Design as a State Policy - Imperatives for India and other Developing Countries.

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Policies are instruments used by the governments by which pressures are exerted artificially to achieve social and economic objectives till the time whole society becomes aware and begins to exert such pressures on their own. One such objective is development and growth which every nation and society aspires for. In the West, science & technology has been used as an effective instrument for industrial development and growth.

Adopting the Western model of growth, India invested heavily in science & technology in the form of research laboratories, training institutions, test centres etc., with 900 such institutions in operation today. India was the first country in the world to have a policy on science & technology and a Ministry of Scientific Research & Natural Resources in 1951, and can now boast of third largest scientific manpower base. Despite all this the pace of development has been rather slow.

Economic advantages of science and technology are derived through products; systems and services, which need to be designed and, only then are made available to the society. A responsive design process therefore provides an appropriate link between science & technology and society to improve the standards of living and create means of employment and growth. It has to be recognised by the policy makers that design in collaboration with science and technology can do just that. Therefore design should form an integral part of any national policy of development which could appropriately be termed as "Science, Technology & Design Policy", to create a cross-catalytic impetus for development.

In this paper, post- war industrial and science & technology scene is reviewed with particular reference to India, and some cases of successful design utilisation, to give an insight, which could lead us to take effective measures for the future. One such push could be given by a concerted state policy on Design.

Indian Science & Technology

It is at the height of faith in science & technology that India became free. The biggest problem that the country faced then was economic backwardness, which was attributed to industrial or technological backwardness. It was therefore natural that India adopted a policy of development of science & technology in the hope that it would end our poverty and will become the panacea of all our economic ills. India was the first country in the world to create a Ministry of Scientific Research and Natural Resources, in 1951. We thought that if science could work wonders in America and Western Europe it should do the same for us, without really knowing how the linkages worked there. Since we had no experience of science and had not known how modern science aided invention and technology, we took a very superficial view of science. This was unfortunate but bound to happen. We chose the dogma of science and technology, which was convenient and ignored the essence and meaning. We forgot that in the West, science and technology and design were brought together through the economic, social and political pressures to become effective. We invested heavily in science & technology and not in design. Chain of national science laboratories was started under the auspices of Council of Scientific and Industrial research, Department of Science & Technology, Atomic Energy Commission, Department of Electronics etc. New institutions to impart higher education in science were started. Indian Institutes of Technology were started to do high level research and impart training in engineering and technology; and each state had its own engineering college plus many more privately funded engineering colleges. As a result India can now boast of 900 and odd research laboratories, training institutions and test centres working in variety of areas and the third largest scientific manpower base in the world.

Indian Industry

As a part of planned development a parallel programme of industrialisation was started. In the late 50's and early 60's many new core public sector industries were set up in steel, energy, mining and communications. Since India had no experience in technology or its development, all the new industries were set up with the help of technologically advanced countries. Western multinational companies also started manufacturing units in India with or without local equity participation. Private industries were also encouraged to develop and start new units. Many of these companies made products in technical collaboration with foreign companies. This was the first phase of technology import. What did we really import? We imported know-how to produce a product along with the capital equipment to produce it. Most of the companies started as single product companies to minimise risk and to avoid high initial costs. Each of these companies imported know-how and capital equipment to produce that very product. This of course costed a lot in foreign exchange but we had no choice at that time. Design came as part of the technology (know-how + equipment) package. If any company wanted to have a different product, another set of know-how and capital equipment had to be imported. Therefore most of the companies

resisted change or even update of products. This is obvious by the fact that some of the products selling these days are as much as 30 - 40 years old. A vested interest developed in resisting any change, improvement or renewal of products, and lobbied for status quo. Protection was sought by the monopolistic industry so developed in the name of letting the local industry grow. Imposing heavy import duties, and banning the import of many items granted protection. Low quality of products, insulated from outside competition was accepted as a way to keep the Indian industry alive, thereby protecting jobs and preventing sickness and at the same time save foreign exchange. No need was therefore felt to absorb the acquired know-how. Most of the companies worked with empirical practices and drawings handed over to them by their principals abroad for years on end. There was no concept of product life cycle. It seemed to be infinity. In the process culture of refinement, invention or innovation got killed in most of the Indian companies. Loss of confidence in developmental abilities and fear of failure took root. There are many instances of companies where it was inconceivable that a new product can be designed and developed in-house or even attempted.

Indian Industry & Design

So while the rest of the world was changing fast, Indian technology stagnated and with it product design and development programme could never take off. Public sector could have given the lead but fared no better. Private sector car manufacturers even after making cars for 40 years could not make a new car on their own. So our products suffered from high cost and low quality.

We have now 200 operating enterprises in the central public sector with an investment of about RS. 40000 Crores (USD 33000 million) and an annual turnover of RS. 55000 Crores (USD 46000 million); and an almost equal contribution from private sector. Our growth rate has not averaged more than 6% per year during the last decade *(1980-1990).* The reason is simple. We took a very simplistic and fragmentary view of science and technology. We did not integrate them well enough to make them useful. We looked for old design, old know-how and old equipment. We became the dumping ground for old plant and machinery. Therefore there was hardly any need felt for interaction between industry and research institutions which resulted in their seeing each other with disrespect and great deal of suspicion. All this happened because we forgot that in the free economies of the west, science, technology & design were brought together through the economic, social and political pressures to become effective. In a controlled economy like ours these pressures had to be brought about through state policy initiatives.

Technology Import

One of the main attractions for importing technology is the design of saleable products or systems that comes along. Very often we purchase same technology over and over again to

produce different products, otherwise we would not have 2 big companies collaborating with one Japanese company to produce 3 different models of 2-wheelers and many other Indian companies buying 2-wheeler technologies from as many Japanese companies. So we are paying many times over for the same technology. The fact is that industry is not interested in technology per se. They are only interested in making products, which they can sell at a good profit, as any business would be. If these practices continue, there will be perpetually dependence on foreign technology and design - the situation that no self-respecting nation would like to be in.

Keeping in view the existing situation it seems that technology import is imperative as long as sufficient capability to develop indigenous technology is not build up. This can only begin when sufficient design capability has been developed. To start the process we should use design to create and make variety of products from the same/existing technology. This would also help in complete absorption of acquired technology and would pave the way for further growth, as the confidence in indigenous capabilities will grow. Challenges thrown at technology by designers will be easily accepted and executed resulting in overall accelerated development. There may be many failures, but these have to be taken in the stride, as that is part of the process and as a stepping-stone to success. This is the scenario that we should aim at - where design becomes a vital and dynamic link between technology and society so that there is overall growth due to cross-catalytic reaction that a proper design utilisation can start.

National Design Policy

India's Science & Technology Policy 1987 announced by the government of India mentions, "Technology must suit local needs and to make an impact on the lives of ordinary citizens, must give constant thought to even small improvements which could make better and cost effective use of existing materials and methods of work. Our development must be based on our own culture and personality". If we analyse this statement or programme it can in no way be executed by science alone, nor by technology alone, it straightaway falls under the domain of design - first part in engineering design and second part in industrial design. So I reiterate if we want to use our science and technology fully we must include design in the policy statement and be absolutely articulate about it so that in India also the trio *(science, technology & design)* works in unison to realise the policy goals. I take another statement from the policy "It is true there is a whole host of problems in these areas (industry, agriculture and rural development) but the solution of them can be simplified by the applicating of technological knowledge available". Now which discipline is more capable of doing or effecting this 'simplifying' and 'applicating'. Design again comes to mind, and yet the whole policy statement is absolutely silent about design.

With the above arguments I have tried to prove that design and its development is as

essential as science & technology development. Design should, therefore form one of the important constituents of our policy for development. It should be articulated and should consciously be made part of any developmental activity. Science & technology policy should be redrafted as science, technology & design policy.

If we agree that design should be promoted for all the above reasons then what kind of design should we promote? Since design is a holistic and integrating (synthesizing) activity both technical aspects, which impart 'usefulness' to products as well as humanistic aspects, which make the products 'usable', should be promoted simultaneously. Technical aspects include engineering, choice of materials, mechanisms etc., while humanistic aspects include ergonomics, use, handling, safety and *acceptance (ecology & environment are part of acceptance).* It has to be seen that the promotional emphasis is balanced and equitable to derive maximum benefits.

Besides developing and utilising design capability per se, there is need to develop design management capability along with the technology management capability. Both these areas have not been yet considered worthy of attention in the policy document. Due to the nature of design process, management of design is quite different from production management, materials management or labour management. Design management involves the management of highly skilled and creative people with different set of aspirations and motivations. It involves management of product development strategies. One of the chief differences between design management and other managements is the variability of control, which is loose in the beginning, and gets tighter and tighter towards the end of the design process. As the principles of design management are now well known the engineering and other management graduates should be exposed to these principles and full fledged training programmes envisaged for future.

Design utilisation

Design utilisation can be classified into two user segments. One is design for industry, which include big public and private sector undertakings as well as small-scale sector. This design is already taking place but the pace at which it is going on, its perceptible and social impact is limited. The other segment, which is fertile for design inputs, is the design for utilities and services which include transportation, traffic, health, communications etc. The design inputs in this segment can make perceptible and immediate impact. The improvements can be seen quickly and widely. For example Indian Railways can become biggest receiver of design services if it recognizes the need for improvement in speeds, carriages, rolling stock, safety, passenger facilities etc. Unfortunately Indian Railways has kept only 0.2% of its total outlay for such developmental activities. Our aviation industry can tap the indigenous engineering & industrial design talent to derive some benefit, as well as help develop it further, and preparing it for complex tasks and challenges ahead. With

this approach the state which controls the public service sector and large industry sector can create unprecedented demand for good design and throw up challenges which many engineering designers, industrial designers, technologists, scientists and communicators will rise to meet, and a breakthrough for healthy growth can be initiated. We have had many examples where challenges have been thrown in and have been met successfully. One is the spectacular success of C-DoT mission despite there being many detractors trying to scuttle the programme. This, I think is a watershed in India's technological self-reliance. Another interesting example of meeting the challenge is atomic power development programme, where external assistance was not available, and now there is a big expansion plan to be implemented indigenously largely because of our will and effort to achieve self reliance in this area by creating a cadre of competent designers, technologists & scientists to do this. There are many other areas and worth mentioning is the small industries sector. They neither had the clout nor the resources to seek foreign technical collaborations. They had to rely on their own talents. Most of these started with copying designs. They developed the manufacturing technologies themselves and from these developed new products. Some of these products are unique to India which no other country need to produce. These were the companies which first employed design services. Many of these have grown and become big in their own right. Some of them are now going in for fresh infusions of technology but they are better placed as far as assimilation and absorption is concerned and has capability to adapt it to suit them and their markets. It is these industries, which have really taken the brunt of technological development in India.

Some big companies have taken the building up of technological capability seriously. They considered design activity as central and not peripheral, and created full-fledged design and development facility right from their inception. One such company is Larsen & Toubro Ltd. in Bombay. It spends 2% of its turnover in design & development, which is quite respectable by world standards in its sector. They are so successful that in some product areas they are considered world leaders. They have also exported technology and design know-how and have received 'good design' awards at Hanover fair in Germany. They also import technology and unlike many other companies they are very selective and their absorption is 100%.

Another example is TELCO (Tata Engineering & Locomotive Co. Ltd.), a big manufacturer of commercial vehicles and trucks. They started with collaboration but simultaneously developed their in-house R&D center, which is one of the largest in-house design and development facility in India. For the last three years they have been launching a new product every year and have taken the competitors having Japanese collaborations, head on. One reason is the faith they have created because of the consistent quality of their products and the other is that their products fit in very well with the Indian market conditions.

Punjab Tractors has designed and developed their range of tractors within the organisation with some help from consultants, and thereby built up a design culture in their company. Eicher Tractors in Delhi is also designing new tractor models. Bajaj Auto Ltd., India's number one 2-wheeler makers are strengthening their design department with more personnel and equipment and are on the verge of bringing out new indigenously developed products in the market. Their new rear engine 3-wheeler rickshaw, an instant hit in the market was a landmark in indigenous product design and development and confirmed that given a chance, design well integrated with technology can contribute to the growth substantially.

Though design is utilised in many industries today but it is also unheard of in many more. If design utilisation is wide spread, which can happen quickly, if adopted as policy and nurtured till maturity would reflect in better products, better systems, better services, better productivity, better wages, and above all better life - which is the aim of any national development programme. This can be achieved quickly if there is a concerted policy on design.

Every nation has its unique problems regarding environment, population, transportation, urban expansion & growth. All these problems are linked to design in some way or the other. Developmental policies, therefore will have to be linked to the national science, technology & design policy of our nations, because the solutions to these problems lie there and not in the products & technologies from other countries.

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Note: This paper is written in early-nineties, some of the figures mentioned relate to that time