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Globalization & Marketing with Environmental Sustainability: A Holistic Resource-Centric Analysis with Reference to Corporatization

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Abstract

The Economic reforms ushered in early 1990's across the world triggered the current expanded developmental path which is essentially consumption oriented. In effect it goes against the principle of sustainability. The marketing strategies of a firm assumed a greater role and significance in a competitive economy to create and expand the market base continually so as to maximize its profits. They influence the purchase decisions of the consumers through its various tools and techniques. This ultimately leads to consumerism or consumption on a scale that supports the constantly expanding market base. And, this brings the issue of sustainability of various resource endowments to the forefront of analysis. The extraction-production-consumption streams pose many and varied forms of environmental hazards. As resource endowments are finite and depleting, the marketing strategies of enhancing consumption for short term gain by ignoring their impacts on environment has become increasingly questionable. The marketing strategies of the corporate can only be sustainable if they are adequately complemented by appropriate environmental protection measures and resource exploration strategies on a scale that mitigate the immediate dangers of depletion. The paper therefore tries to make a few critical observations on various facets of marketing strategies in a competitive economy. The paper also advocates the need to integrate the sustainability aspects with the formulation of marketing strategies to ensure firm's long-term survival. It also pleads that it is better to match demand with supply rather than the current practice of supply with demand in the interests of environmental and resource base sustainability and to achieve their compatibility with globalization. It also addresses the intervening period between now and the future when resource base will be expanded to a near inexhaustibility through S&T.

The three appendices at the end give an empirical assessment /validation.

Key words: *Marketing Strategies; Economic Reform; Resource Exploration; Environmental Sustainability; Purchase decision; Consumer absorption capacity; Process and Product innovations; Compatible and sustainable globalization, Resource-centric Model.*

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1. Introduction

The recent developments in the global economy resulting mainly from the economic reforms of the 1990's reveal that they are tending to go against the principle of sustainability. This is the reason why globalization is being increasingly questioned by several scholars [1]. Globalization is nothing but corporatization or the transnational business whose spread is much beyond the sustainable levels of various resource endowments. Free trade or the competitive market economy has been accepted as the primary economic policy across the world. Free trade is the basic tenet of the transnational business. This is based upon the principle of comparative cost advantage according to which all countries in the world will be specializing in those products in which they are more efficient. In ultimate analysis, the overall costs of products in the global market will go down and consequently the prices. As a result, consumption levels will increase and the global welfare will also be enhanced. This is the essence of the current global developmental path. Obviously, this is consumption-oriented. In this model, consumption is equated with welfare. At the outset, it may be noted that consumption does more harm than non-consumption. It does more harm than good to society.

The fundamentals of a competitive market economy depend mainly, among other things, on efficiency and innovation (of course knowledge) and the volume of consumption on a scale that supports the continually expanding markets. This implies that the consumption or for that matter consumerism on a scale that is seen today, is the fundamental base for the market economy. The very base itself seems to be on shaky grounds because of the inevitable faster rates of depletion[2] and the impending dangers of environmental degradation including the global warming. This is the reason why the issue of sustainability is being brought to the forefront of analysis. So far, the academic debates on globalization vs environment are mainly focused on air and water pollution or the general environmental quality but not on the resource-base, depletion or its sustainability particularly when globalization propels the large scale growth-impulses into the global economy through free trade. The present paper attempts to focus on the latter aspect in a conceptual framework. In essence, the paper tries to postpone or rather manage, the impending dangers of the prophesied doomsday. This necessitates that the vital issues of environmental, resource depletion, sustainability etc., need to be placed at the core of corporate strategies rather than on periphery as is seen.

The primary objective of this paper is to present an integrated framework to make globalization/transnational business compatible with sustainability and environment. Globalization or its variant, transnational business has some definite economic advantages over its counterpart, viz., protectionism, in the long run. But it has also some equally convincing disadvantages in terms of depletion, environmental degradation, inequalities and so on. Therefore, the issue of compatibility with the economic reforms needs to be tackled with a view to mitigate or minimize the adverse impacts. Accordingly, the present paper is an attempt in that direction.

2. Economic Reforms, Marketing and Environment

Transnational business is one of the major logical consequences of the economic reforms with far reaching consequences across all the sectors of the global economy. Corporates or transnational businesses are now considered to be the engine of growth.

To overcome the perennial problems of poverty, unemployment etc and to achieve the faster rates of growth, the economic reforms were introduced in India and other countries. This was further induced and necessitated by the collapse of the socialistic block (USSR etc) and the failures of socialism to achieve the intended objectives. Economic reforms were introduced in the 1990's as a package of interrelated measures, popularly known as LPG (Liberalization, Privatization and Globalization). As a matter of fact, the whole package was directed towards globalization or transnational business. In the ultimate analysis globalization means free trade with competitive markets implying thereby the free flow of goods, services and capital across the countries with no trade barriers of whatsoever kind. This requires competitive markets. Consequently, economic reforms replaced stateism by marketism or in other words, state dominance by market dominance in all the decision-making processes. Thus, state monopoly

was replaced by competitive market forces mainly to facilitate the transnational business. This scheme of macroeconomic arrangement is supposed to achieve faster rates of development at the least cost points through the principle of comparative cost advantage, leading to lower costs and consequently lower prices. In effect, this would enable a larger volume of consumption with a bigger consumption basket for a larger number of people and there by maximizing global welfare. This is the essence of economic reforms and the transnational business. On the whole the present developmental path as explained is essentially consumption driven or consumption centric. The recent bailout plans or stimulus packages as announced in various countries to combat the global recession/meltdown give ample credence to this fact[1]. In other words, it assumes a highly positive correlation between consumption and welfare. That means, the more we consume the more better off we are. This again is the essence of consumption.

In this model of development there is nothing but production and consumption. It should be noted that this is purely a physical phenomena and therefore, it should be guided by and adhere to the physical laws and constraints. Accordingly, the developmental analysis needs to take into account of this physical constraint. Both production and consumption streams create insurmountable problems in extraction and waste generation leading to environmental degradation in various forms. For instance, production requires extraction, which is characterized by many adverse environmental impacts and higher rates of depletion besides generating a number of residuals at the factory sites and the mine heads. On the other hand, consumption is said to be a misnomer. In fact we don't consume anything. We only use the utility component in a product over its lifespan and thereafter, we discard it and throw it to the open environment. Thus, production means waste generation. To put in simple terms, it can be said that **"Today's production is tomorrow's waste"[2].**

In this overall context, the environment should not be considered as a bottomless-sink to receive, absorb and assimilate all kinds of wastes/residuals generated by the extraction-production-consumption streams. It has its own limitations. If the extent of waste generation from the above said streams is more than the environmental capacity to receive, then the result will be the awful environmental degradation and pollution. The latest trends indicate that the environmental capacity is stressed too far to cope with the ever-expanding activities of the corporates and the transnational business. This is the reason why there is the mounting pressure from the environmental groups on the corporates to check their activities.

Marketing strategies have a definite role to play in the present developmental model as described above. Needless to emphasize its role as creating awareness of products and thereby creating or expanding the markets. The primary objective of economic reforms is to achieve faster rates of development, which, infact did take place during the last fifteen years or so. This means that more production of goods and services took place in the country besides larger volumes of imported products. And, hence this calls for more selling efforts to widen markets. Consequently, the marketing strategies assume greater role and significance to market the larger volumes of goods and services to larger number of customers by expanding and creating new markets. Infact, the Say's law of markets demands the effective marketing strategies. Thus, marketing becomes an integral part of economic reforms.

It is widely known that "Efficiency and Innovation" are the basic tenets of competition, which is the base for free trade. That being the case, the marketing strategies need to take the outcomes of "Efficiency and Innovation" through R&D investments to the end users on a larger scale. This means that they need to enhance the diffusion rates on a wider scale. This implies the commercialization of R&D outcomes in terms of a new product developments,

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1. It is unfortunate that our economic policy makers and planners are not willing to think the alternative developmental models.

2. Inputs cannot be totally destroyed to vanish in either production stream (i.e., conversion into products) or in consumption stream (i.e., usage of products). Hence, the residuals or wastes are just indispensable incomes. Extraction process unfolds an altogether different story, which is not considered here

new processes, new technology and better management practices and so on. In this case the marketing strategies have a definite positive role in commercializing the R&D efforts on a wider scale, which will ultimately lead to the overall growth of efficiency and productivity to reduce the costs, and the material and energy intensities of the products. This is perhaps the only way to maximize the gains and benefits from the free trade. The new and better products from improved technology can be taken to wider markets through marketing efforts. On other hand, if marketing strategies through its tools and techniques such as branding, advertisements, promotion campaigns etc., promote and encourage consumerism and conspicuous consumption on a larger scale then they will be harmful to environment in more than one way. Such strategies ultimately lead to the higher rates of extraction of non-renewable resources, threatening levels of environmental degradation, pollution and the frightening global warming. Most of these adverse environmental impacts are irreversible and irreparable. As a matter of fact they jeopardize the economic interest of our posterity in several ways besides depriving them of fertile resource base. This is precisely the reason why we said earlier that unbridled **consumption does more harm than good.** In recent years there is a growing concern that the social benefits of Extraction-Production-Consumption streams may not outweigh the social costs in terms of environmental degradation, depletion, global warming and so on. Considering the various adverse impacts on environment and conservation, we are inclined to advocate that non-consumption or abstinence seems to be better than consumption in the present context.

To a large extent, the problem of depletion and the likely shortages of resources supplies can be tackled through undertaking the large-scale exploration of virgin areas in the globe. It will bring the new and hither to unknown reserves for exploitation to make production sustainable. This would enlarge the known resource base and enable us to overcome the likely shortages of resource supplies in future. In other words, exploration would ensure sustainability for a long term. So to say, the higher rates of growth arising out of globalization and transnational business can be made compatible with sustainability only through large scale exploration programs. In the same vein, substitution of scarce resources by plentiful ones can also be undertaken through S&T (science and Technology) / R&D (Research and Development). Both exploration and substitution together would ensure sustainability. [3]

On the whole our analysis though very brief and incomplete, aims to bring out the various intricacies involved in the extraction-production-consumption streams. The marketing strategies being what they are need to take care of all the above aspects in detail, instead of focusing on the conventional market share, market expansion and profitability.

Economic reforms aiming to achieve faster rates of growth in the global economy, can only be successful, fruitful and beneficial if they are complemented adequately by the environmental protection measures and the exploration strategies. Otherwise they tend to make the dooms day a reality.[4] Because, faster rates of growth means faster rates of depletion of the known resource base and faster rates of environmental degradation including pollution.

The Depletion Effect: The adverse and harmful effects of environmental degradation, waste generation etc., are fairly reliably documented in literature (see, various publications from the Earth scan publishers). But, not much is available on depletion. The implications of depletion are particularly severe in the long run because it is the inevitable outcome of development. If development is made continuous, the depletion also becomes continuous. This cannot be dispensed with. The broad implications are:

(1) The resource base or the workable deposits for extraction will be shifted to far off places from consuming/ using centres. At times, the push will be even into the inaccessible areas. All these will result in ever increasing transport costs.

(2) Shift to the inferior grades of lesser quality and thus pushing the processing costs to higher levels constantly.

(3) In the case of operating mines, depletion constantly pushes the working faces into far off places from the pit mouth and raising the hauling costs and thereby, the overall extraction costs.

(3a) Working mines become less and less productive due to increasing hauling distances caused by depletion. They have to go either deeper or less productive areas with more mining problems.

The adverse effects of these three impacts are comparable with that of shifting cultivation.

(4) Creating a situation of raising scarcity values and subsequently injecting material substitution into the production system, the effects of which are difficult to know.

(5) Availability of raw materials tends to become increasingly critical in the future, besides quality problems.

(6) The net effect will be the overall decline of economic efficiency in the coming years besides the posterity getting adversely affected. The S&T may mitigate this problem to a large measure but not totally.

(7) Intergenerational equity issues.

The net effect of all these implications is that the longrun costs of raw material supplies have an inherent tendency to rise. And the rest follows. How long is the long run, is a matter of opinion and judgment. The above observations are made on the assumption that the information regarding the hidden mineral deposits is fairly adequately known.

3. Transnational Business and the trends in the Corporatization:

The transnational business and the corporatization can be treated as synomous for all practical purposes. Because, corporates carry out the transnational business operations. In one important sense, globalization is nothing but corporatization. They are said to be the engines of growth and development. Since the power and influence of the state is declining rapidly in recent years due to economic reforms, the corporates are simultaneously becoming more and more powerful in all the respects. Their sociological impacts are many and varied. Their role is more powerful than a nation state. The following quotation will explain the all-pervading influence of the corporate sector in the society.

> **"Over the last 150 years, the corporation has risen from relative obscurity to become the world's dominant economic institution. Today, corporations govern over lives. They determine what we eat, what we watch, what we wear, where we work and what we do. We are inescapably surrounded by their culture, iconography, and ideology. And, like the church and the monarchy in other times, they posture as infallible and omnipotent, glorifying themselves in imposing buildings and elaborate displays. Increasingly, corporations dictate the decisions of their supposed overseers in government and control domains of society once firmly embedded within the public sphere. The corporation's dramatic rise to dominance is one of the remarkable events of modern history…"[5]**

The above passage explains broadly the ethics and economics of corporatization. It is true that there are a number of ethical issues involved in these phenomena. This aside, consumption is the driving force for corporatization through various media channels and marketing strategies. The corporates create continually new wants and desires in society to promote consumerism and thereby sustain their growth and profits. At present, they are not showing any significant concern on environment and sustainability despite their populist CSR policy. The CSR is mainly used to promote their image and brand. This is the reason why there is a growing opposition to the expanding trends in corporatization. This opposition is weakened by the continuing poverty, unemployment and so on. Because, several developing countries need their massive investments and technology to solve their economic problems. Their weakness became the strength for the corporates.

The growing urge of the Nation-States to raise their rates of development to eradicate poverty and to create more employment generation and to increase the general welfare and quality of human life etc are pushing the corporatization trends to unprecedented scale. Since they are the instruments of development, almost all the countries are extending all the facilities and incentives for the smooth entry of MNCs into their respective countries to install new production facilities besides their own domestic corporates.The corporatization trends are

further encouraged by the economic reforms, revolutions in S&T, IT, transport and communication and so on.[6] **In effect, corporatization has become an inevitable outcome of reforms and globalization.** And there is nothing that can resist this trend.

In what follows is a brief presentation on the increasing levels of corporatization to substantiate the case in point.[7]

- Today, more than 65,000 corporations are transnational in the sense that they do business and control assets in more than one country.
- Together these companies control some 8,50,000 affiliates or subsidiary companies spread over several countries.
- Between the years 1990 and 2000, the sales of the largest one hundred Transnational Corporations (TNCs) increased from $ 3.2 trillion to 4.8 trillion (50% rise).
- TNCs are also significant local employers. For instance, foreign employment by TNCs (i.e., people employed outside of a corporation's home country) grew substantially from 24 millions in 1990 to 54 millions by 2001. This is a sizeable rise (125%)
- Their investments are also very large exhibiting their **economic power.** The value of cross border mergers and acquisitions (a transaction in which a foreign corporation acquires more than 10% stake in the existing domestic enterprise) skyrocketed from $ 94 billions to $ 866 billions between 1996 and 2000 (9 times).
- By their charitable activities in the name of the so-called CSR, the corporates are encroaching upon the state's jurisdiction to reduce its role and its arena of operations. Another disheartening trend is that the private participation/corporatization is increasingly in the exploitation of natural resources (timber, mining etc) for producing raw materials for production. Besides they are also allowed to own and manage projects in energy, telecom, infrastructure sectors etc to facilitate production. This is how corporates gain access to resource base and production through their technology and subsequently, **control people through media and markets.** One can notice the primacy of corporate interests over the social interest. In other words, the society and its interests (including environmental) are made subservient to corporate interest. In one word, the destiny of the society is placed in their hands. In effect, the government and the civil society are not able to hold them (corporate) accountable for compliance with the environmental standards and acceptable customer service.
- In this context the above report (2002 - 04) of the World Resource Institute observes:

  "The corporate influence on government's policies is also a concern. Critics warn that the corporate are using their economic muscle and close government connections to coax decision-makers to favour corporate interests over other stakeholders. In the U.S., for instance, Energy, Mining and waste management industries contributed $ 29.7 millions to political campaigns in 1999 – 2000 and spent another $ 159 millions on direct lobbying activities in 2000"

This is how the corporates turn everything in their favour without any concern on the "means" adopted. Their nefarious activities are widely known to the public, particularly to the agitating public. Some are known and noticed, some are not. This emphasizes the need for ethics in their decision-making. They do, as we said earlier, to achieve growth without showing any concern for ethics. In their over enthusiasm for profits and growth, the corporates generally ignore the vital social issues. The decisions that govern production, trade and investment often pay **little or no attention to the protection of environment and the human needs.** This aside, the corporates spread the unwanted and unbridled consumerism in society for their own growth, which is catastrophic in the long run. Without consumerism, the corporatization just collapses. The growth that is given and falsely promised by the corporates is solely based on the continually depleting resource-base. This being the case, it is not difficult to argue that the fundamentals of globalization and subsequent corporitization are flimsy and weak because the more of them will make the issue of sustainability more critical.

However, the major sources of power and influence of corporates over the governments, people and the markets are mainly derived from:

- R & D
- Technology
- Innovation capabilities
- Control over the resource base
- Marketing strategies and Branding.

In effect, these sources give them enormous competitive advantage and strength by which they virtually gain monopoly power over the markets.

4. Firm and the resources:

Firms are said to be instruments of development where the commoditification of natural resources from mines takes place. The result is products with saleability and utility. Marketing strategies enable the exchange of products for profits by facilitating their access to consumers. Thus, the whole gamut of operations is essentially a physical phenomena with complex environmental dimensions. In the present context, sustainability refers to the carrying capacity of the environment (physical) to maintain and even increase the current levels of consumption without hampering or jeopardizing the interests of the future generations in any manner. This has a very broad meaning and a catch-all concept. Its influence is all pervading both in theory and practice. In the present paper, resources refer to the physical resources i.e., raw materials.

A firm is designed to transform the raw materials into products, which have utility and salability. This is nothing but commoditification of natural resources. The firms use various marketing strategies to create markets for their products through raising the awareness levels, need identification and their satisfaction among the existing and potential customers.[8] This has been made a continuing process through S & T (Science and Technology) and thereby expanding the existing markets as also creating new markets for their constant growth and expansion. This can be conceptualized as below:

[Resource –base] → [S & T] → [Innovation] → [Commercialization through products] → [Marketing Strategies] → [Consumption]

This is to say that the whole production-consumption steam is essentially a physical phenomena.

Therefore the analysis of marketing the products (whichever category they belong) need to be constrained by physical laws rather than economic/financial principles. As against this background, we intend to look at marketing in its various facets. Marketing through its all-powerful advertising instrument,[9] makes people buy the things, which they don't NEED. Our paper tries to focus on this aspect. In this context, it may be noted that the resources are finite in their known endowments and limited in their supplies.

5. Categorization of Resources and the Marketing Strategies

In the academic debates on the impacts of globalization on environment, the latter is generally restricted to renewable natural resources at the cost of depriving a due space for the nonrenewables. This seems to be a major imbalance (or rather a distortion in our policy thinking) in our approach to achieve sustainability or the carrying capacity and compatibility (Dennis Pirages and Ken Cousins, 2008). As a corollary, it can be said that any developmental model that places an exclusive reliance on the depletable resource-base will have to face an imminent downfall sooner than the other models. By implication, this is the result of the **resource-curse.** As a matter of fact, it is not difficult to manage the problem of sustainability of renewables (e.g., forestry, water, clean air, soil fertility, fisheries etc) by stringent policy measures and their strict implementation. But the nonrenewables (e.g., minerals, fossil fuels etc.,) pose unsurmountable problems because they are not just replenishable at all. This aspect did not get its due space in the ongoing debates. The present paper tries to make an attempt in this direction.

Saleable products as said earlier are made out of the natural resources either directly or processed/converted into raw materials and later processed into exchangeable products. It is the firm that undertakes the whole gamut of operations involved in bringing the products to the markets. Thus the whole landscape of the production – consumption stream is essentially resource centric. In this context, resources are broadly classified into:

a) Renewable / Replenishable; and
b) Non – renewable / exhaustible / nonreplenishable.

Both come mainly from land, either from above soil or below. The above category (a) is generally found to be

ubiquitous and plentifully available for consumption for a particular level of population. There is no scarcity value attached to them. But, if population explodes to abnormal levels, they tend to become scarce and thereby get scarcity value, which is to be added to their normal pricing practices. In this case, it is to be matched with the rate of their regeneration so that continuous resource supplies are ensured. Mismatch leads to scarcities. In the case of renewal resources, the rate of extraction/ exploitation needs to be kept in pace with the rate of replenishment. They are replenishable. This can be achieved through scientific planning and management. Otherwise, depletion sets in (e.g.: fisheries, forestry etc.)

In the case of products made of renewable resources, the marketing strategies can be liberal if they can take care of the 'matching' problem. Since the matching problem is being taken care of, there is no question of depletion and its associated problems. There is no fear of consumerism since their residues are not harmful to environment (easily biodegradable and absorbable). On the whole, those products do not pose any environmental hazards. Unlike other products, these products satisfy the needs of the people (Eg: food, fisheries, fuel wood etc.,). Therefore, there may not be any requirement for any kind of marketing tactics.

On the other hand, the products made out of non-renewable resources are prone to a number of unsurmountable problems in the areas of environment, waste disposal, depletion and pollution. As a result, there is a growing resentment among the enlightened public against the present levels of consumption of these materials. They are generally taken up as the core issues of the NGO sector. These NGO movements are essentially directed towards conspicuous consumption, wasteful use of scarce resources and so on. The major problems associated with these products are:

i) Extraction being an inseparable and integrated part of production processes, creates a number of environmental hazards such as: deforestation, soil erosion, waste disposal, land damages, displacements and many others.

ii) The modern production trends reveal that the sustainability and the carrying capacity of the environment to supply the present levels of raw materials are becoming increasingly critical.

iii) Faster rates of depletion jeopardizing the interests of the unborn posterity.[2] For instance, it has been shown empirically that the sum total extraction for the last 10 years or so are found to be more than the sum of earlier 100 years of output. This refers to a coal mining company, which clearly shows that the depletion rates in recent years are indeed alarming.

iv) Residuals/waste management. As a matter of fact, the word consumption, as said earlier, is a misnomer in economics or marketing. Infact, we buy a product and use it over its lifespan; and thereafter discard it and throw it into the open environment. We only use its utility streams. Hence, the whole problem is one of managing the wastes or the residuals, as today's production of anything becomes tomorrow's waste. Studies reveal that the waste generation from the extraction-production-consumption streams are found to be more than the capacity of the environment to receive, absorb and assimilate such wastes. The consequences are pollution of various types. The generally accepted solution to this problem lies in the 3 R's (Reduce, Reuse & Recycle and Recover). The recycling solution is also being questioned because it only alters the environmental medium to absorb wastes.

v) The extraction–production-consumption stream produces a number of toxic emission/ wastes through their routine operations. They are also highly energy-intensive. The net effect of all these activities is seen in global climatic changes of far reaching consequences. (See Appendix – III)

With this brief background in view, the marketing strategies undertaken by various firms need to be examined, evaluated and appraised for their various socio-economic policy implications. The products being what they are, the corporate/public policies need to be oriented towards promoting and advocating environmentally friendly consumption patterns in society. The "how" of it, is a matter of interdisciplinary concern. **Otherwise the marketing strategies will be undertaken at their own peril.** The marketing strategies through

their various techniques of advertisement, branding, promotion etc tempt and induce people to buy the things, which generally they do not need. This leads to the perilous conspicuous consumption, which is termed as consumerism. The corporates encourage these trends for their short-term gains by overlooking the long-term ramifications on society and on themselves in particular. They sacrifice the long-term interests for their short-term gains. This can be termed as the corporate paradox, which in the long run erodes their own profits.

The marketing strategies generally assume though implicitly that the environment is a perennial and inexhaustible source of raw material supplies for their production stream. On the other hand, they also assume that the environment is a bottomless sink to receive all kinds of wastes generated by their selling processes. Infact both economics and management assume that the resources are 'given' which in reality are not given but 'taken' from a finite source. The reckless extraction for reckless consumption advocated by the corporate in essence, go against the principle of parsimonious or wise use of natural resources. The marketing strategies whatever form they take go against the basic principles of the ethics of conservation.[10] In the ultimate analysis, the corporate impede and jeopardize the practices of sustainability in society and the environment of which they are also an integral part. The whole issue of sustainability, therefore, needs to enter explicitly in the formulation of marketing strategies. Their non-cognizance will make the marketing strategies to go on at their own peril.

The alarming issues of residuals/waste management and environmental sustainability need to be an integral and inseparable part of extraction-production-consumption streams. They have to get their due space in all the corporate strategies. Otherwise, the very objective of development to enhance global welfare will be defeated. This issue has been ignored till recently. It is gaining cognizance due to the increasing involvement of the NGO sector in the corporate affairs.

6. Marketing Strategies and the Purchase Decision

Sustainability is a new name given to the old concept of conservation. In fact they mean the same thing. The core of its advocacy centers on attacking the conspicuous and wasteful consumption of scarce non-renewable resources. Sustainability does not mean abstinence from consumption. But it is essentially parsimonious or wise use of resources in place of reckless consumption as is seen today. **It has a great relevance to marketing strategies** because they lie at the very root of resource-use. Marketing strategies are ostensibly directed towards satisfying the needs of the people such that their welfare is maximized. And, in the process, the corporate earn profits. But in reality the corporate are creating new wants, desires and aspirations to sell things, which are not needed. To justify this sort of divergence, they created the concepts of satisfaction, customer delight and of sorts. In the process, they are making abnormal profits. In view of these complex processes, the marketing strategies need to be judged mainly by the parameter of sustainability.

The fundamentals of marketing strategies need to be based upon the analysis of felt needs in a given society. The felt need analysis and assessment should consider the resource base in great detail – its quality, quantity, longevity and so on and also its relation to a level of population. Resource base in general is a major determinant of the quality of life for majority of the population in a given society. Whether nature is niggardly or bountiful will thus determine the quality of life. In this context, the product requirements can be arranged in an ascending order of their intensity of possessing (buying) rather than going without them. In any given society, at a given point in time the product categories and the nature of product requirements can be diagrammed in Figure 1.

They are nothing but the triggering factors or the underlying forces for the purchase decision. In their absence, marketing cannot take place. Purchase decisions refer to buy or not to buy situation for a particular product category. It is a multi-dimensional process. Several neuro-psychological, complex processes take place within a very short span of time in the mind before a purchase decision is made. In fact, it encompasses several neurological, physiological and psychological processes concerning the purchase decisions. They are highly complex because they take into account several permutations and combinations of the ordering of product requirements

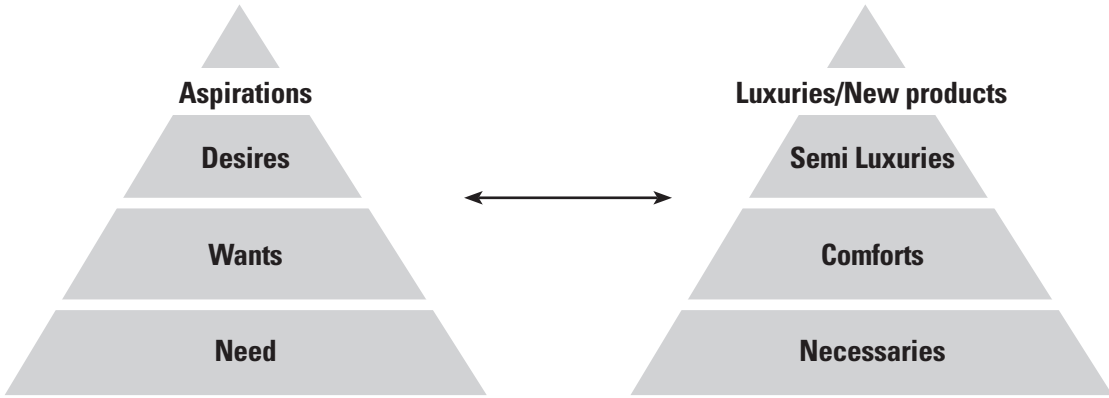

Figure 1a
Nature of product requirements

Figure 1b
Corresponding product categories

(Space in the pyramid is indicative of the respective volumes of the elements presented)

Figure 1 Correspondence between product requirements and product categories

and the product category. In between there is problem of prioritization and its shifts between the products and need assessment. This is the reason why the concept of neuro-marketing is gaining increasing concern from the marketers in recent years.[11]

To make the scheme of marketing phenomena complete, one can also classify the customers as shown by Figure 1c.

The three pyramids together will define the broad boundaries/contours within which the marketing and production strategies will have to operate. The whole gamut of their operations and constant shifts will have to be examined, evaluated and assessed for the social welfare in the context of resource base, environmental sustainability, demographic factors and the developmental imperatives. This is indeed a complex exercise.

By super imposing or overlaying one pyramid over the other, one can get a fuller meaning of marketing strategies aiming to inflict a number of shifts and transformations to expand the market base. Needless to say that the neurological and behavioral responses to marketing stimuli vary widely across the customer categories. A cursory glance at prevailing marketing strategies indicate that they are essentially directed towards exploiting the neurological responses among the gullible public through their marketing techniques and branding strategies. In effect, they promote consumerism against the principles of conservationism and environmental protection. In the long run, they will be counter productive, if unchecked. They cause more damage than good to social well-being. The whole issue requires more elaborate and in-depth analysis.

The above said shifts or conversions from need to… aspirations are in fact the inevitable outcomes of the dynamics of the growth processes and exogenously injected growth impulses. The latter propel the former in subtle and complex ways. Further, they are also part of the social dynamics though tacitly. No society is stationary.

Figure 1c Corresponding Customer Categories

Such tacit shifts take place either spontaneously at times or directed, at times. The on-goings may be tacit and invisible. But, they tend to become perceptible and palpable after they take place (i.e., expost facto). However, they are the inseparable part of social dynamics. Social forces create such shifts/conversions constantly and invisibly. They also unleash equilibrating forces to make necessary adjustments such that there will be some balance (among the three pyramids) between demand and supply of goods and services[3]. In this case, the economic progress may be slow due to lags in social responses. From environmental viewpoint, slow growth may be better than the unregulated, uncontrolled and disastrous growth as seen today. However, the whole process is highly complex, perhaps beyond our (author's) capacity to catch and comprehend. Whatever be the complexities, the policy issue then arises, is:

- whether to leave it to the social forces to operate to manage the shifts/conversions in a non-interventionist manner or allow the intervention of corporate marketing strategies to manipulate in their favor. **This then is a major social public policy issue.**

At the outset it may be noted that there are no sustainability concerns for category 1) products (bottom of the pyramid viz. necessaries). Therefore, the concerns of sustainability/conservation refer to the wants, desires and aspirations and their corresponding product categories. On general grounds, it can be said that they are all based on the non-renewable resources. Hence, the problem[4].

Marketing strategies need to be generally shaped by judicious or optimal correspondence between the product categories and the ordering of product requirements (see the Figure 1) in a broad framework of resource-base and sustainability/conservation strategy adopted by a country. This will be an ideal marketing strategy because it takes into account explicitly the constraints/limits imposed by the existing and known resource-base. Such a strategy would achieve the objectives of conservation while at the same time make normal profits for firms to survive in business. But in practice and in reality, one can observe significant deviations from the ideal strategy for the sake of short-term gains. There has to be scientific correspondence among the three pyramids as shown earlier instead of a haphazard one. It requires a rigorous scientific study.

The Marketing strategies through their various techniques and tools such as advertisement, promotions, branding etc create wants, desires and aspirations to induce the people to buy their products[5]. More importantly, they also try to create some kind of illusionary and false shifts from the top to bottom (see figure 1) in the sense that all the desires are made ultimately to appear to be needs. Thus, they create the **illusions of need** as also the illusions of value in products, perhaps simultaneously, to propagate more and more consumption of goods (mostly unnecessary ones) on an ever increasing scale. These movements are really complex processes involving several neuro-psychological factors. These conversions in the ultimate analysis promote unaffordable consumerism in the society and subsequently hampering the firm's profits for long.

The sole objective of marketing strategies as can be seen today is to make the **conversions** of aspirations into desires; desires into comforts and comforts into needs. And, subsequently their aim is to maximize their market shares and profits by selling more, more and more without any regard for resource base. This is how the purchase decisions are moulded in the society. In the process, they also try to convert everyone into customers for all kinds of products. All in the name of development. All those conversions and distortions as explained are made to occur in society through the corporate power over

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3. Underlying forces behind the demand and supply interactions is the complex web of the three pyramids.

4. In fact, the essence of this discussion can be noticed to some extent in the public agitations in recent years against the globalization / corporatization.

*5. Branding creates mainly **differentiation** in same product. This implies that it multiplies the same product (perceptually) into many depending upon the numbers of brands. Ultimately, this multiplicity leads to a substantial rise in the total consumption of a product by attracting more numbers of variety-seeking, curious and affordable consumers. In this manner, it increases wasteful consumption in the economy as also consumerism.*

mass media. By these conversions/shifts, the corporate are trying to expand the market base (through creating false perceptions about needs) so that they can sell more and more. In the ultimate analysis, marketing creates mundane passions with unscrupulous pursuit of material interests to make our lives **nullity**[70] and homes cluttered with many zero-utility products. Thus the present path adopted by marketing strategies is extremely hazardous to the quality of environment. Rightly, there is a growing awareness on the impeding dangers of environmental degradation in recent years among the planners, policy makers and strategists. This is the reason why the analysts have already started exploring alternative development models.

This is also reflected in the pricing of products, which at present ignore the social costs resulting in under pricing. To correct this anomaly, there is an emerging concept of life cycle costing of products, which take into account all the social costs (thus far ignored) from extraction stage to the product disposal stage. In effect, the prices will go up and consumption levels will go down leading ultimately too lesser burden on the environment. This is indeed a healthy sign if practiced. In the same vein, substitution of scarce materials may also take place, which will ensure sustainability. With the population explosion unchecked and with ever increasing aspirations of the growing population to make their lives materially better off, we are inclined to reach a pessimistic inference that higher prices and smaller consumption baskets are a preferred option in the interests of environment and sustainability. It is true that this goes against globalization. But, the unsustainable globalization also cannot be accepted to placate the corporates. Our hunch is that the globe is not designed to satisfy the greed of everyone but only the needs of all. It is in this context, the marketing strategies are to be evaluated and assessed for their social good.

On the whole, the sustainable marketing strategies for the sustainable globalization will be the ones that:

(a) Will not promote consumerism or conspicuous consumption; and material & energy intensive lifestyles.
(b) Will not promote materials & energy intensive products/production patterns.
(c) Will not shorten product durability /life span.
(d) Will not encourage "use & throw" culture and that encourage "reuse".
(e) Will not use excessive and unwanted packaging.

7. Firm, Market Base and Competitive Advantage:

Firms produce products of various types to satisfy the customer's needs of varying degrees of intensity. Markets are becoming highly heterogeneous and complex. The consumer has "so wide a choice" that firms' marketing strategies have become imperative at best and very complex at worst. In this context, three dominant decision variables have been identified in the formulation of marketing strategies in general. They are:

(a) Firm's sales volume/output
(b) Firm's Marketing efforts
(c) Consumers' absorption capacity.

The following analysis of the three variables emanates from the earlier pyramid analysis (figure 1)

Consumers' absorption capacity to absorb a particular product or a basket of products is a function of income level, education level, urbanization level etc of a consumer. In one important sense, this refers to the market base as mentioned earlier. On general grounds, one can suspect that this cannot be infinite. It is infact limited by the availability of disposable time, leisure, fatigue levels, inclinations etc; besides the conventional variables like income, education etc. As a matter of fact, these variables are becoming increasingly critical in the modern era. They define the scope and magnitude of consumer absorption capacity. Besides them, there are the other imperative demands of socialization and social networking. Several of such things impinge on the disposable time and leisure of the customers. Leisure has become a critical resource. One can observe that people are making a trade off in favour "Leisure & rest" against the use of products they bought (making them useless). Residential space adds yet another dimension. All we want to say is that "income levels alone" cannot determine the consumer absorption capacity of products. Since the determinants themselves are many and complex, it is indeed a complex exercise to determine the scope and extent of the capacity to consume a large variety of products. Further, goods and services

compete to attract customers to buy. On the whole, the consumer absorption capacity can be considered as a limiting factor to buy indiscriminately, though, there may be the desire, will and affordability to buy. This concept refers to all the customer segments since "time, leisure and rest" are equally critical across all segments. This is the consequence of the modern urbanized time-starved human life.

That being the case, this issue will lead to two consequences viz.,

(a) Limitless consumption may not be possible indefinitely; and

(b) Under-use of products implying the avoidable wastages of resources. It is taking place on a large scale. This can be mitigated to a large extent by the development of 'seconds' markets, which enhance the durability of products and thereby reduce the burden on the environment. There appears to be no solution to the former.

It may be noted that the concept of absorption capacity does not refer to the needs and necessities but to the desires and non-need products. In fact, one can feel that the customers seem to be disgusted with the huge variety of products offered in the markets. There seems to be a lurking realization among the consuming public (at least a section of them) that marketing is too disgusting as it is encroaching upon their peaceful existence. In a sense, this is reflected in the growing environmental movements against consumerism and corporatization, in general.

In the same way, it has been observed that globalization has a tendency to increase the inequalities of income and wealth. In the ultimate analysis, the unequal distribution of incomes and wealth also tend to constrict the extent of markets in the long run because the markets will be clustered around higher income brackets[6]. In other words, it excludes a larger segment of population from consumption stream and thus, constricting the extent of markets to a particular category of products (see the earlier pyramids). This will also have the same dampening effect as that of the absorption capacity.

The above implies that the corporates cannot go on selling in quantities that they desire due to the limitations of consumer absorption capacity. In other words, the market base itself is limited beyond which the corporate cannot expand. Thus, it defines the boundaries or the upper bound of the marketing strategies. Even the extent of competitive advantage of firms is limited by the consumer absorption capacity or market base. The above analysis however seems to be more notional and perceptual, but they do exist in reality.

The other two decision variables are self-explanatory. The firm has to formulate its marketing strategies after considering these decision variables in detail and within the broad framework of environmental carrying capacity. One can observe that there could be two limiting factors in this complex operation viz. consumer absorption capacity and environmental carrying capacity in the context of globalization. In other words, the firm needs to operate within these limits. It **cannot** push its marketing strategies beyond consumer absorption capacity and it **should not** ignore environmental carrying capacity in the process.

The interrelationships between a firm's marketing effort, sales volume/output and consumer absorption capacity is conceptualized graphically as in Figure 2.

This graphic analysis though simplistic can be adapted with suitable modifications to any level such as: product level, unit level, micro and macro levels. From the above diagram, the following broad propositions can be formulated for the sake of understanding and further empirical work. They are tendered in a framework of the organizational growth path. This is to state that the enterprise responses through marketing strategies need to be different during different phases of growth cycle.

Proposition I: If the rate of absorption is higher than the rate of increase in marketing efforts, the sales will also be increasing more than proportionately.

During the initial stages of product/firms, the marketing efforts are likely create the required awareness levels in the minds of consumers regarding product requirements

6. This is perhaps the reason why the management gurus advocate the expansion of market-base at the bottom. This is in the interests of the corporate sector.

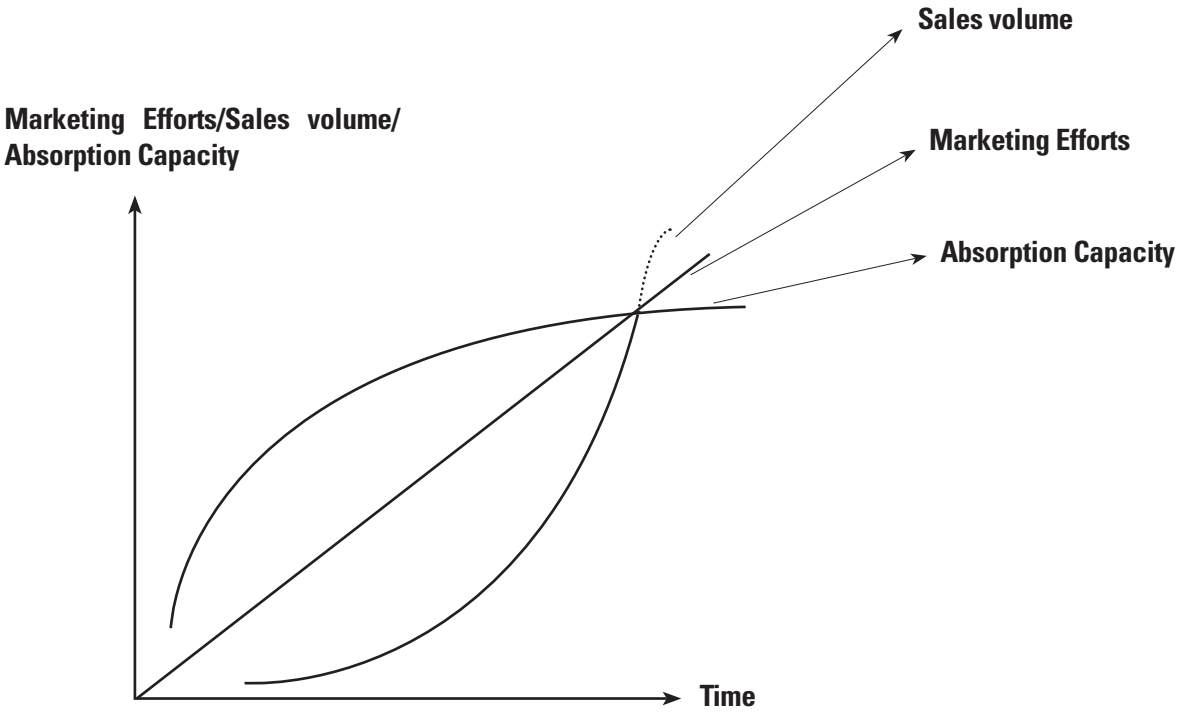

Figure 2 Interfaces between Decision Variables*

along with their product categories resulting in purchase decision (sales for the firms). During this growth phase, the rates of change of the variables will be higher than during the maturity stage. In this case, the sustainability or the environmental concerns will not normally become critical though the socio-economic planning should not ignore it by postponing till the threatening proportions are reached.

Proposition II: When the absorption capacity reaches an asymptotic limit and an equilibrium stage is reached where absorption capacity and sales is maximized for a given level of marketing efforts and product.

This is infact the maturity stage. Since saturation levels of all kinds are reached in a society, the environmental and sustainability concerns come to the fore. This also gives rise to public debates.

Proposition III: Despite the increase in marketing efforts, the rate of absorption for a particular product decrease and thus imposes a constraint on market base expansion.

This is infact an indicator of a declining stage where the benefits of marketing/ development efforts may not outweigh the costs. Environment concerns will continue.

Proposition IV: To ensure survival and growth (increase in sales) after the declining stage, the firm's emphasis needs to shift from new product development (tangible factor) to product-value improvements (intangible factors) and diversification of products and markets.

During this declining stage, it requires significant resource diversification and large-scale resource substitution to achieve sustainability of resource supplies and thereby to keep the business and industry moving. With regard to the environment, there needs to be programs and projects for reclaiming the environmental quality, protection from future degradation and maintenance of the environmental quality standards.

** Details of this budding model will be worked out in one of the author's Ph.D. thesis.*

Proposition V: The non-cognizance of the environmental dimensions in the marketing strategies will be self-defeating.

Environmental and sustainability issues need to enter explicitly into the core (not peripheral as is seen today) of the corporate strategies. Otherwise the Marketing Strategies will be undertaken at their own peril. The marketing strategies need to be reoriented in tune with the complexities arising out of environmental concerns and globalization. They need to consider explicitly the limiting factors as explained earlier. The unregulated and uncontrolled marketing efforts will make the issue of sustainability more critical. In this context, the social control through enlarged role of NGO sector seems to be necessary in today's growing consumerism. Further, we need to reconsider our belief that consumption alone can enhance social welfare keeping in view the environmental and resource constraints.

In the context of globalization, one more proposition can be put forth as below:

"Globalization aiming to achieve faster rates of growth can be made compatible with sustainability only through large scale exploration projects coupled with conservationism"

8. Innovation, Firm and Marketing Strategies:

Innovation is said to be the major driving force for continuous improvements in a competitive economy. Infact competition promotes innovation while the marketing strategies commercialize the outcomes of innovation into revenue-generating processes. Thus both are complementary to each other as also reinforcing each one's contribution. Both together contribute to building of sustainable competitive strength of a firm. Since competition involves continuous innovations through R&D, one may suspect that the whole gamut of linkages may make a dent on the finite resource base and subsequently making sustainability more critical. This suspicion is based on the fact that prices go down, new products come in and consumption rises. In what follows is a brief analysis on this aspect.

In this context, a distinction can be made between

(a) Process innovation and
(b) Product innovation

Process innovation generally refers to the ways in which the products are made through various combinations of factor inputs (mainly the input/output ratios) while the other refers to the design of products mainly the new ones to satisfy the customer's desires, and to create new markets or expanding the existing ones. That being the case, the first one is geared towards promoting and achieving mainly the environmental (resource-base) sustainability of the globe. Because it reduces material and energy intensities in the products. The second one promotes/enhances the short-term competitive advantage of an organization by generating more revenues.

It is true that both process innovation and product innovation are important, but not equally. Their relative importance varies in tune with stage of development, resource availability, S&T, depletion rates etc. Both are important to the society but their relative roles vary. If the process innovation is directed towards reducing the input-output ratios or the material intensities, it is good. If it is directed towards promoting products to satisfy customer desires, it is not so good. On the basis of this distinction, it can be inferred as below:

i) Product innovation promotes consumerism and
ii) Process innovation, if directed well, promotes conservationism.

The type (i) above refers to the markets and type (ii) refers to the production systems. Keeping this in view, the marketing strategies need to make a judicious balance between product and process innovations. In essence, they need to encourage the process innovation, which achieves the objective of environmental sustainability. This is in their own interest. Therefore, the focus of marketing strategies need to make a shift from the tangible dimension (physical) of innovation to the intangible dimension (non physical) which refers mainly to the information and knowledge including the mass media and promote the sustainability values among the customers.

The primary objective of corporate strategies or the thrust of transnational business will be to make globalization

compatible with sustainability. This is necessary in their own long-term interest and survival. Sacrificing the long-term interests for the shorterm gains is no good a policy. In this context, one more proposition can be made as below:

"Globalization can be made compatible with sustainability more through process innovation than product innovation."

Conversely, it can be hypothesized that if the product innovation leads to the conspicuous consumption, then it needs to be discouraged in the interest of sustainability.

Whatever may be the case, the innovation processes need to reduce the material and energy intensities in the products as also enhance their durability or the product life spans. This will ensure sustainability. Their net effect will then be the reduced stress on environment as also the waste/residuals generation will be much less. This is the only way coupled with exploration, to make globalization compatible with sustainability. This is the only way to overcome the impeding dangers of depletion and environmental degradation. And, there is no other way.

9. Marketing Strategies and the State of Environment

In our paper, environment and resource base enters explicitly and in a different way as also assume a unifying role. It is in fact a unifying theme. The basic premise is that everything for material consumption comes from the environment and goes back (residuals) to it, though in a different form [19]. In between, some physical changes take place. Given this, a firm is considered mainly as a processing/converting unit in which, the commoditification of natural resources take place resulting in the production of exchangeable goods with utility and salability (The role of marketing strategies enters thereafter). Thus, a firm assigns "utility and salability" to natural resources by undertaking various processing and converting activities. In essence, it converts the environment and its quality into useable products to satisfy human needs (legitimate). The problem is that the environment and its quality is finite, exhaustible and mostly nonreplenishable; and it is also a huge complex web of many interconnected elements. In that sense, environment is so huge and complex that it is beyond definition. More importantly, the quality of human life depends on the quality of environment that exists. All this, needs to be kept in mind while discussing the marketing strategies in the context of expanding globalization.

The whole process of production (including the extraction of raw materials) and marketing in the name of development is essentially a physical phenomenon. Hence, it has to be guided by and adhere to the physical laws/principles but not economic /financial ones. So to say, there needs to be the primacy of physical laws over the economic laws, which would ensure sustainability. So far, reverse took place. **This the history unfolds.** This is the reason why the globe is facing the nature's fury reflected in the form of climate changes and warming, degradation, soil erosion, desertification and the list goes on and on. Keeping this in mind, a quick scanning of literature, published data and our field visits to various forests and mines was made to describe the existing state of environment. One of the authors of this paper summarized it in an acronym as BALDED with reference to India. Where:

B = Billion lot (of population), including demographic features, population explosion threat, work habits etc.

A = Increasing levels of aspirations to make the lives materially better off leading to more energy and material intensive life styles.

L = Longevity or Life expectancy which is almost double now over 1951 census. This together with the earlier two reflects the extent of stresses/pressures inflicted on environment. Needs no explanation.

D = Depletion of all kinds of natural resources including the ozone layer etc.

E = Effluents or residuals / wastes by the extraction –production-consumption streams (all kinds of gaseous, liquid and solid residues and emissions).

D = Deforestation (including soil erosion, desertification, top soil losses, climatic and rain fall changes, tribal displacement, wild life etc…)

To put it in a cause-effect framework, it may be noted that the first three letters (viz., BAL) can be considered as the causal or contributory factors not only to the latter three letters viz., DED, the effect; but also to the rising industrialization levels and other economic activities. The above-fabricated acronym is deceptively simple because it encompasses the whole range of socio economic activities in their complex forms that have certain and definite dent on the environmental quality. The problem is that the impacts take place imperceptibly with different incubation lags[7] (e.g. deforestation, dust emission by cement plants on land and photosynthesis process; etc.)

That state of BALDED environment can be observed not only in India but in several other countries also. Needless to explain and elaborate its impacts. It is in this context and framework that a critical analysis, evaluation, assessment and appraisal of the corporate marketing strategies and the globalization trends need to be made. In the same vein, the environmental sustainability or its carrying capacity needs to be concurrently carried out. Both together would give a critical appraisal of marketing strategies in the context of globalization and free trade [18]. The whole exercise is indeed very complex. However, one can suspect on general grounds that the likely outcomes of such a holistic exercise may not justify the current trends in globalization and marketing. Environment in its varied forms is likely to impose severe constraints on their expansion. Thus far, no further. Even the existing level of production-consumption may not be tenable and sustainable.

It is not difficult to show empirically[8] that there is a real environmental degeneracy in alarming proportions as also it became really balded. It is not the forests that are denuded but the environment, in general. Therefore, in the ultimate analysis, this becomes a major defining feature of the extent of markets. It also defines the boundaries and contours of markets within which, firms can operate and compete. It also defines the boundaries beyond which one should not push development and globalization[9]. Because, everything has to come from the environment and has to go back to it, though in a different form like the residuals etc [19].

The Corporate Social Responsibility (CSR) in the present form, which takes up a few a forestation projects, some environmental restoration programs, a few environmental protection measures etc., are all geared mainly to comply with the legislation. It is also directed mostly to build the image and branding of the corporates in a philanthropic way [20]. They are not serious and enthusiastic to take up environmental protection and because it affects their cost sheets adversely and thereby, their competitive strength. Consequently, the scope of CSR activities do not lessen the gravity of the situation endangered by the present levels and rates of unarrested environmental degradation.

The Need for Compatibility: When once the environmental quality is damaged by our extraction-production-consumption streams, it is a near impossibility to bring back the damaged and degenerated fragile environment to its **original form** through whatever technology that can be used (e.g.: forestry, top soil, water and air quality etc). The advocates of free trade and globalization argue that the overall rising levels of incomes and profits will enhance the environmental quality through more investments on such abating technologies as being extensively developed and used. But, the **original state** cannot be restored fully by any technology. Can we reclaim the degraded and fragile

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7. The concept of incubation applies not only to humans but equally to the environmental resources. This creates blurs and distortions in the arguments and debates on industrialization, globalization and environment. Consequently, pushes us away from the realities. The arguments in either way may not be tenable.

8. See the various publications (books) from the earth scan (publishing the sustainable future), London. They give enormous amounts of empirical evidence on the on-goings on the environmental front. They also give ample credence to the arguments presented in this paper.

9. In this age of computers, IT and information revolution it is not difficult to construct boundaries to the nations and to the globe at large. Thereafter, the policy design and framework needs the political will of all the nation states.

nature to its original level by any technology? In the ultimate analysis, the solution lies in "protect or perish". If we protect the environment, it will protect us. This is the essence of environmental management[10]. Therefore, a cautious approach and an in-depth analysis are required to exploit the growth-impulses unleashed by the economic reforms. Whatever the arguments in favor of or against the free trade and globalization, there has to be compatibility between the environment and economic development in the interests of the very human survival in the ways that make human life comfortable and lively.

Making globalization sustainable and compatible with the environment is the dire necessity for its very success. Otherwise, it will go on for its own peril. Because, the compatibility would avoid the impending dangers of environmental degradation including the threatening dooms day. It will also counter to a significant measure the forces of antiglobal movements [21]. The compatibility measures lie, among others, in undertaking continuous large scale exploration programs in the virgin areas to bring the hitherto unknown mineral deposits[34] combined with stringent conservation programs [22]. And simultaneously, there has to be a tirade against reckless consumerism, conspicuous and wasteful consumption and overuse of exhaustible resources. This package needs to be supported by a rigorous environmental policy[23].

The above condensed package needs to be scaffolded by a large number of related measured derived from the above package. The major components are:

- To reiterate, exploration and conservation.
- Better mine planning and scientific methods of extraction to enhance the levels of recovery from the working deposits.
- Avoid skimming of the deposits and the slaughter mining practices.
- Reduce material and energy intensities in the products to the barest minimum.
- Condemn the "Use and throw" type of consumption practices.
- Reduce the packing and packaging of products to the barest required levels. Discourage or even avoid the use of packaging to attract customers. Avoid packaging wherever possible.
- Enhance product durability to reduce waste generation.
- Reduce, Reuse and Recycle and Recover. Follow rigorously.
- Transfer of usable materials (or parts) from the discarded products for use.
- Tirade on conspicuous and wasteful consumption.
- Substitution of plentiful to scare resources through R&D
- Enhancing the product lifetime usage through second hand markets which assume special dimensions due to declining product life cycles.
- No new product development, but better quality in the existing ones.
- Reoriented marketing and advertisement strategies in tune with the principle of conservation.
- Make people realize that finite resource base cannot sustain the indefinite growth. Quality of life does not mean bigger consumption baskets.
- Develop relevant value systems and social culture in consonance with the ethics of conservationism. And, to promote less material and energy life styles.
- Develop that technology which releases the least residuals.
- Low-grade ores/mineral resources or deposits to be put into use through R&D or blend with superior quality. Similarly, the inaccessible reserves at uneconomic sites or depths.
- Reduce the scope of carbon economy to reduce the green house effects.
- Lay more stress on process innovation than product innovation.
- R & D efforts to be focused on reducing the materials and energy intensities in products. Though the above package of measures is not exhaustive, it gives the direction and intent. This is how one can

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10. The "how" of it, lies outside the scope of the present paper.

make globalization sustainable and compatible with environment and the finite resource base. But, it may not be palatable to the corporate sector because it thrives on the ever-expanding consumption baskets coupled with reckless exploitation of scarce resources. Their interests collide and confront with the ethics of conservation [24, 25, 26]. In this context, Joel Kovel (2007) has clearly shown how the damned capitalist system is wrecking nature in his seminal work on "The enemy of nature: the end of capitalism or the end of the world". This is the problem that needs to be resolved in the interests of sustainability and compatibility. In this regard, marketing strategies have a definite role to play perhaps in a reoriented manner.

The ethos of corporates in simple terms is: "We produce and produce; you consume and consume: and we make profits and more profits"[11]. In support of this, there is the state to inject continuous purchasing power through bailouts and stimulus packages. This then raises the issue as: how long this can continue. **Definitely not indefinitely.** Because, the resource-base is finite and the **doomsday** is certain at some point or the other (see Appendix – I). As against this, the corporate philosophy takes shelter under the infinite potential of science and technology[12]. It may be true that the S&T can solve the problems of long term sustainable supplies of raw materials through tapping the hitherto inaccessible and likely resources endowed and embedded in other planets and the deep-oceans. Thus, the ethos of corporates goes unquestioned. But the problem is the intervening period between now and then. Thus, there is a transition which requires a set of **transitory** measures which are the integral part of conservation. Thus **conservation is the bridge between the present and future.** This intervening period may be very long during which, a number of sustainability problems become increasingly critical if the current trends in consumption goes unchecked. This perilous period is the main concern of and addressed by our suggested package of those consolidated transitory measures derived from our analysis. Implicitly, it also assumes some limitations of S&T in solving the problems of environment and depletion. In effect, our analysis attempts to postpone the evil day through a set of transitory measures.

Depletion and its consequent problems of resource availabilities (see Appendix – III), environmental and ecological problems etc., are all the indispensable outcomes of globalization which is facilitated by marketing strategies. The issues are essentially global in nature. It needs, therefore, global preparedness to face the doomsday and its possible postponement (as suggested earlier) into the distant future seems to be the best option. After all, we are all dead in the long run.

Development and Environment

Development is both the objective of as also a constraint on the expanding trends in globalization. Projects are said to be the tolls of development. It is carried out through implementing many and varied kinds of projects whose impacts on environment are definite and certain. These impacts are of varying degrees in terms of their severity, urgency, risk, toxity, time and duration, retrievability, restorability and reparability, controllability, tangibility and so on. They are not uniform and homogenous but vary widely from project to project and by location. Hence, they are highly complex to manage and control. However complex they are, they need to be accounted for in the project management methodologies.

More importantly, it is to be noted that an environmental resource, when once damaged, is very difficult to bring back to its **original form.** In that sense, **the environmental resources[37] tend to be nonrenewable and nonreplenishable, definitely in the short run.** Therefore, this calls for an utmost caution and concern from the policy makers, planners and project managers. Otherwise, the projects, whatever they are, tend to become counterproductive in the long run.

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11. This ethos seems to be unbounded and indiscriminate; and is essentially shaped by 'greed and speed'. The recent happenings in world indicate this.

12. It also assumes that there are no limitations to S&T. The fact of the matter is that each of its outcomes carries a price. Who pays? And, at what costs? However, the S&T is hoped to bring a new beginning at the end of the present world of scarcities.

Till recently, the projects were evaluated and appraised solely by the principles of economic and financial viability or the financial appraisal but not the environmental appraisal. In other words, the environmental / social costs were totally ignored and unaccounted in project evaluations and appraisals. Thus, there is already a huge stock of environmental damages in various forms calling for huge investments for their restoration[13]. Thus, the future development will be impeded unlike the past, due to restoration and diversion of productive resources as also due to mounting public opposition. This is one aspect and the other being the growing concern on environment protection in projects. In recent times, the social/environmental costs started gaining some space in project appraisals through Environmental Impact Statements (EIS) and Environmental Impact Assessments (EIA). They are made mandatory for all major projects. However, these instruments are not carried out rigorously for various reasons. And, there are many impacts which are beyond identification and quantification. The primary objective of EIS and EIA is only to get the required environmental clearances from the governmental agencies. To our limited knowledge, only a very few projects might have been rejected on the basis of EIS/ EIA[64]. Though they are of limited value, they could create environmental awareness (its protection) among the public and the investors. Among other things, they are also generating public agitations (through NGOs) to protect environment.

Since the Social/Environmental costs are not taken into account fully in the developmental projects, the benefits of development are over stated while the costs understated. This also holds good in the case of GDP estimations. Therefore, it is necessary to reconsider and question the costs/benefits of development in their entirety. Because, there is a growing feeling among people that the benefits of development may not outweigh the costs. This is looming large in recent years due to mass media.

Implicit in all these matters of vital concern is the pervading role of unbridled marketing strategies. Therefore they need to be controlled and regulated through the environmental sustainability viewpoint. This the paper advocates.

Market Mechanism and Human Intervention

Market mechanism if left free, without any conceivable form of human intervention, is likely to achieve the desired levels of compatibility between marketing (i.e., demand) and the environmental sustainability (i.e., supply). Invisible hand operates in many an invisible way. This is perhaps beyond our comprehension (on-goings) though the expost facto outcomes (often effects) can be. Among several others, price-mechanism is one. The invisible hand operates through price mechanisms to maintain (a case of over exploitation) high prices and low consumption arising out of depletion and scarcities of resource availability, high long run real costs etc. And, the opposite is also true. This is only one example to show how free market mechanism operates to bring compatibility. The whole problem can be attributed to human intervention in the free play of market forces. Human interventions are taking place constantly to obstruct and impede the free play of market forces in their natural ways. Marketing strategies is one such intervention. They are not used fairly and in a just manner. They are used conveniently and selectively to serve selected partisan interests. This is the problem. The policy makers, planners and the public at large, do not believe totally either in market forces or in human interventions. Selectively adopting a bit of that and a bit of this, created all the problems that the globe is facing today. In what follows is a demonstration to show how the human interventions in the form of marketing strategies create distortions to make globalization unsustainable. Joel Kovel, op.cit, suggests the practice of **ecosocialism** to build a better world and a better life upon it for all creatures.

Making Globalization Unsustainable Explained

Many scholars started doubting that the present trends in consumption-oriented and resource-centric globalization may not be sustainable for long if pushed unchecked.

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13. The financing of future development (costs) needs to take this aspect into account explicitly. In some cases restoration of the already damaged environment may even be a precondition for further development (e.g. mining projects). Therefore the costs of future development will be more than what they were earlier. This has some economic implications for posterity.

Marketing is the center of the problem. It is going much beyond its limits to expand the markets (new and old) endlessly, indefinitely and indiscriminately. Thus, it is making the issue of environmental sustainability and compatibility (with nature) increasingly critical leading to the total environmental collapse.

In other words the carrying–capacity of the general environmental and the resource-base in, particular, will be stretched too far to become hopelessly critical. Above all, development, whatever form it takes, is essentially resource-centric. The human progress is generally measured in terms of resource-commanded process through monetary incomes. Money is nothing but the empowerment of its possessor to command resources (goods/services). The higher the incomes generated, the higher will be the empowerment of more people to command more and more resources for various purposes and uses. More money means more consumption. Since the resource-base is finite, the development cannot be infinite and limitless. Thus, limits to growth become certain and definite. By implication, this imposes several constraints on the capitalistic system (and its expansion) of production and consumption. Therefore, reckless globalization without any remedial measures becomes questionable from the sustainability viewpoint. In a sense, it can be accused that it is in fact digging the grave for the capitalist system which is recently immortalized with the fall of socialism. Because, it lures, attracts and tempts the people to buy things that they don't need, by its mesmerizing techniques. It converts all people into customers and a country into a market place[14].

Marketing entails production which in turn entails extraction[15] and together they lead to destabilize the nature's balance. Thus creates ecological collapse. In this way, marketing has become the culprit. Without it, the course of materialization would have been much less hazardous than what it is today. The mechanisms by which the marketing strategies make globalization unsustainable can be explained through the earlier need analysis presented in the pyramids. It can be categorized in a tabular form as shown in Table 2.

The categorization could be subjective, even biased and impressionistic but definitely not out of an evil design. It is not opinionated but based on experience and observation. The above table is self-explanatory. The column on "processing intensities" needs a clarification. It refers not only to raw materials processing to make products but apologically also the consumer - purchase - decision making processes. This is only to save space though the needs to be shown separately.

Needless to say that the society is dynamic and change is its innate quality. Consequently, the conversions of needs into other forms do take place even without marketing efforts. The differences lie in the rate, motive and purpose of conversions or transformations. It may be noted that the needs get converted without marketing strategies but slowly and gradually and in natural processes without causing much destabilization or damages. This change takes place in ways that the nature adapts itself in tune with the change since it is a natural process and its innate quality too. The adjustment processes are thus inherent in the natural ways and processes. But, the problem is with the human interventions through marketing strategies. In this case, the rate of conversions will be much faster in undesirable directions and distorted in ways that normally go against the natural process/laws. This makes globalization unsustainable.

It may be noted that the intensity of biological urges to buy, possess and use the products varies from one trigger to the other (i.e., need to … aspiration). It is the biological urges that create different levels of intensities of desire to buy, possess and use the products. Again, the concept of "use" also varies. Thus, they make people buy what the corporates want them to buy. These manipulations are made mainly by the marketing strategies besides responding to those urges. Thus, they play a **dual role** viz., (a) manipulations and (b) responding to both original and created urges. In point of this fact, their

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14. A CEO of a shoe company (MNC) visited India sometime back. In a press conference, he was asked to give his impressions about India. He simply said, he sees a billion feet. This explains the case in point.

15. To start with, the sequence is reversed here, which would have been the opposite. This is due to stabilized state of S&T.

Sl. No	Triggers	Main Features	Nature of resource demands	Energy-Resource Intensities	Processing Intensities	Environ-mental impacts	Sustain-ability levels
1.	Needs	Few, inherently limited; basic, natural & biological; spontaneous; satiable.	Mostly Renewable & Replenishable	Least; Comparatively negligible	Least or Relatively insignificant.	Very low, natural changes	Very high
2	Wants	Man-made; created; converted needs; unlimited, many; unsatiable; work related; unspontaneous	Exhaustible & Non-replenishable	Medium	Moderate	Significant; controllable.	Low but not threatening
3	Desires	Sociological; status oriented; comfort seeking. Imitation	Exhaustible; scarce; more toxic; lesser substitutes	High	High	High; more damaging	Low
4	Aspirations	Pleasure-oriented; false prestige & values; showy.	As in desires	Very high	Very high	Very high; more damaging, Ruinous	Very low

Table 2 Human Need Conversions and Sustainability levels: A Resource Centric Approach.

role is stretched much beyond selling what is produced. They define, determine and direct both production and consumption patterns. This is why it is considered as the culprit of environmental maladies in society.

In the name of growth imperatives, the marketing strategies ascribe the conversions as if they are the inevitable outcomes of development including S&T. Thereby, they create illusions among the people that they need to go beyond their felt-need assessments. In the ultimate analysis, they make desires and aspirations (i.e., the created ones) as the integral part of the dynamics of human progress. This is how, to state precisely, their strategies are legitimated without any due concern for environment or resource sustainability. This apart, the corporates use the marketing strategies to create deep biological urges in their favour on a scale that makes sustainability increasingly critical. That would have worked by their wishes, had there been no problems of depletion or in other words, if the resource base were infinitely plentiful in terms of quantity and quality. So to say, Corporates never show any due regard either to environment or resource sustainability. Because their motto as said earlier is: We produce & produce, you consume & consume; and we make more & more profits". Further… if you don't have money to buy, we also arrange NINJNA type of loans[16]. This sort of economic logic/

16. This type of loans refers to "No income, no job, no assets" based loans.

arrangement seems to be on the verge of collapse. Thus far, no further.

By conversions and shifts from needs to wants etc., the marketing strategies create different levels of biological urges in such a way that they maximize the size of the market base and profits. This is their primary objective. The corporates thrive on creating wants etc., and shifts. Since corporatizations are the characteristic feature of capitalism, the latter (by implication) also thrives on the created-wants. (All due to greed). Amassing capital quickly through creating relative wants and then satisfying them at prices of one's own choosing, is the ethos of corporatization. Corporates are mainly set up to fulfill the created wants, which have no upper limits. They manipulate and respond to the biological urges as also make them as the dominant feature of growth. Biological urges are perhaps the motive force behind growth impulses or the development itself. All these things may go on till the public realizes the mistake of choosing a wrong growth path. This is the essence of the mechanism of the triggers of market expansion. However, this does not stand to logic from the point of view of environmentalism or the ethics of conservation. In what follows is an explanation of this aspect.

Different types of conversions have different intensities of environmental impacts and rates of depletion of scarce resources. This is broadly categorized and presented in a tabulated form earlier. It is self-explanatory. **The central proposition is that the marketing strategies are inclined to make the globalization increasingly unsustainable and incompatible** in a graduated manner by conversions. Because, the energy and material intensities raise persistently from one level (need) to the other (aspirations) and thereby guaranteeing the doomsday. Similar is the case with adverse environmental impacts. All these negatives can be overcome to a large extent, atleast, till the alternative sources of raw materials are found in other planets and deep oceans, by adopting and implementing rigorously the package of suggested measures at all levels of policy making. If so, the globalization and corporatization can be made compatible with environment and resource-base. This is how sustainability or the sustainable development can be achieved globally. And, there seems to be no alternative.

The corporate Power and Influence

It is necessary to know and address the issue as to how conversions are effected and the consumerism is spread in the society. At the outset, it can be stated that the expansionist strategies of the corporate are the root cause of the problem under consideration.

The conversions, as explained earlier, are further promoted and encouraged by what is popularly known as the demonstration or imitation effect leading ultimately to the expanding consumerism. Thus, the conversions are constantly abetted by the imitation-effect, not to speak of advertisements, publicity etc. The **combined-effect and** its on-goings can be seen in the new or young generations more discernably. Whose incomes/ purchasing powers are increasing rapidly for various reasons? This newly emerging customer-segment is acting as the agent of not only social change but also of ostentaneous consumerism/changing patterns of consumption. This segment is creating dramatic changes unparalleled in history. The impact of the combined-effect (i.e., conversion effect coupled with the imitation effect) is taking place in a spiraling manner. This has almost become an endless process due to the mass-media and several other factors. This combined effect is generally abetted by the corporate to serve their private interests. As a matter of fact, it is a precondition and a triggering factor for their continuing expansion globally. Otherwise, their growth and expansion will be dwarfed. Incidentally, their strength lies in the monopoly of R&D, which enables them to acquire control over the resource-base[10]. **Control over resources gives control over people.** The R&D generates knowledge (on technology, markets, people etc). Knowledge is power. More importantly, the R&D generates both **product and process innovations** to expand the existing markets or create new ones (or both), reduce costs/prices and sell more to more number of customers. In this process, the above combined effect act both as facilitator and enabler. Thus, the corporate have woven a well-knit package of strengths derived from various sources. This gives them enormous power to change people's mind-sets in their favor.

In effect they can exercise their powers to inject and effect the above said conversions the way they want. They can also devise several controlling mechanisms to bring changes in markets and society in their favour. Underlying all this phenomena is the marketing strategies. Because, the primary objective of corporates is to sell more to more numbers irrespective of whether or not they consume/ use. Not consumption but selling is their sole aim. In the process, the resource wastages/damages become their ingrained feature.

From the above brief analysis, the following proposition can be tendered:

Proposition No VI:

"The corporate by their unquestionable powers over the R&D, resource-base and knowledge have an inherent tendency to create false illusions of needs by questionable techniques to generate an ever expanding demand and market(s) for products for their continuous growth and expansion; and thereby making environmental/resource sustainability and social stability increasing critical".*

The ethos of corporate and their characteristic features, and the trends in their growth in recent years, are all contributing to act as an eye-opener to question the very developmental path adopted in the global economy. Since the environmental capacity to bear the burdens of development is arguably fully utilized, it appears that the zero-growth policy will be the most preferred one in place of uncontrolled and limitless growth. Implicitly, our paper advocates this message.

10. A Critical Appraisal of the Theories of the Firm, Globalization and Marketing: An Integrated Approach To a Resource-Centric Model

The above account and analysis on various aspects of globalization and its associated phenomena necessitate a comprehensive and an integrated theory of the growth of the firm (Edith Penrose, 1956 & 1972). In this theory, the constantly dwindling prospects of resource supplies over the long run and the firm's responses will have to enter explicitly. Growth itself is a long run phenomenon. It may be noted that the continuous dwindling prospects of resource supplies with stable quality levels is the central theme around which a firm's responses on issues such as technology, substitute development, marketing, pricing strategies etc., will revolve. It needs to initiate the required adjustment processes to cope with change.

A number of things such as depletion in various forms, declining prospects of exploration yield, environmental degradation etc., happen continuously. No doubt, it is all a long-term phenomena. In time frame, both long and short terms get merged in ways that adjustments/adaptation processes become necessarily continuous. Hence this analysis. Such a comprehensive and integrated theory of the firm is necessary because of the fact that the primary function of a firm is to transform and convert the natural resource endowments (both renewables and nonrenewables) through the application of technology into usable and saleable products to satisfy the human needs. In other words, its primary function is the commodification of natural resources (either in their raw form or in a processed/altered form) to satisfy the human needs which is also generally consistent and compatible with the known endowed resource-base. Now, there is a shift. It is the marketing strategies that tend to enlarge and expand the size of the consumption basket constantly as also expand the scope of the firm's activities limitlessly. This is achieved by replacing selling by marketing to go beyond the needs into wants etc., (see, the pyramid). The transition from selling to marketing without thinking any complementary and countervailing measures to counter its negative impacts is the starting point for today's environmental maladies leading to the ecological collapse[9][50]. In effect, firms grow both in numbers and size. This is all done in the name of development and to maximize social welfare. Welfare is mistakenly equated with material consumption----the more we consume the better off we are [51]. This is generally accomplished by graduating the needs into wants etc., through marketing techniques. This misconception needs to be corrected in the light of environmental constraints. In the ultimate analysis, it is not difficult to show that development, marketing etc., will all lead to unbridled consumerism

** The essence of all the propositions tendered so far and the gist of analysis presented ultimately culminates into an attempt to construct a Resource-centric model. This would improve our understanding of the broader issues of globalization and its aftermath.*

and the consequent severe problems in environment, depletion, ecology etc.,. Had there been an integrated approach to the theory of the firm or its growth, perhaps this (envital problems etc.,) would not have taken place in the way it took place. Because, the prevention or the avoidance costs would have been internalized rather than the treatment of the aftermath costs through the **"polluter pay"** principle. Thus prevention would have been internalized rather than the aftermath[17]. Remember the popular saying that "prevention is always better than the cure".

All the well-known theories of the firm (e.g., conventional economic theory, RBV theory, Tech-based theory etc) are all based on the assumption that the resources are "given" and not "taken", implying that the resources are plentiful and perennially available just for asking. Now, the reality is different. Environmental or social costs are treated as externalities while they are infact internal to the firm. Hence, it requires a relook.

The growth of the firm or its theory is either explicitly or implicitly based on the following assumptions:

(a) Uninterrupted supplies/availabilities of raw materials/inputs over time (i.e., no depletion) with stable prices.

(b) No decline in quality or grades of ores.

(c) Resources are given (actually they are taken).

(d) Resources (both renewable and non renewable) are available just for asking (ie., no scarcity value).

(e) Transport costs of raw materials remain the same over time implying that mining is NOT a shifting activity but a stable one like a firm on concrete foundations.

(f) Nature is bountiful and not niggardly.

These assumptions might have been valid and realistic during the initial periods of industrialization when resources:

(i) were available plentifully;

(ii) Environmental problems were not serious/threatening and

(iii) the depletion rates were unnoticeable and negligible.

The present situation is almost the opposite tending to make those assumptions unrealistic and untenable (See Appendix – II). They can at best serve theory building. Hence, it calls for a new look at the theory of the firm and its growth which has to be resource centric.

After the advent of the great seminal work by Edith Penrose (1956), several theories on the growth of the firm have cropped up in economic literature. However, there is a conspicuous lack of a theory integrating mineral resources extraction (its costs, depletion rates, scarcity values etc) with the theory of the firm. In other words, there is no wholesome theory with a unifying theme of resource-availabilities (supply side) combining with production (demand side) or integrating with the theory of the mine. This is a major lacunae in literature. What is required is a grounded theory culminating from an empirical analysis through field data. Because, the deductive theories based on mathematical modeling may not serve the practical purpose of the policy makers[18]. A reorientation of the theory of the growth of the firm is therefore needed keeping in pace with the resource centric globalization. An attempt is made to briefly conceptualize such a theory building later in a diagrammatic form with a view to address the central issue of sustainability of the resource base. In a sense, it can also be referred to as the general theory of development which is generally measured by the size of consumption by the largest number of people.

In this case, the important parameters considered are: (a) Longrun costs of extraction; (b) Conservation & substitute development; (c) Extraction/depletion, (d) Marketing efforts and (e) Exploration. All these are considered in

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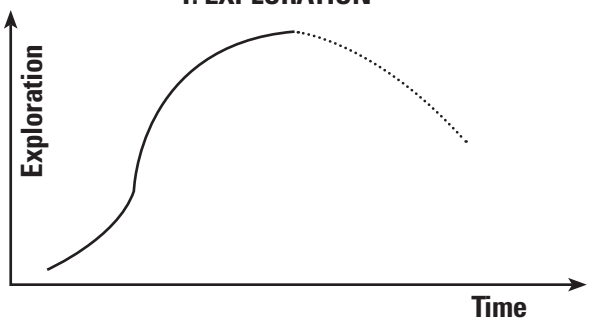
17. New firms or the new business activities are cropping up to make business out of the aftermath of environmental degradation. This mode of developmental path is in fact laughable. Instead of dealing with the environmental problems in an anticipatory manner before damages are done, the present approaches mainly engage in remedial actions after the damages are already occurred.

*18. David Novick "Mathematics: Logic, Quantity & method, **The Review of Economics and Statistics,** Vol. 36, No.4 (Nov, 1954) pp 357 – 358.*

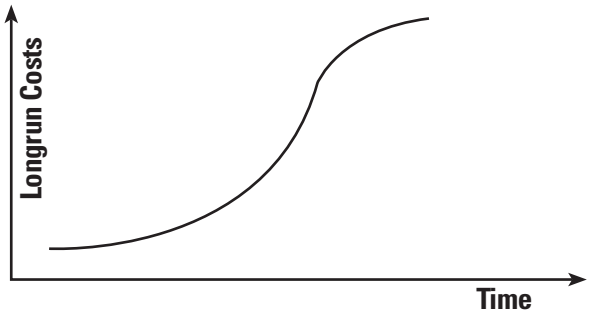
their broadest sense. The firm will have to operate under the broad contours of those parameters. It needs to take into account of their complex multilateral interactions; and thereby it needs to adjust itself to cope with the constant changes in them. This adjustment process and the coping strategies it has to adopt will be a continuous process. This may either be noticeable or otherwise.

The long run likely behavioral patterns for each of the above stated factors are shown below.

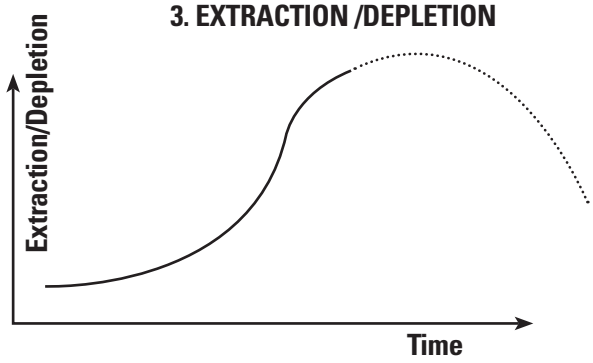
1. EXPLORATION



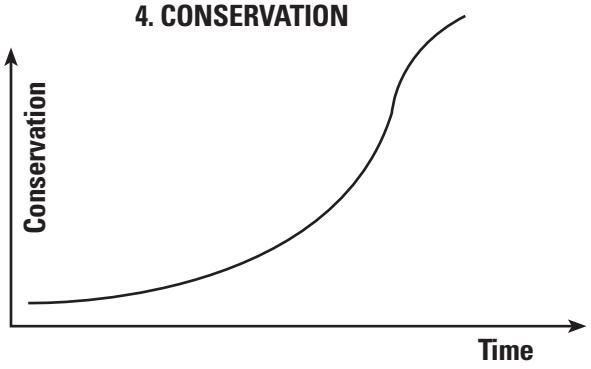
2. LONGRUN COSTS



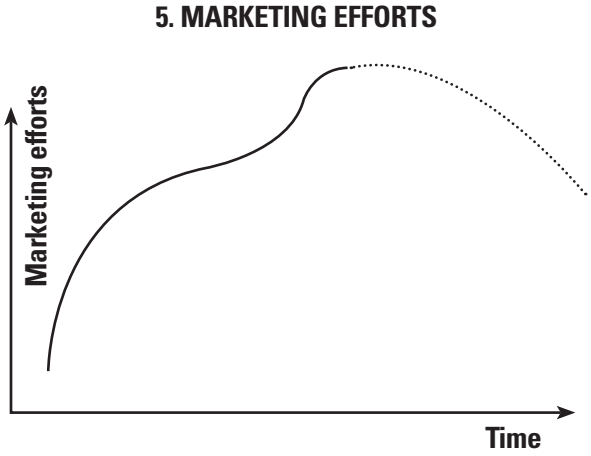
3. EXTRACTION /DEPLETION



4. CONSERVATION



5. MARKETING EFFORTS



In what follows is a brief explanation of the above stated parameters and their longrun behavior pattern.

1. Longrun costs of Extraction/Raw materials supplies

There is a tendency for the longrun costs to increase because of exhaustion of mineral deposits under working and thereby pushing the mines into far away places from the using/processing/loading centres. This will raise the transport costs as also create problems in location. Further, the superior/better quality grades will be exhausted and subsequently pushing the mines to go for interior grades. This will increase the processing/smelting costs. This may also affect adversely the overall input-output ratios of products. Depletion will also push the extraction into difficult working conditions. In effect, the costs of raw materials supply have an inherent tendency to rise in the longrun. Skimming the deposits or the slaughter mining practices will also contribute to this phenomenon. Further, their availabilities will also become increasingly critical due to depletion. This will also add up to the scarcity

values. However, this may induce the development of substitutes and trigger several counter veiling measures. Technology and better methods of extraction may offset the effects of raising longrun costs to some extent. More importantly, the extraction sector is strangely subjected to the law of increasingly costs. From this, it follows that the major underlying factors contributing to the raising longrun costs are: (a) Depletion; (b) increasing size of mines; and (c) age of mines [33][34].

2. Conservation/Substitute Development

Conserva-tion is a very broad and an all-inclusive concept. It advocates the total avoidance of wastages and over-use of resources in all the conceivable and possible forms in the production-extraction-consumption processes through S&T and public policies[3]. This would result in substantial savings of resources (nonrenewables) for the future as also for the unborn posterity who can also maintain the same levels of consumption as we do. **A thing saved is a thing produced is its ethos.** Rest needs no explanation. In simple terms, this is what it means. It implies a continuous reduction in input-output ratios, less energy and material intensive life styles, the popular three R's and so on. It does not preach abstinence from consumption but only the parsimonious use of resources and fuller use of resources and products. However, its concern is mainly placed more on the human needs than on the unlimited and unsatiable wants, desires etc; (see the pyramid). This is the reason why it occupied a preeminent position in the theories of ethics[10]. In a practical sense, conservation also encompasses the development of substitutes to both the scarce nonrenewable resources and products, with lesser material intensities and longer durability. It is also against the **"use & throw"** type of consumption. Thus, its thrust is related to resource supplies undiminished and production maintainable for long periods. That being what it is the principle of conservation has a great relevance to the issue of sustainability and equally to marketing though in a different way.

If conservation ethics is followed strictly across the board, then it would ensure sustainability of resource base, i.e., a copious flow of materials supplies over longer periods. In other words, the increased availabilities of material resources over long run is assured. This is how the fears of the prophesies of doomsday can be overcome atleast for now.

Addressing Compatibility Issue

In the process, conservation would also make globalization and marketing compatible with the environmental and resource sustainability. Since globalization entails free trade, the production facilities will be located at the least-cost points across the globe. In effect, this would also go a long way in achieving conservation by eliminating wastages. Further, the lowering of costs due to free trade may entice consumerism. These fears may be taken care of by following the conservation ethics strictly. Thus a sustainable consumption for longer periods can be achieved by both conservation and exploration together.

3. Extraction / Depletion

Both are the two sides of the same coin because a ton extracted is a ton depleted from a given mineral deposit. In addition to the earlier explanation, one can notice three dimensions to this concept. Firstly, depletion is an integral or rather an innate quality of a mine. Therefore, it has to constantly cope with the depletion effect. By depletion effect, we mean the inability of a mine to raise output levels inspite of its technical, managerial and other capabilities. Since most of the costs are fixed particularly in the shortrun, the consequences will be the raising real costs. In the same vein, it also pushes the workings within a mine to far off places and thereby raising the hauling costs. The ultimate effect will be the raising total extraction costs. Secondly, depletion will make the mines closed when once the deposit under working is completely exhausted. This will push the new mines to distant places. Consequently, the transportation costs will go up. Thirdly, it also raises the issue of intergenerational equity in the current levels of extraction. In the same way, it also leads to what is popularly known as the doomsday----the day on which there will not be any trace of a mineral in the earth's crust. Of course, this is an extreme case with a rhetoric tone. Whatever it may be, the fact of the matter is that the resource base is finite, exhaustible, nonreplineshable, endowed at different depths from surface and with varying degrees of quality and mineability. This is the reason why the reckless extraction and consumption of scarce resources are vehemently opposed by the conservationists as it creates unsurmountable problems in future materials

supplies. This criticality is considered as the doomsday. In point of all these explanations, it may be said that it is the depletion that brings the issue of sustainability to the fore of all debates.

4. Marketing Efforts/Doomsday

As implicitly said earlier that it is the marketing strategies which have an inherent tendency to create all the known ills on the resource (including environment) front by converting needs into other demand-triggering forms and by enticing consumerism with a view to fulfill the greeds of the corporates. So as to say, they create and nurture the avoidable, unnecessary and reckless and wasteful consumption patterns without any concern on either environment or resource base. On general grounds and on some empirical evidence, one can say that the marketing is pushing the consumption levels beyond the capacity limits of environment/ resource base to sustain and maintain for long without jeopardizing the claims and interest of the future and the posterity as well (See Appendix – I). That is why it has become a matter of grave concern in public policy and environmental management. The on-going public agitations against globalization/corportization are by implication against the marketing strategies. Because they serve only the interests of the corporates in more than one way at the cost of damaging the environment and even the social fabric. Arguably, there needs therefore to be a limit or an upper bound beyond which the marketing efforts should not be pushed. This calls for state intervention.

Defining and determining the upper bound is a difficult task both for a nation state and the globe as a whole. It appears to be more perceptual than empirical. That does not however mean it should be ignored. The upper bound is not static but dynamic. It varies over time and by country depending upon: (a) the extent of resource endowments and exploration intensities and potential; (b) sustainable capacity of environment/resource base; (c) S&T (d) demographic, income & education levels and so on. Equally difficult task will be its implementation in ways that satisfy all the stakeholders. However difficult and complex it may be, there has to be an upper limit beyond which the marketing efforts should not pushed. **If pushed, the doomsday predictions become more a reality than a prophecy; and that too, much earlier than prophesied.**

Marketing being what it is, totally ignores the aftermath of its sales maximization function. This is the problem to be addressed. It has both forward and backward linkages with the severe most adverse effects on environment. These effects are to be fully identified, assessed and evaluated for their damages and there by, the role of marketing can be appraised. It has to be made fully accountable for all damages. Therefore, it cannot be left unregulated and uncontrolled. In the present context, it needs to be complemented by the principles of conservation. Both should be blended in ways that ensure sustainability.

5. Exploration

It is a scientific and technological activity geared towards searching and finding new mineral bearing areas and mineral deposits embedded at different depths from the earth's crust in the virgin areas on the basis of clues, surfaced data and the outcrops/exposures. Indications and surface data give only the likelihood of the presence/ absence of a mineral. On the other hand, the S&T assign usage and salability to a resource. In other words, it converts the neutral stuff into a resource. The outcome of exploration is information /knowledge regarding a mineral about its quality, quantity and mineability to serve the industry. In this case, both successes and failures are equally important. Mineability and utility of mineral resources vary with the technological developments. In that sense, the supposedly useless and non mineable stuff of today may become useful and extractable tomorrow due to technological developments[3]. Therefore, resource base is relative to technology. In fact, this may give comfort to the aggressive marketers (S.Das Gupta, 2009). But, everything comes with a cost or a price tag.

On the whole, exploration together with S&T gives rise to the whole gamut of industrial activities. More importantly, **exploration ensures material security to industrial economy, which** otherwise will have to face the impending danger of collapse sooner than later. Because, it brings hither to unknown deposits for exploitation. But, there is a formidable limitation to this trend. It cannot continue indefinitely because a day will be reached when the entire globe will be totally explored giving no scope

for any more new additions to deposits. This means that the total knowledge/information about resource base in detail by country/region and by quality/quantity etc., will be made known. In other words, the quantity of new founds by exploration will reach asymptotic limits when the globe is fully explored. For instance, the Indian geologists report that the iron ore prospects are fully explored in India and further exploration may not add anything more. Thus, exploration gives a detailed map of resource base across all the countries and geographical regions. That being the case, it gives not only the material-security but also gives a detailed baseline data on the basis of which the following can be worked out:

i) Capacity of a nation to consume; how much, how long and by how many.
ii) Upper bound for marketing efforts.
iii) An empirical and more realistic assessment of sustainability of resource base.
iv) Longevity/life spans of resource availabilities and thereby the annual rates and levels of extraction.
v) Conservation plans and material security.
vi) Supply side issues and advance planning for substitute development and inter-resource substitutions.
vii) Upper limits for growth.

On the whole, it gives broad contours and boundaries within which the whole gamut of economic activities can be undertaken. It gives a road map and an empirical base for various development plans. All this apart, a resource-centric approach can be formulated to make globalization and marketing compatible with sustainability. Otherwise, the sustainability remains a mere slogan.

Exploration and the Resource supplies[19]

For the sake of better understanding and appreciation of the case in point, the chain of exploration and resource supply activities can be arranged in a flow chart below. Each element in the chain forms part of the environment and the firm converts environment into products for use and profit. This is to show that manufacturing and marketing are essentially physical phenomena and consequently they need to be guided by and adhere more to physical laws than financial/economic laws. This is the essence of our analysis.

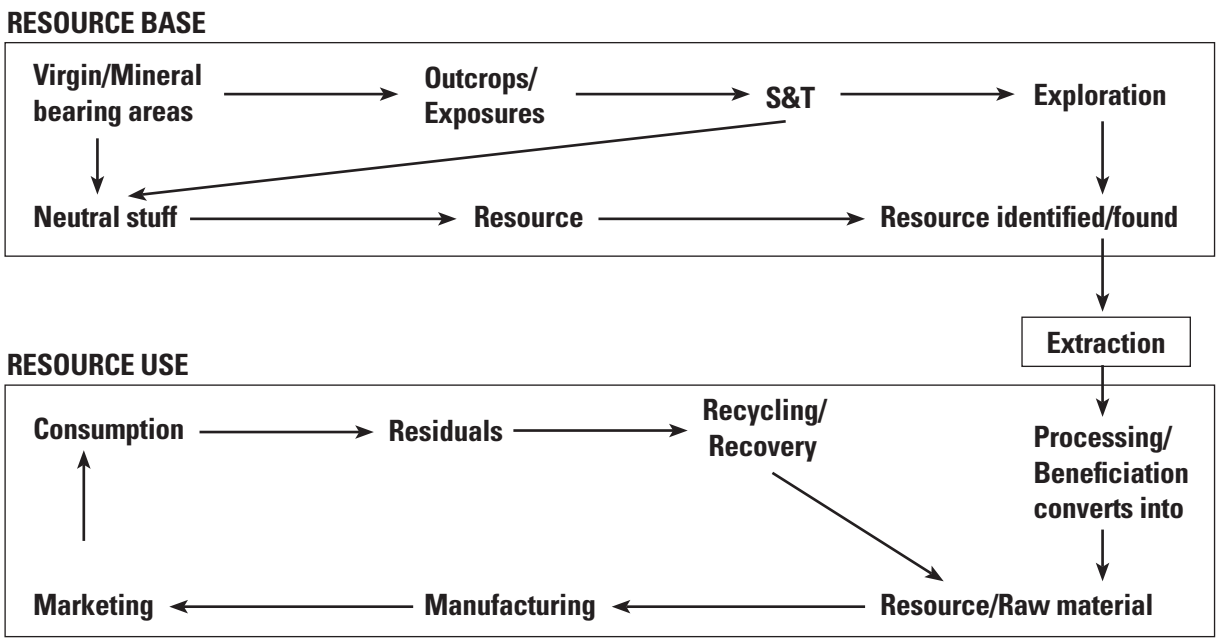


Chart 1 The Chain of Exploration & Resource Supplies

19. When compared with other disciplines, our knowledge on natural resources management is limited.

Environment: The Mainspring of All

For the sake of brevity and understanding, this aspect has been exhibited in the form of a flow chart. This may be read along with the earlier one to get a fuller picture because the resource base is an integral part of environment. At the outset, it may be noted that it is not concerned with the longrun behavior of its elements. It only depicts how everything comes from environment and goes back to it, though in a different form. By and large, the chart is self explanatory. There are in all four spectrums----the fourth one being the environment itself. Their connection is also given through arrows. They are all connected mostly unidirectionally except between manufacturing and marketing. This is to show that the environment goes on giving till it is exhausted completely. This is the reason why we emphatically stated that the environment imposes constraints/limits and define the boundaries for human activity and growth, in general.

After due consideration, the component on "S&T/ knowledge" is deliberately placed on the top of the chart because they are the **resource of the resources** which will never be exhaustible. It is like drawing water from a well. The more we draw, the more fresh waters spring. Otherwise, the still water in the well gets **stinking.** That being the case, the "S&T/Knowledge" give a ray of hope to overcome (atleast, for now) the environmental constraints including the faster rates of depletion. On the other hand, the environment is given, for obvious reasons, the central place around which the rest evolves and revolves. No doubt, it is the main spring of all things. But, it should not be sucked too much to make it dry. The fears of seeing it dried, gave rise to the increasing concerns on sustainability all over the world.

Making Sustainability Compatible

In the ultimate analysis, this is what is required to make globalization to last long and to make it an enduring phenomenon. On the face of it, globalization seems to be necessary due to its definite advantages. All the above five factors are considered as the major defining features of sustainability in the context of globalization/ corporatization (Stephen D. Cohen, 2007). They can also be considered as the determinants of sustainability with varying degrees of influence. Sustainability, as said earlier, refers mainly to the long-term. How long is the long term is a matter of opinion and judgment. Therefore, the judgmental forecasting appears to be more relevant than others. Accordingly, their possible and likely behavioral patterns over time are delineated in a diagram below by overlaying the earlier individual diagrams.

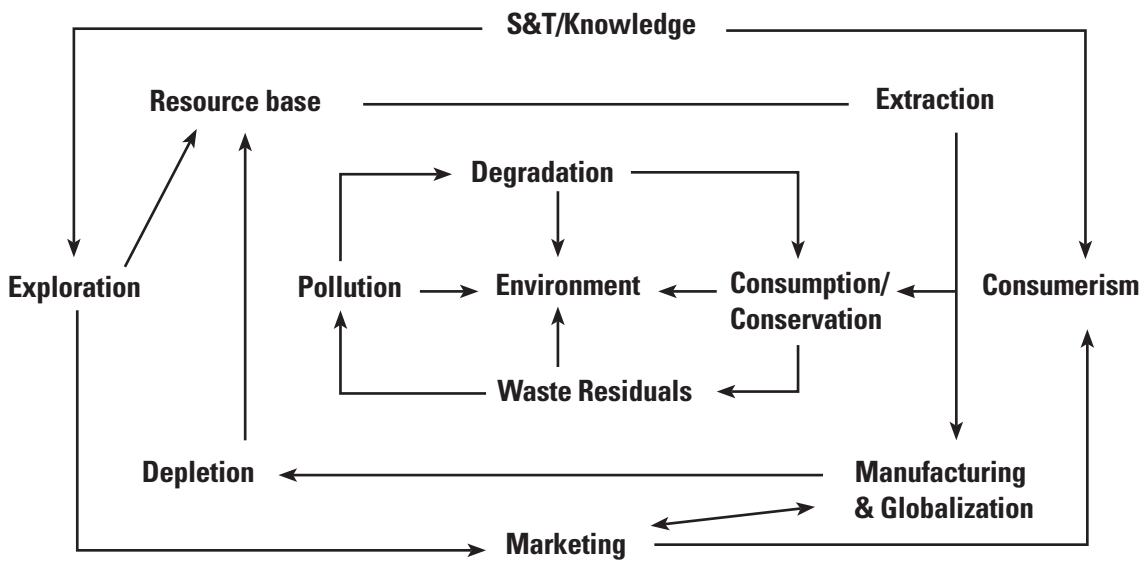


Chart 2 Dimensions of Sustainability in a Resource-centric Framework

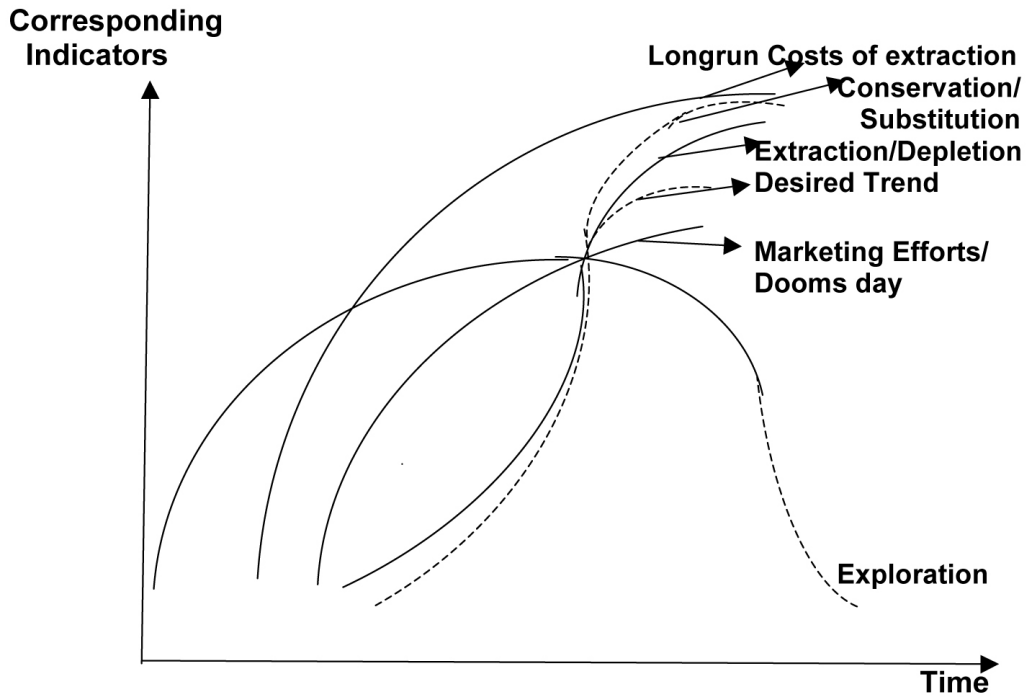


Figure 3 Making Globalization and Marketing Compatible with Sustainability (A Resource-Centric Model)

In the above diagram, time is shown on the x-axis. The corresponding indicators of each curve representing the above five factors are shown on the y-axis, viz., longrun unit costs of extraction[20], conservation comprising various programs to reduce avoidable wastages etc., and their possible outcomes. Extraction refers to the annual rate of extraction of non-renewable resources; marketing efforts refer to the money spent on marketing strategies, advertisements, sales promotion etc., Exploration refers to the quantity of new deposits found per unit of exploration (i.e., meterage drilled or any other method).

In essence, sustainability is essentially resource centric. Keeping this in view, the above empirical indicants are selected. Together, they constitute the core of sustainability. In some way or the other and either directly or indirectly, they bear a relationship with sustainability and hence, they address the issue. Therefore, the understanding of their behavior over time (either long run or otherwise) is a prerequisite to achieve sustainability in various forms. An attempt is made to conceptualize this aspect in the above diagram so as to give signal for and yield some relevant policy initiatives on public & private investments on conservation programs, S&T, regulating capitalist modes of production & consumption, exploration etc., The policy initiatives are hoped to achieve sustainability and compatibility.

By and large, the shape and placing/positioning of the curves in relation to time is expected to be fairly adequately realistic. At the extreme, the longrun behavioral patterns as shown in the diagram may go awry due to unregulated developments in S&T. They are not independent of each other. One shapes the other and is also shaped by others. In that sense, they are mutually interdependent with complex multilateral interactions. It is indeed difficult to

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20. As a matter of fact, the longrun costs curve will increase not in a smooth linear way but in a cyclical manner depending upon the fertility of the newly found deposits, location etc., later, and depletion will set in to push the costs upward.

capture their behavioral patterns in their totality. In what follows is their brief explanation.

Marketing through its various techniques, tools, strategies and conversions (see the pyramid) create demand or the desires to possess the products for use. Thus, it creates demand and that too, in increasing rates. In other words, it creates the demand curves as also shifts at a particular price level. According to the diagram, longrun costs will be constantly raising. So also prices. But the S&T and economies of scale are likely to exert their influence significantly on their patterns of behavior in the longrun. On the other hand, exploration deals mainly with the supply side of the economy. Supply of products comes from the flow of conversion of minerals/raw materials into products. Since the resources (physical) are exhaustible, exploration replenishes the stocks and makes the supplies continuous. In our analysis, it also encompasses the development of substitutes. In this regard, the role of S&T needs no exploration. Conservation in its various forms and ramifications also contribute to sustainability by reducing all the avoidable wastages and input-output ratios which arrest the rates of depletion of the fixed stocks of resources. **Thus, exploration and conservation together create the sustainable supply side of the economy** (See Chart C - 1 in Appendix III).

It is the environment from which both demand and supply originate. They interact with environment in subtle ways. To reiterate, everything has to come from the environment as also goes back to it, though in a different form. It should be noted that it does not have any infinite source of resources nor does it have a bottomless sink to receive and absorb all the residues generated by human actions. Thus, environment being what it is, determines the broad boundary lines or contours within which both demand-supply and their interactions need to take place. It fixes the upper and lower bounds beyond which no activity should be pushed. Crossing the boundaries will give the wake up calls to all the stakeholders.

The longrun behavioral patterns will tend to be more indicative than accurate predictions due to the unpredictable blurs/distortions created by the S&T advances and unexpected exploration surprises. However, the indicators have their own value and utility. On this basis, a number of policy initiatives can be derived with regard to the investment planning and resource allocation. An advance planning can also be worked out to avoid the bottlenecks in the materials supplies and to workout a redesign of production system in tune with sustainability. At their best, help devising various regulatory mechanisms to control the unbridled consumerism and the capitalist system in general [48][49]. In this way, several timely policy measures at all levels in relation to sustainability, globalization, development etc., fall under their spell.

Matching Supply with Demand or Demand with Supply

This is the issue that culminates from the above analysis. It is the issue to be resolved by the civil society. So far, the economic history reveals that the global economy was always trying to match the supply with demand. This created a number of problems in environment, ecology and society in general. The time has come to reverse this trend by matching the demand with supply. The earlier analysis explains "Why" of it. "How" of it, is a difficult challenge before the analysts and the public. It requires a more in-depth analysis.

On the basis of our analysis, the following proposition can be formulated.

Proposition No: VII

"Marketing creates demand while exploration creates supply. And, the environment in its broad sense determines the spectrum of their operations and interactions. Bypassing or surpassing this spectrum will blow the whistle".

We guess, all of us are hearing this whistle. It is loud enough. That is why there is an unprecedented concern on environment and other issues in recent years. This is a healthy sign. The outcomes of its validation and the proposed in-depth analysis will go a long way in making globalization and marketing compatible with sustainability. Besides, it also helps formulation of realistic policies at all levels. Above all, the theory of the growth of the firm needs to be relooked in this alternative frame of reference.

Explanation of the Temporal Trends

The striking point in the Figure 3 is that all the curves lie above the exploration curve after it reaches the

peak. (The only exception is the longrun cost curve). This means that the exploration has achieved high rates of new discoveries of more reserves (perhaps more fertile ones), then everything can increase at faster rates. In this case, the resource-base can afford the luxury of all the rising trends at faster rates without any serious concern on the sustainability issues. This is the reason why most of the curves increase at faster rates below the peak of exploration curve. When once the peak is reached, then the rates of increase fall, leading to their asymptotic limits or even they may have to show the declining trends. Exploration peak is the turning point, which gives a warning bell to monitor or even arrest the rising trends. This the history unfolds.

Another important noticeable observation is that the conservation curve lies at the lowest level below all the curves. This indicates that there is no concern on conservation if resources are available plentifully. When once the exploration curve reaches its peak, the conservation curve reaches top and lies above the rest. This has a significant meaning and implications. It shows that the economy whether global or national needs to give a preeminent position to conservation policy in its fullest sense to tackle the issue of sustainability. It acts as a **speed-breaker** on the high velocity demand-growth or runaway consumerism. In effect, it is given the status of being considered as a strategic decision variable and a major determinant of sustainability at the macro level.

The opposite of conservation is marketing in their objectives and processes because the former advocates constrained consumption while the later an unbounded consumption. The former pleads for a parsimonious consumption-basket while the latter argues for an ever expanding size of consumption-basket in the name of development and welfare maximization. The concern of one is on the social/public interest while the other on private interests. The conservation ethics gives a predominant concern on sustainability and environmental quality protection while the marketing ethics almost ignores it but exhibits if at all only casual attitude. The former warns a doomsday while the later does not recognize it. After due cogitation in this manner the marketing curve is placed below the rest of the curves in the interests of achieving sustainability. That is only to show that the unbridled and reckless marketing will do more harm than good to resource-utilization. In other words, marketing (i.e., demand) should not be pushed beyond the supply-capacity and its constraints. If pushed, depletion will be faster to make the dooms day occur much earlier than expected. So long as the marketing is kept below the rest (or within some sustainable limits), it is not difficult to make globalization compatible with environmental/resource sustainability. This tantamount to saying that conservation and exploration together would ensure the compatibility in question. There is no other way.

Extraction being what it is cannot continue to rise indefinitely over time. Some time or the other, it has to either reach asymptotic limits or start declining. However it needs to lie lower than conservation so that the material supplies can be maintained to sustain the existing level of development/consumption.

On the basis of the above analysis of various temporal trends (see, Diagram 3), a number of policy initiatives can be derived both at the corporate, national and global levels to make growth and development compatible with environmental/resource sustainability [63]. The delineation, positions and the rates of growth of various curves are contrived in such a way that they can achieve sustainability and compatibility. The policies need to be designed so as to ensure them remain so.

Conclusion

It is true that we need development. It is also true that the marketing strategies help developmental outcomes percolate down to the wider public. Thus development and marketing are necessary for the enhancement of the material welfare of the people. But, both need to take into account the physical limits imposed by the environmental and the endowed resource-base. Otherwise, both will be counterproductive.

Globalization or the transnational business aiming to achieve faster rates of development will certainly lead to increased rates of depletion and environmental degradation. This is certain. To overcome these impending dangers and to make globalization compatible with sustainability, the only way is through the resource

exploration and the process innovations. Of course, the environmental protection measures need to be kept in place. In effect, this necessitates the replacement of the present practices of **"matching supply with demand"** by **"matching demand with supply".** In turn, this calls for a paradigm shift in corporate philosophy and their strategic orientation. Above all, it entails a shift in the consumption-centric developmental models. In this regard, conservation acts as the bridge between the present and the future. In conclusion, it can be stated that exploration (supply side) and conservation (demand side) together would ensure the compatibility in question. (See Chart 1 & Chart 2)

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Appendices on Empirical Assessment

Suspecting that one may get a feeling after going through this paper that it only contains a few rhetorical statements on the subject matter. Some empirical base is given in the following appendices I, II and III to nullify such impressions. They are evidence-based. They give ample credence to the arguments tendered in the text. But the empirical evidence is restricted to the India as a case study. The issues raised refer essentially to long term while the data presented here do not cover that long a period. Hence, the empirical evidence is more indicative and suggestive than projective. This could be a limitation. The three appendices display three different but interrelated scenarios which substantiate the essence of compatibility as discussed in the paper. This empirical analysis is in no way complete nor adequate. Nevertheless, it can serve as an indicant.

Appendix – I

Limits to Exploration

At the outset, it is to be noted that the **limits to exploration give rise to limits to growth.** In what follows is a brief explanation of this proposition keeping in view the text of the paper. Since energy shortages are notorious in Indian economy, the coal sector is chosen for a case study.

This **case study** is on a depleting industry viz., the coal mining industry in Andrapradesh. It is operated by the Singareni Collieries Company Ltd (SCCL). It is a public sector undertaking. It has a very long history of about 125 years. It has grown from a meager ten to twenty thousand tons of annual outputs in the starting years. Its contribution to the all-India coal output increased from 6.5% in the 1973-74 to 10.0% by 2007-08. Its location has a special significance to South India. As the oil price hypes during 1971-72 ascribed a more dramatic role to coal in India, this company realized the importance of exploration (as also the dangers of depletion) in meeting the ever-growing requirements of coal in India's energy futures. Accordingly it started an exclusive department for exploration in the wake of unprecedented demands for coal. This was in 1973-74. The data for this **case study** are obtained for 35 years since 1973-74.

The data on exploration with a break up of: (a) total meterage drilled and (b) coal reserved proved, along with annual output raisings for the period from 1973-74 to 2007-08 are presented in Table A-1. Incidentally, it may be noted that exploration is prone to a very high level of risk. It is a pure gamble. The relative growth trends registered by these three parameters would explain the

case in point. It is evident from Table A-1 that the "total meterage drilled" witnessed a staggering rise from a low of 27.9 thousand meters in 1973-74 to a high of about a lakh meters by the year 2007-08. This indicates the intensity of the need felt by the company to undertake the exploration operations in many of the surrounding virgin areas. As against this trend, the amount of "total reserves proved" exhibits an opposite trend. Table A-1 reveals that it declined significantly from 263 million tones in 1973-74 to 187 million tones during 2007–08. This decline took place despite the fact that there was almost a four-fold rise in exploration-intensity. **This is a revealing observation.** It makes our arguments highly tenable beyond any reasonable doubt. Besides, it also confirms the shape of the Exploration-curve in the text. More importantly, it needs to be specially noted that what all proved cannot be extracted due to mining losses and several geological uncertain ties in the process. In effect the proved-reserves seem to be a myth while production is a reality.

To make the picture complete, the output trends are overlaid on exploration to exhibit the impending dangers of depletion. Table A-1 shows that the coal outputs increased many fold during this period while exploration is lagging behind. It increased from a low of 5.3 million tones in 1973–74 to a high of 40.6 million tones by 2007-08. Unlike the exploration trends, there is a substantial continuous rise in outputs. This is a major finding. Exploration reaching one day a near zero-contribution, the constant rising output trends indicate the alarming levels of depletion leading to growing material scarcities (coal). This the text cautions.

All these relative growth trends together would strengthen the arguments put forth in the text besides confirming broadly the shapes of the curves in the text.

Further, the whole period is divided into pre and post economic reforms to delineate the broad impacts of the later on exploration and its outcomes, and the outputs. Accordingly, the data in Table A-1 is processed and summarized in Table A-2. It gives five-year averages. The impacts of economic reforms are clearly discernible particularly on (a) exploration, the urge to find new deposits to cope with the expanding outputs; and (b) the output levels. Understandably, their impact is not much on the reserves proved. Hence, exploration is not keeping pace with depletion. This is what was expected. Since the Table A-2 summarizes the data in Table A-1, the observations made therein holds good in this case also. To reiterate, the empirical evidence, however, scarity it appears to strengthen the tenability of the propositions put forth in the text.

The above evidence based case analysis on a single mineral can be extended to the whole of the extractive sector. We guess, the same findings will emerge. For instance, the experts in the geological survey of India (GSI) reported that the likely iron-ore bearing areas in the country are almost fully explored. Similar is the case with most of the metallic minerals. So also, the oil reserves. By implication, this suggests that the additional exploration efforts will not fetch any new fresh deposits for exploitation. It means that **exploration has reached its limits.** In the case of coal, it may reach soon, say in a decade. This being the case, the rising outputs will push the dooms day sooner to occur. In the wake of exploration reaching its limits sooner, the issue of sustainability assumes critical dimensions. When once exploration reaches its limits, the sustainability of resource-availability has to come from: (a) Recycle & recover, and (b) Stringent conservation measures to reduce material – intensities and enhancing product durabilities etc. Both together may defer the occurrence of doomsday considerably or till alternatives are found.

In the case of renewable & replenishabe resources, the rate of depletion depends on the rate of their regeneration. If the latter cannot cope with the rate of their exploitation, then the awful depletion is certain. If they are made matching, then there may not be any depletion in their availability (Eg: forestry, fishery, underground water etc.)

Table A-1: Exploration: Total meterage drilled, Reserves proved and output raisings (1973-74 to 2007-08).

Year	Total Meterage Drilled (Meters)	Reserves proved (million tones)	Output (Lakh tones)	Mtrs used to prove one million tones (1)/ (2) =4
1973-74	27904	263	53.12	106.1
74-75	35284	157	61.79	224.7

75-76	37566	243	73.58	154.6
76-77	38767	289	82.98	134.1
77-78	30471	75	89.12	406.3
78-79	31848	126	90.08	252.8
79-80	29940	68	94.03	440.3
80-81	29819	116	100.97	257.1
81-82	37477	284	121.03	132.0
82-83	47752	779	123.45	61.3
83-84	39228	408	126.87	96.1
84-85	48087	151	123.28	318.5
85-86	71173	204	156.55	348.9
86-87	75485	219	165.8	344.7
87-88	79463	518	164.01	153.4
88-89	93291	416	186.05	224.3
89-90	87300	520	178.05	167.9
90-91	100895	432	177.09	233.6
91-92	91344	337	205.83	271.1
92-93	105884	144	225.12	735.3
93-94	107812	129	252.09	835.8
94-95	98729	162	256.5	609.4
95-96	93369	209	267.7	446.7
96-97	76314	297	287.34	256.9
97-98	86823	200	289.41	434.1
98-99	86575	251	273.26	344.9
99-2000	80895	158	295.56	512.0
2000-01	73528	225	302.74	326.8
2001-02	82526	215	308.11	383.8
2002-03	74783	147	332.36	508.7
2003-04	78744	141	338.54	558.5
2004-05	75970	216	353.03	351.7
2005-06	85714	130	361.38	659.3
2006-07	105681	393	377.07	268.9
2007-08	96534	187	406.04	516.2

Source: N. Naganna & Savitha Rani, Feb 2006. Field data.

(Iron ore presents a different story. Its extraction is mainly from exports to pay for our import bills. All the likely ore-bearing areas are fairly completely explored in India. Its exploitation has a dual purpose-one for steel production and the other for exports. Hence, its depletion rates seem to be higher than otherwise.)

The essence of the major arguments in the paper lies in Table A-1 and A-2. The last column in these tables clearly indicate that the meterage required to prove one million tones of reserve has increased substantially by more than two times. This trend will obviously continue as all the suspected mineral-bearing areas will be explored gradually and at times swiftly. Thus, exploration will reach its limits in future implying that there are no more virgin areas. By inference, this means that the impending material scarcities in the near future are more definite than prophesied.

Appendix – II

Resource-Base of India's Economy

With the establishment of the geological survey of India (GSI) in the year 1857, India assumes a long history of exploration. Consequently, the country is fairly adequately explored. The records, memoirs and other documents in the GSI provide us with rich data and information to identify, assess, examine and evaluate the resource-base of India's economy. A cursory glance at the known endowed resource base reveals that it is deceptively comfortable. And, its fragile capacity will become clearly evident in relation to the population size its demography and its ever increasing levels of aspirations to better their material well being. The country may be rich in ferrous metals and other non-metallic minerals but very poorly endowed in non-ferrous metals. Nature is not so bountiful. Fuel resource base (coal) is seemingly comfortable but not devoid of problems like high ash, low quality, uneven location and so on. Oil is notorious for its inadequacy. Thick quick scanning of the known resource base signals its fragile capacity to meet the fast growing requirements of expanding industrialization and growth. Data regarding this vital aspect is presented in Table A-3. Since the data are slightly dated, it can be considered as indicative and suggestive of the fact that India's resource base, particularly non-ferrous metals, is far from adequate. This inadequacy is doubly niggardly in relation to its population growth. There are no surprising discoveries by exploration in the recent past except a few in oil and gas. From all this evidence, it follows that the **nation's capacity to consume is very limited – particularly the luxury consumption basket.**

Table A-2: Five year averages of Meterage drilled Reserves proved and output.
Five-Year Average:

Year	Meterage Drilled per year (Meters)	Reserves proved per year (million tones)	Output (Lakh tones)	Mtrs used to prove one million tones
Pre Economic Reforms Period				
1973-74 to 1977-78	33998	205	72.12	205.2
	(-)	(-)	(-)	(-)
78-79 to 82-83	35367	275	105.91	188.7
	-4.3	-34.1	-46.9	-8
83-84 to 87-88	62687	300	147.3	252.3
	-77.2	-9.1	-39.1	-33.7
Post Economic Reforms Period				
88-89 to 92-93	95743	370	194.43	327.6
	-52.7	-23.3	-32	-30
93-94 to 97-98	92609	199	270.61	516.6
	(-3.3)	(-46.2)	-39.2	-57.7
98-99 to 2002-03	79661	199	302.41	415.3
	(-14.0)	0	-11.75	-19.6
03-04 to 07-08	88523	213	367.21	471
	-11.1	-7	-21.4	-13.4

(Figures in brackets show the percentage variation over the previous period(s). Computed from Table A-1).

Policy implication: Development is essentially built upon an ever depleting resource base because development means extraction and extraction means depletion. Resources are finite and nonreplenishable. Therefore, the fact of the matter is that **growth contains decay** or in growth lies decay. Depletion and decay are by nature, inherent in the mining sector or far that matter in the development itself.

The cognizance of this awesome reality constraints policy-making machinery to consider sustainability as its core instead of periphery as is the case now. Mere empty slogans and target fixing do not or should not make policies at any level. This calls for a paradigm shift in development thinking and policy making processes.

In the same vein, the Table A-4 presents a global scenario regarding the rising trends in global mineral production for the period between 1950 and 1980. Data are obviously a bit old. But the trends will not change in the reverse. On the contrary, with advent of economic reforms and globalization promoting consumerism, the rising trends must have been much faster and larger than before. The empirical evidence indicates that the global depletion rates have reached threatening proportions. The consequences is anyone's guess.

We definitely need development but with least or no damages after giving due space to sustainability (environment and resource base). This demands a constrained development path in place of reckless models. Otherwise this concept becomes elusive. In other words, the pure consumption-oriented development models need to be reconsidered keeping in view the sustainability as the core concern. The state of the environment as explained briefly by our acronym together with the extent

of the resource-endowments will determine the capacity of a nation to consume.

Appendix – III

Fuel and Material-intensities in the Indian Economy

To make their business going uninterruptedly, the corporates put forth the obtrusive viewpoints against the widely felt fears of the impending material scarcities/ sustainability through the infinite strengths of S&T and their R&D investments. This prompted us to examine the impacts of technology on fuel and material-intensities at the macro level. Besides the corporates, the development planners and policy makers are reposing their hopes on technology to tackle the problems of materials – sustainability to meet the growing needs of industrial expansion. Hence, there is a need to examine the resource sustainability.

The technology developments generally will make a dent on the material consumption or its cost composition (%) in the total costs of manufacturing. If they are directed towards achieving the goals of conservation, i.e.,

Table No A – 3: Life Indices of Some Important Minerals in India (m.tones)

Sl. No.	Mineral/Ore/Metal	Recoverable reserves as on 1-1-1985	Depletion during 1985-97	Recoverable Reserves as on 1-1-1997	Projected Production during 96-97	Balance Life at 96-97 level of Production (Years)*
1	Crude Oil(as on 1-1-91)	993	230	763	50	15.3
2	Natural (B.Cu.m) 1-4-90	858	161	697	30	23
3	Coal (1-1-91) a) Cooking b) Non-cooking	 8507 60346	 201 1397	 8306 58949	 39 269	 213 219
4	Bauxite	2333	80	2253	8	281
5	Copper metal (31-3-88)	3.95	0.431	3.52	0.055	64.0
6	Lead metal (1-1-89)	1.93	0.56	1.36	0.096	14
7	Zinc metal (1-1-89)	7.00	1.10	5.89	0.154	38
8	Gold (1-1-88)	1.03 Kg	16727 Kg	86273 Kg	1850 Kg	46
9	Iron ore	(Extractable) 10440	 686	 9754	 72	 135
10	Chromate ore	139	15	124	2.4	51
11	Magnesite	222	6.7	215	0.73	294
12	Manganese ore	83.2	17.65	65.52	1.83	36
13	Limestone	69353	876	68477	101	Adequate
14	Root phosphate (High grade)	14.78	8.79	6.00	0.72	8
15	Sillimanite + Beach sand	0.5+54.1	0.35	54.25	0.02	Adequate
16	Kyanite	1.55	0.51	1.04	0.06	18.0
17	Dolomite (usable)	4608	32	4576	3.2	Adequate

Source: ***Eighth Five Year plan 1992-97;*** *page 35; planning commission, GOI*

Life of mineral deposits would change on revision of recoverable reserves, the extent of production and the new discoveries by exploration. S&T plays a very vital role in this regard. However, it may be noted that the mining industry is prone to high-risk.* ***Hence, the extent of recoverable reserves of any mineral can only be known after it is fully extracted.*

Table A – 4: Value of World Mineral production (billion $)

Sl. No.	Item	1950	1960	1970	1980
1	*Global GNP* *Energy Fuels*	3932	5805	9363	13108
2.	Petroleum & gas	24.3	37.0	50.3	704.7
3	Coal	80.6	86.4	104.6	169.9
4	Others	6.2	13.0	28.8	104.9
5	*Total –fuels*	111.1	136.4	191.6	979.5
	In % of GNP	**2.82**	**2.35**	**2.05**	**7.47**
	Metallic Resources				
6	Iron & iron alloys	20.8	33.5	48.4	47.6
7	Precious metals	4.4	5.4	7.6	39.10
8	Base metals	12.2	25.9	54.7	68.8
9	Others	0.4	0.6	1.8	1.3
	Total – metallic	37.8	65.4	112.5	156.8
	In % of GNP	**0.96**	**1.13**	**1.20**	**1.20**
	Non-Metallic Resources				
10	Construction materials	-	39.9	69.3	100.6
11	Fertilizers	2.9	6.0	8.5	16.5
12	Diamonds	-	2.0	4.1	9.1
13	Chemical resources	6.3	12.1	18.0	32.4
	Total – non metallic	40.7	60.0	99.9	158.6
	In % of GNP	1.04	1.03	1.07	1.21
	Total Mineral resources	189.6	261.8	404.0	1295.0
	In % of GNP	**4.82**	**4.51**	**4.32**	**9.88**

Source: Werner R. Gocht, Halg Zantap & Roderick Eggert, ***"International Mineral Economics"*** *Spinger-Verlag, Newyork, 1988, P6.*

reducing material-intensities in products and eliminating all kinds of wastes, then the proportion of material costs in total costs has to decline. This is in fact what is desired for under the present circumstances. In this context, a distinction needs to be made between: (a) material intensities, and (b) total materials consumption in the economy. The first one refers to the contribution of S&T to achieve conservation while the second refers to the extent of impact on resource depletion. Thus, both the concepts are different signifying different phenomena. Keeping this in view, an attempt is made to compute the % of materials and fuels consumption (costs) in the total costs of the manufacturing sector as also per unit basis. These data are presented in Table A-5.

The Table A-5 has been prepared on the basis of data available in the Handbook of Statistics on the Indian Economy (RBI, 2007-08, Table 33, pp 76 &77). The data refer to the post reforms period. The trends are computed as ratios. They are based on the common assumption that there is a uniform relative price rise in the economy during this period.

(1) $\frac{\text{Materials Consumed}}{\text{Fuels Consumed}} = M1$

(2) $\frac{\text{Materials Consumed}}{\text{Value of Output}} = M2$

(3) $\frac{\text{Materials Consumed}}{\text{Net Value added}} = M3$

Table A-5: Fuel & Material-Intensities in the Indian Economy (1990-01 to 2004-05)

Year	M1	M2	M3	M4	M5	F1	F2	F3	F4(%)	% M	% F
1990-91	7.987	0.617	3.241	1.515	0.797	0.125	0.077	0.406	10.0	61.70	7.72
91-92	7.707	0.620	3.382	1.651	0.796	0.130	0.080	0.439	10.3	61.97	8.04
92-93	7.199	0.610	3.140	1.872	0.791	0.139	0.084	0.436	11.0	60.69	8.43
93-94	7.566	0.598	2.882	2.096	0.794	0.132	0.079	0.381	10.5	59.85	7.92
94-95	7.716	0.602	2.872	2.534	0.797	0.130	0.078	0.372	10.3	60.17	7.82
95-96	8.456	0.612	2.944	3.050	0.808	0.118	0.072	0.348	9.6	61.20	7.23
96-97	7.470	0.550	2.594	3.074	0.734	0.134	0.074	0.347	9.8	55.03	7.34
97-98	7.567	0.548	2.754	3.371	0.720	0.132	0.072	0.364	9.5	54.81	7.24
98-99	9.610	0.567	3.056	3.375	0.729	0.104	0.060	0.318	7.6	56.71	5.90
99-2000	9.514	0.585	3.389	3.992	0.740	0.105	0.062	0.356	7.7	58.49	6.15
2000-01	9.521	0.606	3.910	4.277	0.750	0.105	0.064	0.411	7.9	60.57	6.36
01-02	9.844	0.611	4.074	4.574	0.755	0.102	0.062	0.414	7.6	61.09	6.21
02-03	10.526	0.620	4.066	5.477	0.765	0.095	0.059	0.386	7.2	61.98	5.89
03-04	8.425	0.602	3.820	6.004	0.745	0.119	0.071	0.453	8.8	60.20	7.14
04-05	11.931	0.612	3.941	7.512	0.752	0.084	0.051	0.330	6.3	61.24	5.13

Source: Computed from Table 33, pp 76 &77, of the HandBook of Statistics on the Indian Economy, Reserve Bank of India, 2007-08.

(4) $\frac{\text{Materials Consumed}}{\text{Number of Factories}}$ = M4

(5) $\frac{\text{Materials Consumed}}{\text{Total input costs}}$ = M5

(6) $\frac{\text{Fuels Consumed}}{\text{Materials Consumed}}$ = F1

(7) $\frac{\text{Fuels Consumed}}{\text{Value of Output}}$ = F2

(8) $\frac{\text{Fuels Consumed}}{\text{Net Value added}}$ = F3

(9) $\frac{\text{Fuels Consumed}}{\text{Total input costs}}$ = F4

The above ratios represent different kinds of phenomena regarding the technological changes taking place after the introduction of economic reforms. Generally, any technological development will make a dent on the material cost composition in the total costs. Contrary to this general expectation, the empirical evidence (Table A-5) indicates, though implicitly, that the technology did not make a significant contribution to reducing the material intensities during the period. For instance, the % of material costs in total value of output and the total input costs remained more or less stable about 60% and 75% respectively during this period. However there is a very marginal decline. This is the most striking observation, which reveals that the technology did not make significant contribution to conservation.

Notes:

M1 = Materials consumed / Fuels consumed;
M2 = Materials consumed / Value of output;
M3 = Materials consumed / Net value added;
M4 = Materials consumed / Number of factories;
M5 = Materials consumed / Total value of inputs;
% M = % of materials in value of output

F1 = Fuels consumed / Material consumed
F2 = Fuels consumed / Value of output
F3 = Fuels consumed / Net value added
F4 = % of fuels in total value of inputs
% F = % of fuels in value of output

All of them refer to the manufacturing sector in value terms.

Policy Implications

The major policy issue lies in choosing between higher prices or the lower prices. Both conflict with each other and their goals are just opposite. The former is preferred to achieve resource sustainability but conflicts with the welfare maximization. The opposite can be seen in the later. Thus, the choice turns out to be between sustainability and welfare maximization (i.e., maximum consumption by maximum number). Similarly, the choice also implies that higher prices are preferred to maintain environmental quality due to lesser consumption and lesser release of residuals/wastes; but again conflicts with welfare. The lower prices give the opposite. More importantly, the choice becomes an ethical issue because higher prices imply economic inequalities etc, In point of these unsurmountable policy-choices, the achievement of resource sustainability becomes highly complex with far reaching consequences.

In what follows is a brief explanation of Table A-5. In recent years, the prices of fuels (oil & energy) started getting reflected their real **scarcity-value.** This is the main reason why the % of fuel costs in total input costs is behaving the way it is observed (Table A-5). Further, it also induced the major energy-using sectors to implement the principle of conservation in various ways. This is not observed in other nonrenewable resources because: (a) Their scarcity value is not reflected in their pricing; (b) they are all under-priced due mainly to the exclusion of social and other environmental costs; (c) this under-pricing is leading to their over-use and wasteful exploitation as also to the slaughter selective mining practices; and (d) even the export –subsidies of minerals have the same adverse effects. By eliminating these fallacies and by equating other non-renewable resources on par with oil in matters relating to pricing, exploration etc., one can achieve conservation in them. The energy sector, particularly oil sector, provides **great lessons** in conservation. They need to be applied to other nonrenewable resources to achieve conservation and sustainability in material-availabilities in pace with production trends.

Above all, it is also necessary to get the feel of the aggregate trends at the macro level to appreciate the real need for sustainability. The data in this regard are presented in Table A-6 and Table A-7. These two tables are mainly complementary to others. They need no explanation. Briefly, they highlight the ever-increasing levels of industrial activities and outputs; and thereby, bring the issue of sustainability to the forefront of policy analysis. The rising trends (Table A-6 and Table A-7) will increase unabatedly unless the policy of constrained growth is accepted and followed globally. There is every reason to believe that the endowed and known resource base will not be able to sustain them for long. This justifies the need and relevance of our approach in this paper.

TABLE A-6: Index Numbers of Industrial Production-Use-Based Classification

Year 1	Basic Goods 2	Capital Goods 3	Intermediate Goods 4	Consumer Goods 5	Consumer Durables 6	Consumer Non-durables 7
Base: 1980-81 = 100						
Weight	**39.42**	**16.43**	**20.51**	**23.65**	**2.55**	**21.10**
1981-82	110.9	106.7	103.7	113.8	110.9	114.1
1982-83	118.7	110.6	104.7	112.0	121.0	110.9
1983-84	125.8	123.5	115.0	113.8	140.5	110.5
1984-85	139.8	127.2	126.2	122.0	178.8	116.1
1985-86	149.3	140.7	135.7	137.3	212.2	129.5
1986-87	163.2	166.3	141.2	145.7	241.3	134.1
1987-88	172.2	192.8	145.0	160.0	259.6	147.9
1988-89	189.2	206.4	161.9	166.2	317.5	148.0
1989-90	199.4	251.5	168.9	177.0	325.0	159.1
1990-91	213.0	291.8	177.1	188.0	359.0	167.3
1991-92	226.9	266.8	173.2	190.8	320.5	175.1
1992-93	232.9	266.4	182.6	194.2	318.1	179.3
1993-94	254.9	255.4	203.9	202.0	369.4	181.7
1994-95	269.0	318.8	211.4	219.6	407.2	196.9
1995-96	291.4	376.0	236.3	251.0	554.2	214.3
1996-97	315.1	398.0	259.5	261.3	584.4	222.2
1997-98	337.3	382.2	277.4	273.3	642.0	228.7
Average Annual Growth rate	**14.2**	**17.2**	**10.8**	**10.0**	**33.2**	**7.2**
Base: 1993-94 = 100						
Weight	**35.57**	**9.26**	**26.51**	**28.66**	**5.37**	**23.30**
1994-95	109.6	109.2	105.3	112.1	116.2	111.2
1995-96	121.4	115.0	125.7	126.5	146.2	122.1
1996-97	125.0	128.2	135.9	134.3	152.9	130.2
1997-98	133.6	135.6	146.8	141.7	164.9	136.5
1998-99	135.8	152.7	155.8	144.8	174.1	138.1
1999-00	143.3	163.3	169.5	153.0	198.7	142.5
2000-01	148.5	166.2	177.4	165.2	227.6	150.8
2001-02	152.5	160.6	180.1	175.1	253.7	157.0
2002-03	159.9	177.4	187.1	187.5	237.8	175.9
2003-04	168.6	201.5	199.0	200.9	265.4	186.1
2004-05	177.9	229.6	211.1	224.4	303.5	206.2
2005-06	189.8	265.8	216.4	251.4	349.9	228.8
2006-07	209.3	314.2	242.4	276.8	382.0	252.6
2007-08	223.9	370.8	264.1	293.6	378.0	274.2
Average Annual Growth rate	**8.8**	**20.1**	**12.2**	**14.0**	**20.1**	**12.5**

Source: HandBook of Statistics on the Indian Economy, RBI, 2007-08

TABLE A-7: Index Numbers of Infrastructure Industries

Year 1	Composite Index 2	Electricity 3	Coal 4	Finished Steel 5	Cement 6	Crude Petroleum 7	Petroleum Refinery Products 8
Base: 1980-81 = 100							
Weight	**28.77**	**11.43**	**6.61**	**5.21**	**1.60**	**2.41**	**1.52**
1981-82	115.5	110.0	108.9	115.9	112.3	152.8	108.5
1982-83	124.5	117.5	114.5	115.9	124.6	199.1	111.6
1983-84	132.5	126.5	121.2	101.6	144.9	245.3	127.1
1984-85	145.0	141.6	129.3	111.1	161.5	273.6	128.3
1985-86	156.7	153.7	135.4	123.8	177.0	285.8	154.7
1986-87	168.4	169.6	145.4	130.2	195.7	287.7	164.7
1987-88	178.6	182.5	158.4	136.5	211.8	286.8	172.1
1988-89	193.2	199.9	170.4	146.0	239.6	307.5	176.0
1989-90	205.3	221.6	176.2	142.9	244.9	321.7	187.2
1990-91	215.0	238.9	185.7	147.6	260.4	317.9	186.8
1991-92	229.9	259.2	201.1	177.8	288.8	285.8	185.3
1992-93	237.4	272.2	209.0	179.4	289.3	254.7	193.0
1993-94	249.9	292.3	215.8	190.5	309.1	254.7	196.1
Average Annual Growth rate	**10.3**	**14.0**	**8.2**	**5.7**	**15.1**	**7.8**	**6.7**
Base: 1993-94 = 100							
Weight	**26.68**	**10.17**	**3.22**	**5.13**	**1.99**	**4.17**	**2.00**
1994-95	111.1	108.5	103.2	117.3	108.8	119.3	105.9
1995-96	122.8	117.3	109.8	142.9	121.3	127.7	110.1
1996-97	127.3	122.0	116.1	151.1	133.0	121.8	117.8
1997-98	134.5	130.0	120.3	160.6	145.1	125.3	122.1
1998-99	138.3	138.4	117.8	162.8	153.4	121.1	128.4
1999-00	150.9	148.5	121.6	187.3	175.2	118.2	161.0
2000-01	158.6	154.4	125.9	199.3	173.6	120.0	193.8
2001-02	163.7	159.2	131.2	206.4	186.5	118.5	201.0
2002-03	171.9	164.3	137.2	221.5	203.0	122.6	210.9
2003-04	182.4	172.6	144.2	243.1	215.3	123.5	228.3
2004-05	193.0	181.5	153.1	263.5	229.5	125.8	238.1
2005-06	204.7	190.9	163.2	292.0	257.8	119.2	243.2
2006-07	223.6	204.7	172.8	330.2	281.4	125.8	274.6
2007-08	236.2	217.7	183.2	347.1	304.1	126.2	292.5
Average Annual Growth rate	**9.6**	**8.4**	**6.2**	**17.7**	**15.0**	**0.5**	**14.3**

Source: HandBook of Statistics on the Indian Economy, RBI, 2007-08

CHART C-1: A Model Exhibiting a Compatible Globalization

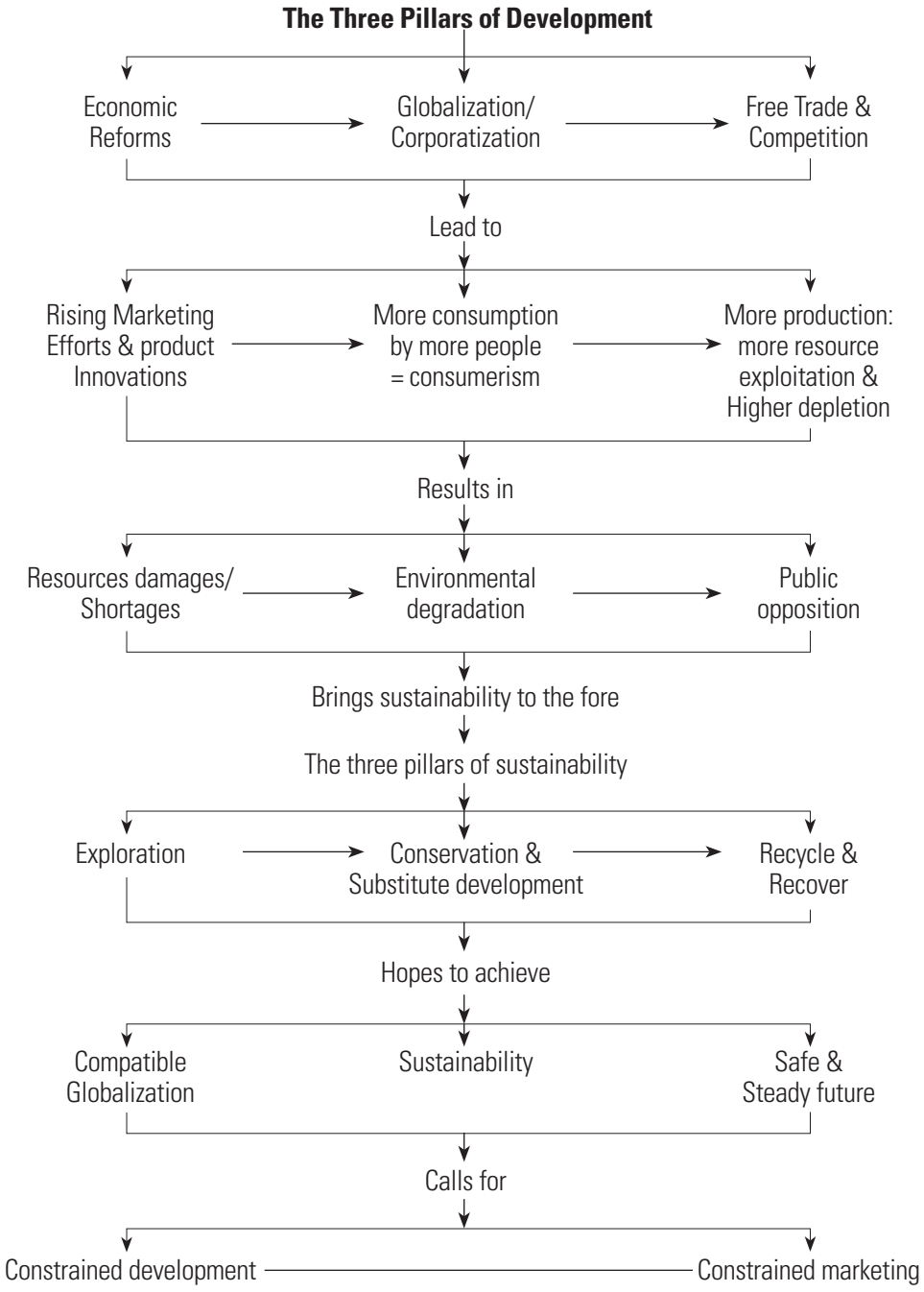

CHART C- 2: A Simplified Version of CHART C-1 Ensuring Compatibility Process