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E-Commerce and Sustainability: Concepts, Issues and Experiences

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Abstract: The new and rapidly advanced knowledge based technology becomes a dominant force shaping and modeling the future of mankind. Although advanced technology always brings side effects, the Internet and e-commerce are contributors to environmental solutions rather than generators of whole new set of environmental problems and enables to reach sustainability goals. As such, along with its massive economic growth, Southeast Asia's Internet and e-commerce growth rate is much higher than that of developed countries or NICs, which provides higher communication and transaction facilities. Southeast Asia's higher Internet and e-commerce growth rate could be a tool for achieving sustainability while its products and services responsibility are taken into consideration. This paper discusses the concepts of e-commerce and sustainability and their relationships as well. Some policies and issues of e-commerce and the Internet and its effectiveness for achieving sustainability goals to meet emerging challenges also are explored.

Key Words: E-Commerce, Sustainability, Product and Service Responsibility

Introduction

The twentieth century began with a world population of 1.5 billion; the twenty-first begins with 6 billion and is headed to nearly 10 billion mid-century (B.K. Fishbein 2000). These large increases in population, along with rising standards of living and consumption, are increasing the pressures on the earth as both a source of resources and a sink for wastes. As the new century dawns, it is essential to take stock of the state of the environment. For this purpose, a materials and technologies efficiency revolution is needed in order for global ecosystems to sustain technology and economic development without unacceptable environmental consequences.

Technologies at the close of the twentieth century are very different breed compared to technologies past, as they move inexorably toward the very core of fundamental knowledge-quantum mechanics. The results of using these mechanics are an explosive growth of knowledge and the ways in which use the newfound knowledge. E-commerce system is such a newfound knowledge and the major concerns of e-commerce systems are new product and service, and their delivery innovation, which reduce substantial environmental problems through network communication and reduced product supply chain. Therefore, it is essential to construct a conceptual framework of e-commerce and sustainability and the issues related to e-commerce and environment as whole. This paper focuses on the concepts of e-commerce and sustainability and their relationships for sustainable development. Some policies and issues of sustainable e-commerce development and its effectiveness for sustained economic growth to meet emerging challenges also are explored.

Concepts and Definitions: Conceptual framework is the basis of a study. Therefore, clarifying the conceptual framework is necessary for a study to come forth with a logical policy implication. As such the conceptual components of the study and their various composites are defined briefly as follows.

E-Commerce: A most common definition of e-commerce is ' the buying and selling of products and services over the Internet or other electronic network' (J.C.Yang 2000). Another possible definition of electronic commerce would be: 'any form of business transaction in which the parties interact electronically rather than by physical exchange or direct physical contact' (EC 1995). However, while accurate, such a definition hardly captures the spirit of electronic commerce, which in practice is far better viewed as one of those rare cases where changing needs and new technologies come together to revolutionize the way in which business is conducted.

Ever-increasing supply capabilities, ever-increasing global competition, and ever-increasing customer expectations characterize Modern business. In response, businesses throughout the world are changing both their organizations and their operations. From Fig. 1, businesses are flattening old hierarchical structures and eradicating the barriers between company divisions. They are lowering the barriers between the company and its customers and suppliers. Business processes are being re-designed so that they cross these old boundaries. As a result it promises to make buying and selling a lot more efficient and considerably cheaper. This is because, it results much compressed intermediation process and much reduced costs. On the other extreme, this compressed process reduces waste generation, which cause less environmental degradation.

Categories of E-commerce: E-commerce can be sub-divided into four distinct categories, which are interrelated each other (EC 1995). The categories of e-commerce such as business-business, business-consumer, business-administration and consumer-administration, and their interactions can be seen in Fig. 2.

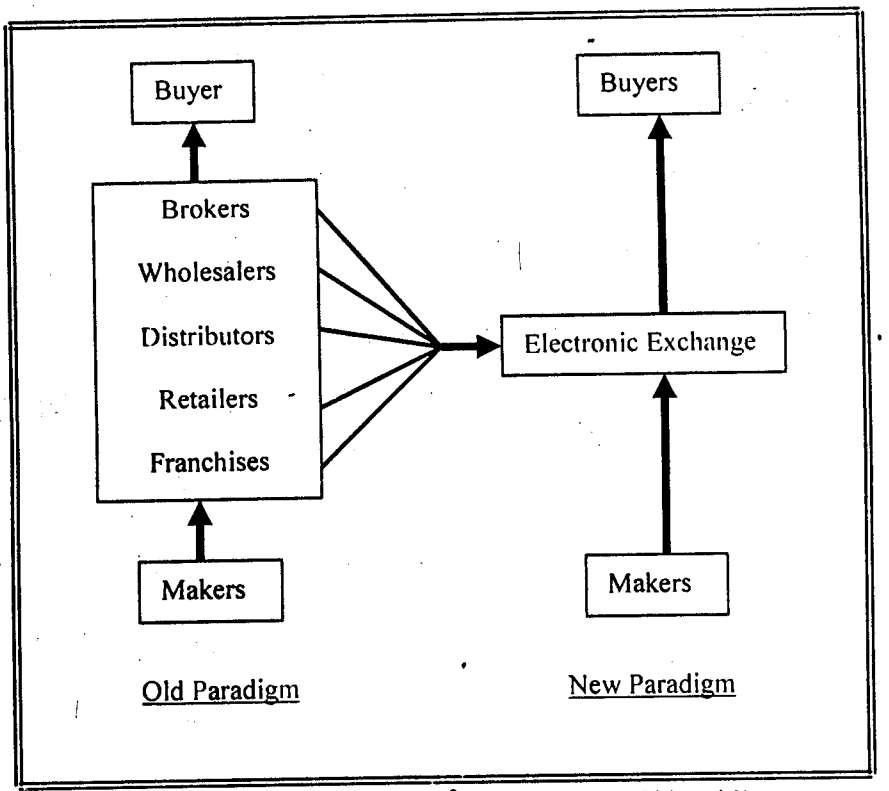

Fig. 1: Buying and Selling Paradigms: Old and New
Source: Modified from J.C.Yang 2000

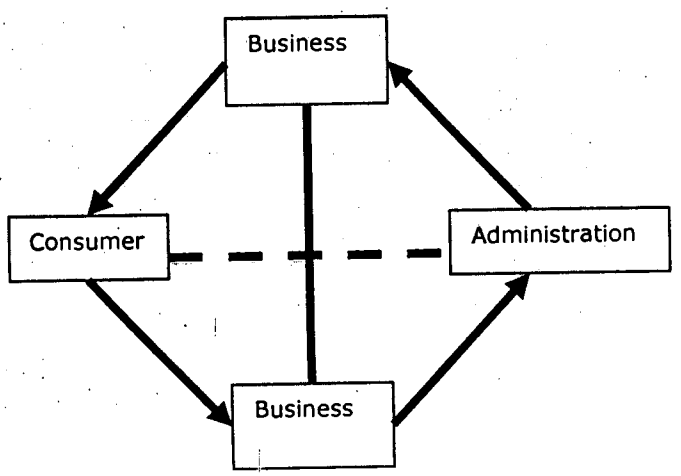

Fig.2: Categories of E-commerce and their Interactions
Source: EC 1995

Sustainability and Economic Growth: The move toward sustainable development has been building for twenty years, and as we approach the millennium, the time has come for corporations to begin preparing for a sustainable future. They must become proactive and help to lead the way, or risk being swallowed in a reactive, heavily legislated, and adverse business environment. To be sustainable, development must improve economic efficiency, protect and restore ecological systems, and enhance the well being of all peoples.

Sustainable development focuses right away on 'consequences' such as climate change, losses of bio-diversity, rain forests, top soils, technological improvements and its output, and addressing their causes. The causes are found over at the developmental end of things (J.C.Yang 2000). Begin with the consequences, it gets complicated very quickly but begin with the causes, it becomes very simple and sustainability is reached when:
Dematerialization rate = growth rate
Here the word 'dematerialization' stands for the reduction of the consumption of materials (energy, water, land, forests, minerals etc.) in each unit of economic output. As long as dematerialize at a rate slower than economic growth rate, or other words if a dematerialization deficit, sustainability problems can only accumulate and get worse.

Sustainability and Developed Economy: From Table 1, apart from Germany, other five developed country's average annual economic growth rates are much higher than that of energy improvement efficiency rates between the year 1990 and 1997. The persistent gaps between economic growth rates and material intensity improvement rates are the root cause of sustainability problems. The point here is that if growth rates and the efficiency rates are the same, then growth would take place with no extra energy consumption. If this situation keep up for many years, wealth and wellbeing will grow substantially while energy use would remain the same as year one. That is sustainability, or as close as will come to it.

Table 1: Average Economic Growth Rates and Energy Efficiency Improvement Rates of six Developed Countries 1990-1997

Name of the country	Indicators	
	Average GDP growth rates	Average energy efficiency improvement rates
France	1.7	0.4
Germany	2.3	2.4
UK	1.4	0.3
USA	2.2	0.7
Canada	1.5	0.09
Japan	2.6	0.5

Source: Adapted from J.C Yang 2000

Sustainability and rich-poor economy: Sustainability ills at developed and developing countries are diametrically different and the former from too much growth while the latter not enough growth. For sustainability to be achieved on a global basis, the developed countries must do extra so that the developing countries can grow out of their unsustainable ways as fast as they can. This is called North/South Issue (J.C. Yang 2000).

Table 2: The North and the South Blocks of the World

	North	South
Average per capita GDP ($)	23,000	1,000
Number of countries	48	169
Total GDP ($ billion)	19529	4,995
Population (million)	850	5,823

Source: Adapted from the World Factbook 2001

Looking at Table 2, if the world is divided up at per capita income of $ 10,000 into two blocks such as the North and the South. And these two blocks will show that a 1 extra percentage point of dematerialization by the North would give the South 2 extra percentage point of growth while still satisfying the overall sustainability requirement for the world as a whole (J.C. Yang 2000).

Socio-Economic Aspects of E-Commerce and The Internet: The goals of e-commerce are business excellence and environmental excellence, by creating the bridge through which corporate behavior can support sustainable development, the integration of economic growth and environmental improvement. E-commerce goes beyond resource use and pollution reduction by emphasizing value creation for business and society at large, while providing for competitive needs. By increasing value for the goods and services it creates, business will maximize resource productivity, gain bottom-line benefits, and reward shareholders. For achieving these goals, requires new technologies and interdisciplinary and inter-social levels (rich and poor) of communication and transaction, which also produces consumer's best-desired products and services taking into account environmental sustainability. Internet is such a technology, which acts as medium of communication and transaction for a well-documented e-commerce activities with all levels of society as whole. In addition, Internet is creating much-needed new jobs opportunities through rapidly increasing numbers of Internet café and related professions in developing Asian countries.

Looking at Table 3, Internet user growth rate in selected developing Asian counties, in particular Southeast Asia such as Malaysia, Philippines, Indonesia, Thailand and Vietnam is much higher than that of NIC like South Korea, Singapore and Taiwan, and developed countries such as Japan and Australia. This means that communication between rich and poor as well as other social groups and transactions through Internet in all these Southeast Asian developing countries is increasing faster than that of developed countries. One of the benefits of the rapidly advancing information technology like Internet use is supposed to be its power to linkage and integrate not only the rich but also the poor countries, thereby improving their sustainability. Table 3 also shows that the percent of Internet user population in all these Asian developing countries is much lower than that of developed countries. This is due to the fact that apart from Malaysia, all these countries are over populated and poor telecommunication infrastructure as the success of Internet strongly depends on telecommunication infrastructure (B. Rahardjo 2001).

Issues and Challenges For E-Commerce and The Internet: In order to understand the future of the Asian, especially Southeast Asian material policy and particularly products and services related to e-commerce, it is important to address some of the technological changes now transforming the Southeast Asian economy. In the Southeast Asia, especially in Malaysia, the Internet and e-commerce are dramatically changing how people live, work and communicate with each other. In particular, there has been an explosion in retail e-commerce such as the sale of goods and services to consumers on-line.

The Internet and e-commerce are transforming the ways in which products are bought and distributed as well as the products themselves. All of these changes have implications for the environment that have so far received little attention. Some are clearly positive – the substitution of digital versions of printed materials such as telephone directories, for instance, reduces the environmental impacts of materials use, production, transportation, and disposal. Also on the plus side for the environment is the potential to reduce brick-and-motor stores, packaging, and packaging impacts from the increasing use of home delivery and the construction of new facilities for products sold on-line.

It is especially important to make sure that new electronic products do not constitute a major addition to the waste pile and exacerbate pressures on the ecological limits of the planet. In 1998, over 20 million computers became obsolete in the United State, and only 11 percent were recycled (B.K. Fishbein et al 2000). Recently, a patent was granted for a disposable cellular phone that can be thrown away after a specified amount of airtime. Taking into consideration this experience from USA, applying extended product and service responsibility to cell phone, e-book and

potential digital assistants would internalize the waste management costs of these devices by ensuring that

Table 3: Selected Developed, NIC and Asia Pacific Developing Countries Internet users 2000 and Projection of 2005 (millions)

	2000	2001	2002	2003	2004	2005	Growth rate (%)	% adult population
Japan	31.12	45.96	54.02	60.25	66.72	80.72	21.0	13.4
Australia	7.83	9.00	10.19	11.30	11.97	12.47	9.8	32.0
South Korea	15.89	22.16	26.48	29.21	31.96	34.15	16.5	7.8
China	16.93	27.08	39.62	56.32	76.58	100.90	42.9	0.1
Taiwan	5.06	6.56	8.25	9.88	11.72	13.56	21.8	14.3
Singapore	1.53	1.80	2.05	2.19	2.32	2.41	9.5	24.9
Indonesia	1.75	2.26	2.84	3.51	4.24	5.03	23.6	00.04
Malaysia	2.51	3.25	4.05	4.79	5.58	6.15	19.6	15.8
Philippines	2.88	4.31	6.31	9.06	11.25	12.49	34.1	02.0
Thailand	1.94	2.58	3.37	4.31	5.38	6.56	27.6	3.8
Vietnam	0.27	0.44	0.72	1.10	1.62	2.23	52.5	0.3
India	4.47	7.27	11.70	18.73	27.33	37.59	53.10	0.08

Source: B. Rahardjo 2001, J. Lieb 2000, and M. Michael 2001

Note: % adult population (Japan, Australia, China, South Korea, Taiwan, India) in 1998/1999 and ASEAN countries in 2000.

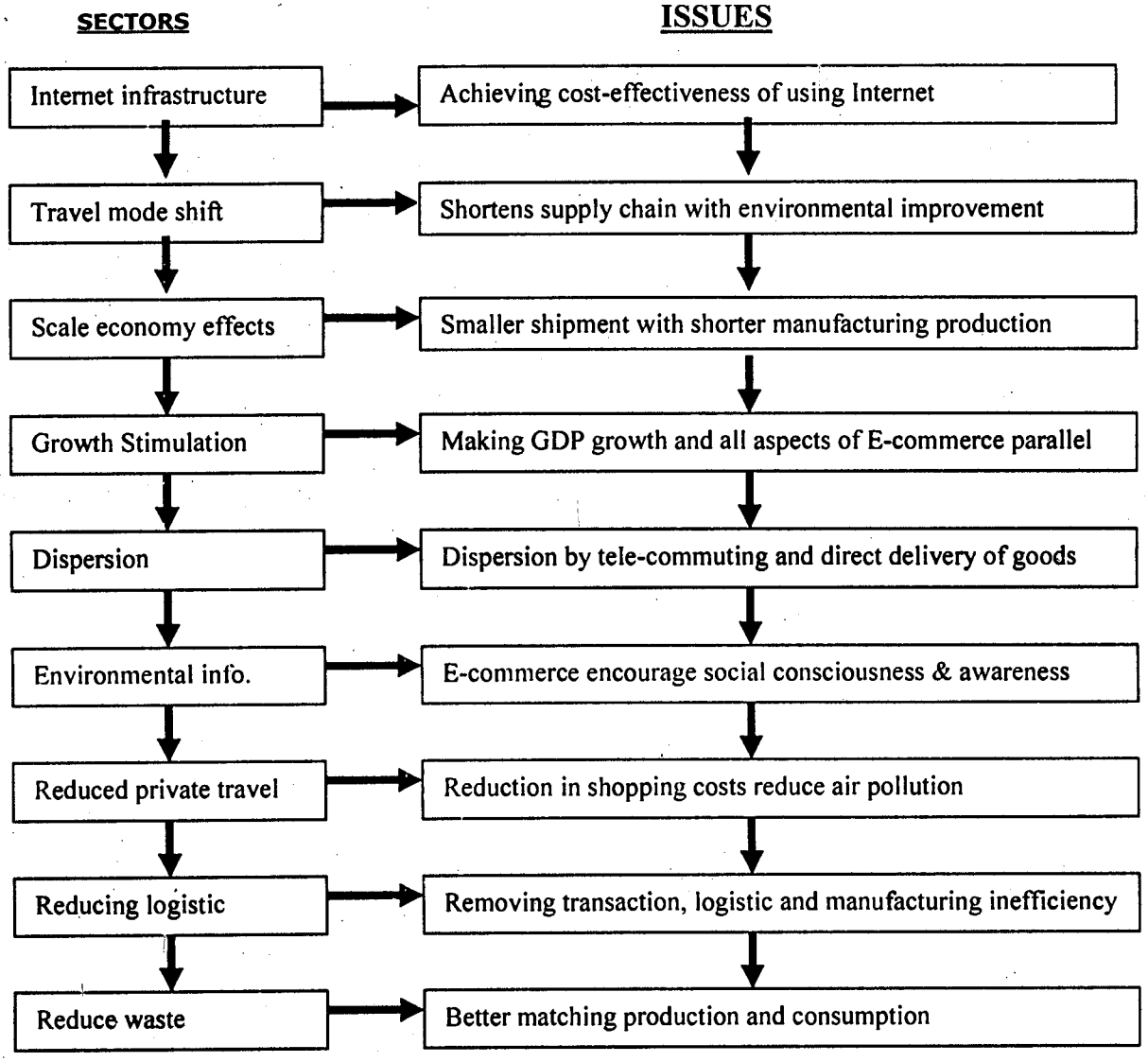

Fig. 3: Some Specific Issues of the Internet and E-commerce

producers take them back for reuse, re-manufacturing and recycling. Therefore, for reducing environmental problems, it is urgent to take into account the logistics networks, inventory and manufacturing changes. Some specific issues and its related sectors can be seen in Fig. 3.

Conclusion

Policy Implication: It is ensure that the Internet and e-commerce are contributors to environmental solutions rather than generators of whole new set of environmental problems. The current period, with the status quo already in flux from these rapid and potentially far-reaching changes, presents an ideal opportunity to start thinking in terms of goals of product and service responsibility. And how can the new technology, product, packages, and delivery systems of the Information Age be designed to generate less waste, close material loops, and reduce impacts on the environment.

Business should begin to embody notions of sustainability into their long-term strategies, and everyday operations. Ideally this includes, among other activities, a new focus on providing services instead of goods, extending responsibility over the entire product life cycle. Instituting a set of sustainability principles, educating customers and partners about sustainable practices, reporting on progress toward meeting sustainability goals, and incorporating these values into the culture of the firm. With the world's highest Internet and e-commerce growth rate, Southeast Asia needs economic instruments to encourage all these sustainability practices.

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