There are people who see the world from zero-sum perspective. However, the key to deploying BEST Paradigm is to create a win-win scenario in which human creativity and innovation expand the resources available and motivate people to change because it is in their own best interest to do so. Harping on the note of motivation, Hensler and Edgeman invoked the seminal contribution of Abraham Maslow. Maslow's *Hierarchy of Needs* is valued as a reasonable organisation of human needs that motivate human action. As a human being begins to fulfill each level of need, higher levels take on greater importance. It is not difficult to see that depending on the individual community, society or nation, the degree of importance and fulfillment of these levels of needs may differ and can change over time.

While Maslow's Hierarchy of Needs may appear complex at the first instance, it can be better understood if one employs Quality Function Deployment where customers prioritise their needs according to importance and degree of satisfaction with current and competitive products. Examples of basketball player and China's policy of one family one child could lead to decrease in output beneficial to the whole. Players maximise their scoring chances instead of that of the team, or where the policy of one family one child is breeding obese children at the expense of future health of the society as a whole.

Concluding, Hensler and Edgeman assert that globally considered, resolution of deep and varied environmental, economic, societal and technological issues would require the employment or deployment of the BESfT Paradigm model. This model combines key concepts of sustainability and business excellence with the integrating factors that address the human condition of stewardship, charity, profit as residue and of course, kyosei – living and working for the common good.

On this concluding note of the varied environmental, economic, societal and technological issues which address the human condition, Desai casts a bright searchlight on the problem of poverty as enunciated in the United Nations Millennium Development Goals. These goals are eight quantified targets to eradicated extreme poverty, hunger, improving health and education and ensuring environmental sustainability. Desai from the outset points to the challenges posed by globalisation, trade-related aspects of intellectual property rights and General Agreement on Trade in Services and avers that significant influence would be brought to bear on the process of achieving the Millennium Development Goals due to the imbalance and inequity in today's international system. He attempts to develop a framework for the role of academic institutions and societies for achieving the Millennium Development Goals. He analyses the nature and socioeconomic impact of agro-biotechnologies in the context of the role of academic institutions.

He asserts that even though there has been unprecedented inflow of Foreign Direct Investment and technology from the developed to the less developed countries, only few of the latter have been able to attract and benefit from globalisation and liberalisation, sectoral variations, notwithstanding. Despite rapid technological advances, the issue of poverty alleviation still plagues policies of most developing countries. While one can point to some evidence of reduction in poverty in some countries, there is also equally increasing inequality and bridging of inequality at the same time in different regions of the world. Between 1990 and 2001, people living below the poverty line declined in developing countries with the exception of sub-Saharan Africa where the proportion of the poor increased from 41% to 46%.

Desai informs his readers that of the world's 6 billion people, about 800 million do not have enough to eat. Malnutrition, including deficiencies in micronutrients is still widespread. Hunger and low intake of vitamin A, zinc, iron, and iodine, contribute to low birth weight, infections, and increased risk of death. Close to 24% in developing countries of all newborns have impaired growth due to poor nutrition. Therefore, enabling developing countries to import adequate food at stable prices would be helpful but it has been a daunting task. Three-fourths of the world's poor live in rural areas and they depend on agriculture. Two-thirds of developing countries export agricultural commodities. Improved market access for the developing countries can increase agricultural exports, thereby increasing foreign exchange earnings and imports of food, thus raising the level of income and employment among low-income rural families.

With this graphic and pointed picture of poverty, albeit, the rural poor in developing countries, Desai asked the following question: could biotechnologies solve the problem of hunger and rural poverty? He believes based on research that a strategy of dovetailing biotechnologies with the economic priorities, resource endowment and infrastructure of a country can bring about positive results and economic benefits. However, there could also arise from this endeavour, economic disasters in terms of labour displacement, loss of revenues and export earnings or wastage of resources. It is therefore critical that people understand the changing structure of agricultural research and technology and the features of the agro-biotechnology industry. With the emergence of biotechnology, a technological possibility of introducing new genetic traits in plant has become a reality to the extent that the focus of agricultural research has shifted from public sector to private sector or to the university.

To avoid rushing to hasty conclusion or applause for the effects of biotechnology, Desai analyses the features of agro-biotechnology industry. He discovered that the benefits of the technologies in terms of their impact on poverty reduction has leveled off. The crop yield has slowed down from average of 2.9% per year for cereals in 1967–1982 to 1.8% in 1982–1994. He speculates that this reduction or leveling off might be due to depressed crop prices, increased input demands and resultant increase in fertiliser, pesticide prices and increasing scarcity of water. The inevitable questions therefore are: will this reduced yield growth of existing technologies meet the projected demand? Are the emerging technologies answers to these problems in the prevailing socioeconomic and international system? Will the emerging technologies increase the bio-safety risk to the poor or provided such benefits as increased productivity, reduced risks in terms of pests and drought-induced losses storability, enhance health standards by nutritional improvement, and reduced exposure to agrochemicals and development of new edible vaccines?

Answers to these questions can be found by analysing the socioeconomic impact of the biotechnology industry that has for the past two decades expanded rapidly and widely. The estimated global area under transgenic crops has increased from 1.7 million hectares in 1996 to 44.2 million hectares or 109.2 million acres. The value of transgenic seeds has grown from $1 million in 1995 to an estimated $3,044 million. It is important to state that only 10 industrialised and 5 developing countries contributed to this increase. The demand for transgenic seeds is expected to rise at the rate of 12% per year to $3.8 billion in 2006 according to available study.

While global research and development expenditure in private and public sectors have risen over 95% of the total in the industrialised countries, very little has been expended in developing countries. China, however, is the leading investor in research and development on crop biotechonology among developing nations. Global research into areas critical to developing countries remains greatly under-funded. For example, the annual operating budget of $400 million of the worldwide network of 16 tropical agricultural research centres under the Consultative Group on International Research is miniscule in comparison to combined research and development budgets of the world's six largest agro-biotechnology companies estimated at about $3 billion per year. Similarly, environmental constraints are notoriously under-researched across the developing countries. At the time of these constraints, globalisation has exposed developing countries to the implications of intellectual property rights preferences of the inventors of the developed countries. Protection of intellectual property rights encourages private sector investment in agro-biotechnology, but in developing countries the needs of smallholder farmers and environmental conservation are unlikely to attract private funds. In a situation like this, developing countries that lag behind in appropriating patents on DNA sequences will be vulnerable because they would have no access to genomic database and search software at reasonable costs

Desai is emphatic in making the points that must not be glossed over, that majority of farmers in the developing countries are small farmers and they depend on dry land agriculture and that the assignment of Intellectual Property Rights to living things is new to these countries. So, in the context of technological and organisational change, a number of issues confront developing countries. If they adopt the trade-related intellectual property rights agreement, they would be obliged to adopt protection of plant varieties or by other means, without any serious consideration as to whether such protection would be beneficial to both producers and consumers. Another issue is

whether the provisions of the trade-related intellectual property rights agreement would succeed in protecting biodiversity. While Convention on Biodiversity asserts national sovereignty over genetic resources, there is nothing in trade-related intellectual property rights to provide support to the objectives of the Convention on Biodiversity. Furthermore, the trade-related intellectual property rights are silent about the equitable 'benefit sharing', and 'prior informed consent' that are emphasised in the Convention on Biodiversity.

Desai discussed in great detail a number of treaties or agreements that govern seeds and plant varieties, thus affecting farmers: Trade-related Intellectual Property Rights; International Treaty on Plant Genetic Resources for Food and Agriculture; Material Transfer Agreement; Convention on Biodiversity; General Agreement on Trade in Services; Patents and Breeder's Rights and many more appear to raise more issues rather than provide answers and protections that small farmers in the developing countries would need to obtain some meaningful access to genetic resources and knowledge associated with them. Critics point to what is believed to be an asymmetry and bias in market access commitments towards capital mobility as opposed to labour mobility. Such perceived asymmetry works in favour of the developed countries rather than in the interest of developing countries. It reflects a basic imbalance in negotiating position and lobbying power between the developed and developing countries. This is where the role of academic institutions becomes invaluable by getting involved in research and untangling the Gordian knots of international development issues in order to achieve the Millennium Development Goals.

In the final analysis the academic institutions could play important role if the following are ensured: strengthening of infrastructural needs through national and international support and improving national policy environment; reforming systems of higher education to make them relevant to development challenges and creating entrepreneurial universities; paying attention to diffusion of knowledge; adopting interdisciplinary approach or such that integrates the sciences; ensuring the dissemination of scientific results; more training in agro-biotechnology; orienting agro-biotechnology research more towards food crops and its nutritive values rather than for commercial purposes and the creating of a public-private collaborative system that would be a mainstay of the 'gene revolution' beneficial to developing countries.

Given the disparities that exist between and within the developing and the developed countries, there needs to be a framework evolved to achieve the Millennium Development Goals. Agro-biotechnologies hold out the promise and benefits for uplifting the rural poor. Education and concerted research endeavours of academic institutions would be invaluable on this score.

On this high note of education, Ramady points the reader's attention to the current Saudi educational structure, which needs to be directed towards science-based subjects in order for technology transfers to become self-sustaining and job-generating. Saudi Arabia's university and secondary educational system is geared towards arts and humanities, with only 8% of all graduates specialising in science and engineering subjects. The lack of a science-based education has prevented a culture of scientific research and development from emerging. The absence of research and development is one drawback of the Saudi private sector where few companies have internal research and development programmes that can harness or be adapted to foreign technology transfer.

It was hoped that the 'Economic Offset Programme' established in 1984, as an innovative investment programme could have helped to solve the lack of scientific know-how that would have satisfied what was understood as 'technology transfer'. Through this programme international contractors were to re-invest a percentage of the value of awarded defense-related contracts in the Kingdom. Offset programmes were used to reduce the economic burden created by an underlying defense imports. Ramady makes distinctions between direct and indirect offset programmes. Direct offsets are those by which the purchasing country joins the selling country to supply elements of the underlying purchased product through co-production, technology licenses and other supply arrangements. Indirect offsets assist the importing country in its development or investment plans unrelated to the principal import contract. Indirect offsets take advantage of the expertise and experience of foreign contractors with the aim of supporting the development efforts of their economies towards non-oil industrial diversification.

Ramady looked at various degrees of technology transfer, which he termed 'packaging' which refers to the comprehensiveness in the provision of technology transfer by principal technology supplier. When this level of comprehensiveness is broad, the associated degree of packaging could be either high or low. He found that one reason for low packaging bias in Saudi private sector was due to lack of science-based research culture and few numbers of science and engineering graduates to enable absorption and application of advanced technology transfer programmes. Ramady concludes by reiterating that economic development efforts would be successful and profitable if the appropriate domestic managerial, educational and market infrastructure to support technology transfer existed. Importing technology without these basic fundamentals in place would not ensure success even if mandated by the government through contracts. Until Saudi educational and corporate research and development become more science and engineering-based, the Kingdom will continue to rely on expatriate labour and will not derive benefit from technology transfer efforts.

Carrying this note of technology transfer and the need for local or indigenous innovative expertise for sustainable development forward, Gewali and Bhandari present interesting and encouraging efforts in Nepal to find alternatives to its energy problems. Nepal's rural population has been meeting energy needs from fuel wood and other biomass resources. Gewali and Bhandari assert that this traditional source of energy is neither sustainable nor desirable from environmental considerations as well as from the perspective of the effort to improve the quality of life of the citizenry. There is, therefore, need for a substitute as well as supplement to the traditional energy supply system by modern forms of energy. Dependence on imported fossil fuels cost Nepal highly. Because of scattered population density, a decentralised energy supply system becomes paramount. Gewali and Bhandari gave a detailed history of efforts in Nepal to find renewable energy technologies beginning with biomass, improved cook stove, briquetting, biogas, hydropower, micro-hydropower, solar energy, tukimara, solar water heater, solar drying, wind energy geothermal energy etc.

The search for alternatives to Nepal's energy has as its focus environmental concern. So, in order to reduce the adverse environmental effects of the use of fuel wood and other conventional fuels, there is need for innovation, appropriate adaptation and mitigation measures on the increased use of renewable forms of energy. The authors recommend that due to depleting foreign currency reserve, which in part is caused by importation of foreign fuel need and growing deforestation due to the use of fuel wood, Nepal should

implement clean development mechanism based on renewable energy technology. Nepal needs to invest its efforts in detailed studies on localised and time-specific energy demand and supply system, energy consumption pattern and adaptability. Local capability development in terms of renewable energy technologies and technical backup know-how are crucial for sustainability.