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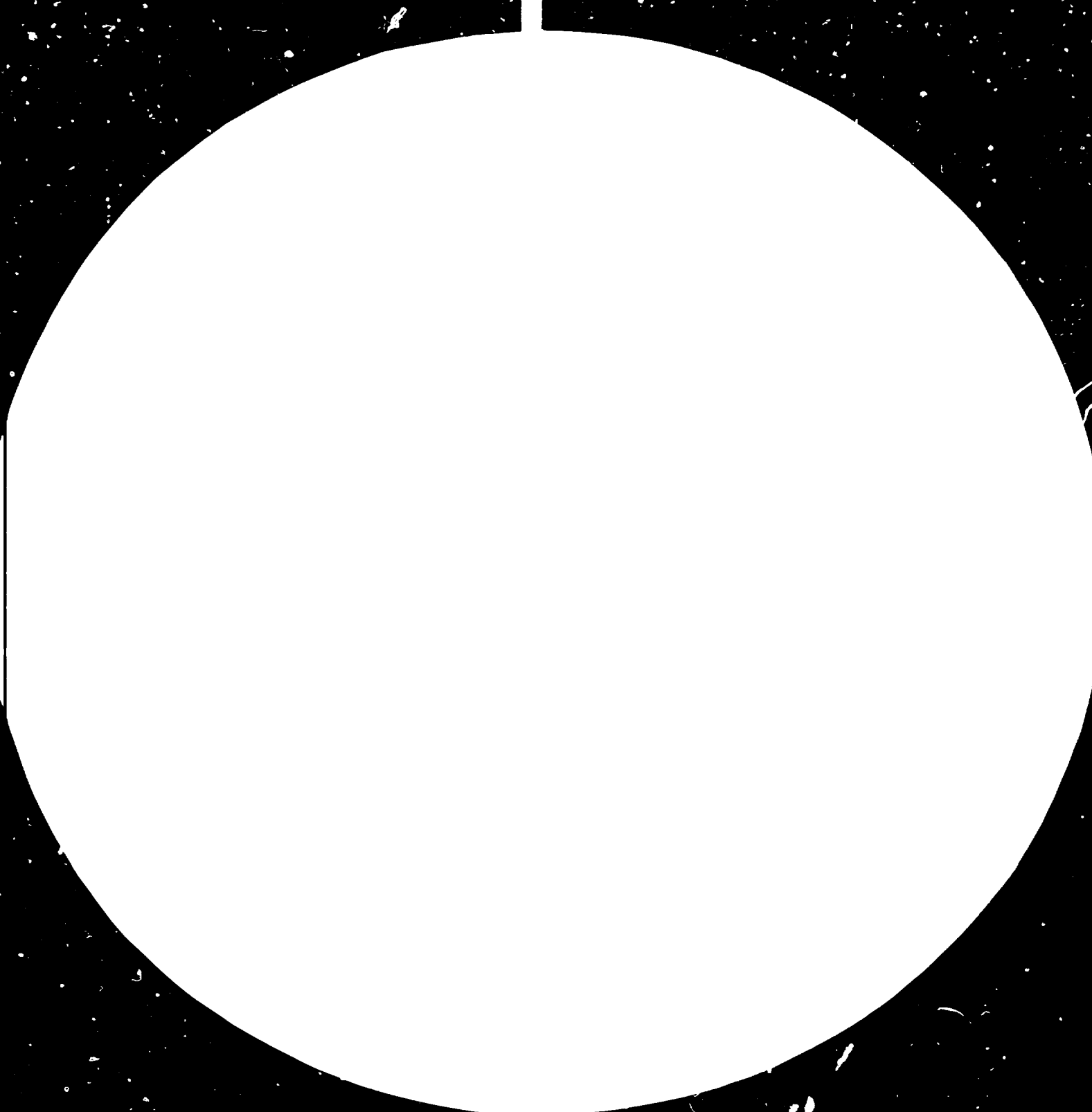
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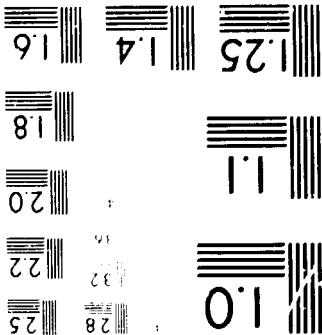
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SOCIAL IMPLICATION  
OF  
INDUSTRIAL DEVELOPMENT AND TECHNOLOGY TRANSFER

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## Summary

The recent history shows that a greater attention should be devoted to the social values and their role in the industrialization. The contention is that if the industrial development is pursued too aggressively and without due regard to the social values, there is a likelihood of causing social dislocations, - which may negate the industrial development. Iran may be cited as the most recent and dramatic example.

The social framework has far reaching implications which point out that the capacity of the LDC to assimilate new technologies is governed by the cultural and in turn socio-economic conditions.

To express this relationship in a geometric analogy, the industrial development and technology transfer may be expressed by a concave function of a parabolic property with an apex representing the theoretical point where the socio-economic values are in an optimum relation to the capacity to assimilate the new technologies and the curve beyond this point will be governed by the law of diminishing returns.

## SOCIAL IMPLICATION OF INDUSTRIAL DEVELOPMENT AND TECHNOLOGY TRANSFER

The progress of industrial society depends upon numerous elements. The basic premise lies probably in the capability of organizing human activity. This capability is responsible for the creation of the state and other social institutions such as religions, armies or corporations. The organization can accumulate wealth and capital resources, and it is responsible for the political system and the success or failure of a particular national entity. Basically, the organization is a co-ordinated effort of a group of persons toward a common objective.

The organization objective is, indirectly, a personal objective of all the participants. It is the means whereby their organizational activity is bound together to achieve a satisfaction of their own diverse personal motives. The organization implies more than mere control of human effort for productive purposes. It includes the ability to accumulate capital, to exploit natural resources and to direct the overall effort toward predetermined goals.

Organization can be divided into three categories that in combination represent different political and economic forms. The first major subdivision is embodied in government agencies concerned with the planning and management of the developing economy. The second subdivision consists of social institutions and organizations. The third comprises organizations which actually control and operate financial commercial and industrial enterprises.

In the general sense the progressive social changes, coupled with further technological maturation created the necessity for new and stronger governmental control. The governmental function in the technological society became, in itself, a strong influence in altering ethical, economic, political and social values, thus affecting and increasing the overall impact of technology.

The assumed political forms ranging from authoritarian dictatorships to capitalistic and social democracies function not only within the constitutional framework of the adopted political

ideologies, but also have legal provisions which are oriented towards furthering the economic objectives. They will reflect in the social legislatures, tax laws, business regulations, licensing, foreign trade provisions, subsidies, unemployment and health insurance to name just a few. These will vary with the nature of the political entities and will play an important role in the determination of the overall results.

Larger markets increased the growth of industry and offered greater employment and higher wages. The purchasing power of consumers increased and created, in turn, new demands for more industries and for large-scale production. The call for increased output brought about mass production methods. Mass production, automation and modern manufacturing methods created a new need for specialized labour skills and knowledge to handle the more and more sophisticated equipment that replaced the labour of man. Automated manufacturing methods continued to reduce operating costs. The reduction of production costs made lower prices possible, thus broadening the market for industry's output. And so the spiral of industrial development continued.

In the pragmatic sense of our worldly objectives, it may be said that industrialization is the common denominator of our civilization. Therefore, if it can be assumed that industrialization with its associated effects on the society is indeed the means of improving the existence of mankind, then the trend toward industrialization should not be left to chance.

In pursuing the isolation of the values which lead to creativeness and productivity, one has to consider the qualification of man as an individual, namely his capacities and skills and adjointly the social system in which he functions. Man is shaped by the cultural values of the society which in turn provides for him the platform for attaining the chosen goals. The product of the two values, the cultural capacity and the economic environment determines the effectiveness of industrial development.

It would be very difficult to separate mores from religious and political systems because of their interdependence. The impact of technology is directed toward man, and more precisely toward his well-being. It influences his environment and his relationship to his fellow men, to his family, to his church and to the whole community. The resulting change in the attitude of the individual is the very substance for transformation of the whole social and political structure of the society.

The decline of paternalism was proportionate to the declining authority of the church and inversely proportional to the growth of power in political institutions. Technology became a powerful material and ideological conditioning force, capable of significantly altering broad spectra of human relationship.

The fast increase in the urbanization of the society and steady growth of industrial technology, has radically lessened the degree of economic independence of the average citizen. The continuing expansion of the industrial technology has profoundly affected the kinds of skills demanded of the economic population. It is precisely in these conditions in which the political will originates.

The Protestant Ethnics - Calvinism - have often been attributed as the formative force behind the industrialization and affluence of the occidental societies. This may be partly true. However, one may find even in this group considerable variations. Historically, it appears that a most rapid development of human resources occurred in the periods of liberalization and enlightenment whereas the totalitarian regime with the concept of centralization of authority regardless if this was political (state) or religious (church) caused retardation of the social and consequently economic development. An example although inconclusive can be given in the variation between the European catholic and protestant countries.



Thus, the ethnic background is no guaranty of the productivity. This contention can be further supported by the example of Japan, which also is of complete different ethnic origin remote from Europe and the USA. It is of different religion (Shintoism) and totally different social structure (Paternalism), which partially contradicts the concept of liberalization stated above, but also has a highly industrialized stage.

The common factor which emerges as directly relevant to the industrial effectiveness is the social discipline represented by a competent population on all functional levels harmonized into a cohesive whole by responsible leadership. This relationship is expressed by an appropriate political framework and relevant legislations.

This concept often meets with resentment in underdeveloped countries. The opponents give emotional arguments of discrimination since the productivity is being equated to social evolution. Yet what determines the social productivity? Is it technology? Geographical location or climate? The political form, religion or ideology? Obviously none on its own; but the combination of these functions create the cultural base, out of which stems the hierarchy of social values and preferences, and in turn the incentive system - which is the driving force of the socio-economic mechanisms.

Therefore the development programmes represent a complex network of interrelated functions far beyond the spheres of technical requirements, which must be harmoniously synchronized - not to foster advancement of one sector at the expense of another.

The past three decades witnessed concentrated effort of the industrialized countries to help the backward regions with economic development in a hope to alleviate their poverty. In few endeavours the nations were as united, and the related programmes were accepted practically without reservations. In spite of the impressive effort, the results achieved were disappointing. The billions poured into the developing countries often disappeared without results and sometimes even disrupted the traditional socio-economic pattern and

caused aggravation and an even wider rift between the rich Northern and the impoverished Southern hemispheres as the division is now loosely defined.

It was assumed that the process of industrialization can be accelerated by transfer of various technologies - preferably most advanced technologies. The least developed countries demanded the most advanced technologies in the hope to by-pass the numerous steps of evolution experienced by countries which attained a high level of industrial state. An offer of anything but the best was resented as an attempt to relegate the developing nations to a second-rate technology and so to keep them in a perpetual competitive disadvantage. Some developing nations are still adhering to this fallacy which causes loss of the scarce resources and leads to disillusionment. This was caused mainly by the inability of the socio-economic infrastructure to absorb the transferred technologies.

There is no justification for purchasing sophisticated machinery for manufacturing simple implements or procuring transport equipment where the roads and bridges are not designed to sustain it and the people not qualified to operate it. Numerous examples can be given based on past experience and acceptance can be gained since the results and implications are quantifiable. The more difficult obstacle lies in the assessment of the infrastructure and the related intangible values as the expression of the cultural base.

In summary, industrialism is an almost universal goal toward which all nations are marching. The underdeveloped countries are striving to industrialize as a means of accelerating economic progress; the advanced countries seek to broaden and to extend industrialization in order to achieve ever-higher standards of living and greater economic power. In the march toward industrialism, capital, technology and natural resources are but passive agents. The active forces are human agents who create and control the organizations and institutions which modern industrialism requires.

The comparative analysis of the various countries suggests that the level and intensity of industrialization is a function of

the cultural background, which determines the socio-economic framework and also the capacity to create and absorb new technologies. The law of diminishing return is indicative whether the technical sophistication and the supporting socio-economic framework are in balance. The scope of technological assimilation is a function of the social evolution since the steps of industrial development can be accelerated but not bypassed. Industrialization is not confined only to the technology but more to the broader concepts of social values which are not transferable but must be acquired by a steady process of cultural development.

The objective is to identify the critical elements of industrial productivity and their inter-dependence within the framework of the socio-economic system which forms the foundation of a viable industrial base. The interaction between the physical properties of economic values and the cultural motivating forces create the industrial dynamism. The dual impact of technological change has thus been identified. The first result, which provides an easily measurable economic environment, is well understood. The by-product changes as the accepted doctrines such as ethics, behaviour, social values and politics are recognized but difficult to predict. Since the concept of industrial decentralization may be governed by the motives of efficiency, profitability, various strategies or social rewards, the solution can be found by optimizing the available resources and the set of chosen objectives. These relationships can be best expressed by quantitative techniques of operational research.

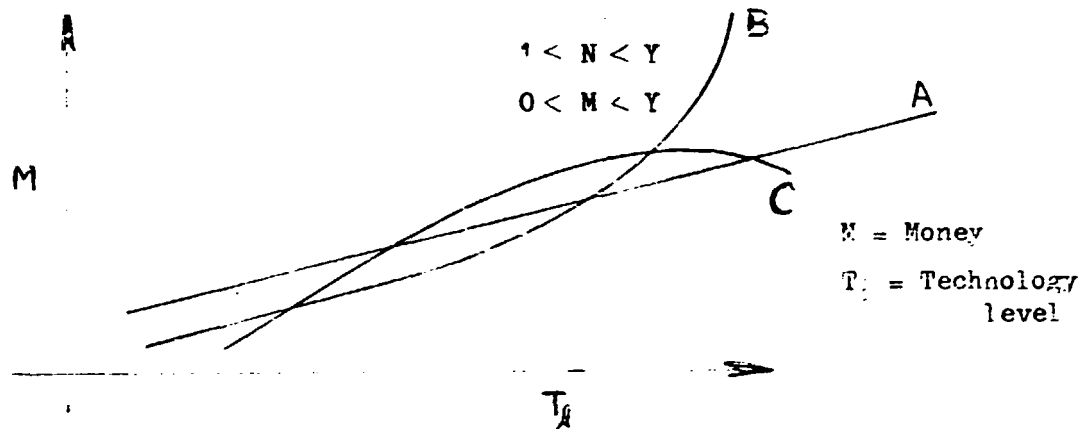
ANNEX I

The law governing the rate of return on investment in technology transfer can be stated in the three general conditions: A, B, and C.

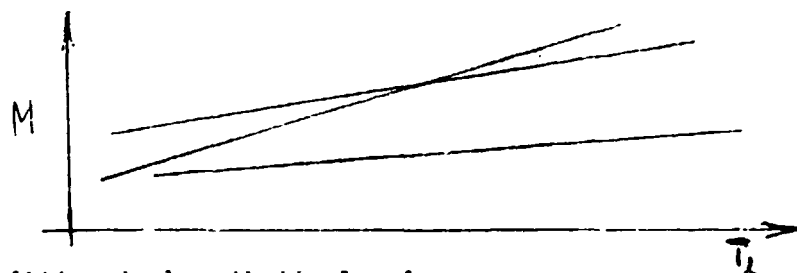
A = linear function  $M_1 = P_1 \cdot T_t$

B = concave function  $M_2 = P_2 \sqrt{T_t}$

C = convex function  $M_3 = P_3 \cdot T_t^m$



1. Condition A (linear) signifies that the values determining the level of technology are linearly related to the investments. There are no bottle-necks or shortages or breakthrough of tapping more economic resources. The slope of the linear curve may vary but the relationship will remain the same

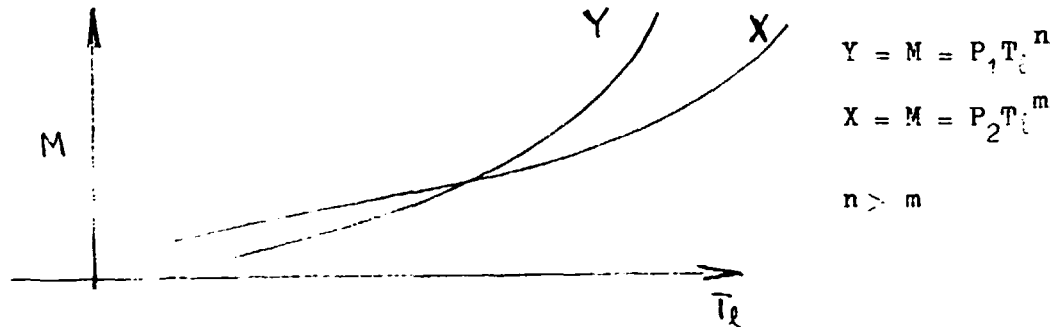


This condition is hypothetical only.

2. Condition B (concave) signifies that the new technology may have opened new slack resources and with the higher level of technology ( $T_t$ ) the expenditures of achieving the objective (product) is decreasing. Such condition may arise in tapping larger markets and expanding production with reduced cost per unit. The stimulated employment, and purchasing power, again, enlarges the market. Such a situation feeds on itself and is symptomatic of economic booms.

3. Condition C (convex) is probably the most realistic, - expressing the long-term factors, of technology level with an exponential cost growth.

Considering the fact that each curve is determined by large number of functions - such as labour, materials, skills, etc. - the characteristic of the curve will reflect the infrastructure as well as the cultural background. Thus if the same technology is applied in country X it will demonstrate itself differently in country Y.



From these two curves it is obvious that the law of the diminishing return for country Y is greater than for country X and thus the level of technological saturation in the general sense may have been reached earlier.

The relationship and determination of the law of diminishing return can be expressed as follows:

- i. The constant "linear relationship" (any slope)

$$T_l = \frac{M_1}{P_1}$$

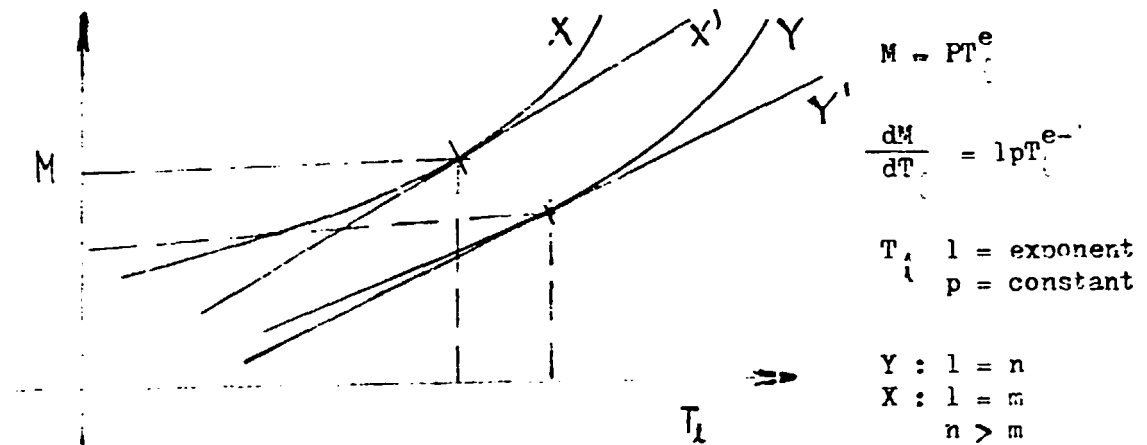
- ii. The concave "economic boom" (self-generating) relationship

$$-T_l = P_2^2 - M_2^2$$

- iii. The convex "classical" relationship

$$T_l^m = P_3 \cdot M_3$$

iv. The slope of the curve determining the law of diminishing return (expressed by tangents)



To optimize = to maximize dx  
 = to minimize dy

Thus the arbitrary point for a technological saturation may be considered

$$dx = dy \quad (\text{costs} = \text{benefits})$$

At which point the slope of the tangent will be 45 degrees, and the subsequent costs M will exceed the benefits, as expressed by the law of diminishing return.

The variation of tangent X' and tangent Y' shall express the variation of the technological saturation level, or derivatively the Industrial Capacity Base (ICB).

The ICB shall be used in further analysis as a reference plane for (qualitative) assessment of various industrial conditions.



