

Social factors in market creation for high tech. products in developing country*

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(1) Introduction;

It is generally accepted that remarkable trends or phenomena of our age are resulted of rapid progress in science and globalization of economic activities. Both of these trends affect crucially every aspect of society throughout the world. In most of developing countries, there is the serious problem of keeping economic development continually coordinated with these two trends. Their success of today's economic development policy will be decisive in determination of their economic role in the picture of tomorrow's world economy. As a part of their economic role, it is needless to say, production activity of high tech. products is vitally important. It is very desirable for them to make their high technology industry work as a leading sector. This leading sector has to have possibilities for innovation, or for the exploitation of newly profitable or hitherto unexplored resources that yield a growth-rate markedly higher than the average for the economy. To make their high technology industry more profitable than the rest of their competition, they have various problems to solve such as technology base management. But in

the end, the problem of demand creation of their high tech. products at their home comes up as one of the highest priority. We will discuss some aspects of their uniqueness of economic and social factors in their demand of high tech. products.

(2) Concept of developing countries and points of our interest.

To start with, it seems desirable to define broadly our image or concept of "developing country". On the concept of developing country, we like to follow Dr. Robert E. Rostow. According to his theory, growth processes of economy take the form to move from the traditional society to the take-off, from the take-off to the drive to maturity, and from the age of maturity to the age of high mass consumption.⁽¹⁾ Furthermore, some scholars add the stage of "from the age of high mass consumption to the age of post of high mass consumption". Within the frame of this growth process, the developing economy is either at the stage of the take-off, or the drive to maturity. In simplest form, a skelton of Dr. R. E. Rostow's model of open system can be expressed as follow;

production function of National Product; $N. P. = f. \text{ of } L. \text{ \& } C.$

L ; size and productivity of working force.

C ; size and productivity of capital.

$\Delta N. P. = f. \text{ of } \Delta L. \text{ \& } \Delta C.$

ΔC ; changes of size and productivity of capital.

ΔL ; changes of size and productivity of working force.

Interpretation of variables and system.

changes in size of capital = amount of investment minus depreciat-

ion.

productivity of capital = level of profit making.

kinds of investment.....(a) simple enlargement of existing capacity.

(b) cost reduction by process innovation.

(c) new product production by innovation.

amount of investment = f. of schedule of expected value of profit making perceived by entrepreneurs (e. v. p.) and level of availability of capital (l. a. c.)

e. v. p. = f. of marketability of product output & cost function.

kinds of products.....(1) industrial goods and (2) consumer goods. (1-1) industrial goods for home country. (1-2) industrial goods for foreign use. (2-1) consumer goods for home country (2-1) consumer goods for foreign country.

market of (1-1) = market for investment (a) (b) (c) above.

kinds of investment by source of capital.....(1) ploughing profit back (2) borrowing from consumption sector through financial institution, (3-1) borrowing from foreign countries and (3-2) direct investment made by foreign countries.

l. a. c. = f. of amount of profit reserved at production sector and amount of saving at consumption sector and amount of (3-1) and (3-2).

amount of investment by kinds of source (2) and most of (1) = f. of

price offered by entrepreneur for capital.

Price of foreign capital is determined by politics in most case.

some of investment of kinds (3-2) = f. of profitability of investment in context of international economy.

profitability of investment = f. of size & productivity of capital and working force under a given level of marketability of output product.

size of working force = total working hour of working force.

productivity of working force = level of skill at the techniques coordinated with capital in use.

level of skill = f. of education system including O. J. T.

efficiency of skill formation = f. of kinds of investment made and their motivation to learn the skill.

profitability of investment type (b) and (c) = f. of the quality and quantity of the pool resulting from the pursuit of advancement of science and the ability of management to translate it into commercial business.

quality and quantity of the pool resulting from pursuit of advancement of science = f. of the volume of resources devoted to the pursuit of fundamental and applied science, and the proportion of the flow and pool of potential innovation accepted.

amount of saving at consumption sector = f. level of income and propensity to consume.

The key variables of this model are investment, marketability, profitability, innovation, consumption and skill formation (including management skill). All of these variables are explained mainly by the

underlying variables of peoples' mental attitude. Therefore, he insists economic decisions can not be explained solely by a function of what are conventionally regarded as economic motives. And he proposed seven variables of propensities: (A) The propensity to develop fundamental science (physical and social), (B) The propensity to apply science to economic end, (C) The propensity to accept innovation, (D) The propensity to seek material advance, (E) The propensity to consume and (F) The propensity to have children.⁽²⁾

Here, we are confronted with the problem of stating the determinants of the propensities. As a first descriptive approximation they may be taken as an aspect of values of society's value-systems, as efficiently operating through it's institutional structure; and in turn, through this medium the propensities may be linked socially with the distribution of working force, techniques of production, and the way of living. He insists propensities summarize the effective response of a society to its environment, at any period of time, acting through its existing institutions and leading social groups. He also says the propensities are regarded as a function of the value systems of a society and thus they are fundamentally connected with the social structure and institutions of a society, and the manner in which economic activity has been organized.⁽³⁾

So far we have seen a skelton of a general concept of economy proposed by Dr. R. E. Rostow. A developing economy is an economy that fulfills the following three conditions ;⁽⁴⁾

- (1) the rate of productive investment is more than 10% of national product.
- (2) the development of one or more substantial manufacturing sectors, with a high rate of growth.

- (3) the existence or quick emergence of a political, social, and institutional framework which exploits the impulses to expansion in the modern sector and the potential external economy effects of take-off, and gives to growth an on-going character.

Now, we can imagine a concept of developing economy by locking the three conditions into the general concept of economy. As we pointed out before, the most important key variable is investment, which should be kept at more than 10% of national income, if the economy is to be in a developing state. And Dr. R. E. Rostow says "whether a given rate of growth can be sustained depends mainly on whether investment of a given scale and productivity is sustained". "The course of investment emerges as a race between diminishing return, the flow of innovational possibilities, and two fundamentally sociological characteristics of a society - namely, its response to opportunities for profit (including profit to be derived from fundamental and applied science) and the extent to which it is prepared to accept and apply the innovational possibilities offered".⁽⁵⁾ In short, in order to get the economy to be developing, current changes in size and quality of the working force and the capital stock must be within the appropriate range. Especially, the volume and quality of investment determines the changes in size and quality of the capital stock, which should be in the desired range. The value of these variables are dependent on past and current attitudes that may well be expressed by the above propensities. Leaving the problem of the working force aside, the mental attitude toward investment of people in the society determine whether it is in developing process or not, and more specifically, the rate of economic growth. In most cases of less developed countries, they have difficulties to have investment of their own at the

amount more than the 10% of their national income. They do not have the competitive advantages in technological base of high technology. But their wage rate is very low. Developed countries are competitively seeking profitable opportunities for investment and they find some opportunities for investment of type (2) above, making use of the low rate of wage in less developed countries. They make direct investment to produce various products in which parts of high tech. or electronics are built. Most of the output products from these direct investment are expected to have some competitive cost advantages in world economy. The O. J. T. at such organization is certainly an effective way of skill formation in less developed countries. The income increases derived from direct investment are tied together with incremental demand for consumer goods. They may find some profitable opportunities to invest to produce the products for this incremental demand with new technology learned through the experiences in the direct investment done by developed countries. These investments themselves mean demand for some industrial goods. These goods are likely of high technology. The direct investment, incremental demand and domestic investment of their own to meet with incremental demand of both consumer goods and industrial goods are to be taken place continually as a desirable circulation. The leading industrial sector in this circulation will be able to enjoy its growth by playing more roles in world economy.

The problem to realize this desirable circulation is in the mind of people; that is the matter of propensities. The propensities relating to innovation is the cores of this desirable circulation. Innovation is one form of investment by a society, which is regarded as an induced phenomenon, taking the form of continuing flow of possibility. The entrepreneur can

perceive possibility of profit making with innovation. So the entrepreneurship comes up as a key variable.

Now, we can identify the points of our interests; what is the configuration of the group of value-system in a developing country?, what evolving mechanism of the group of value-systems can be assumed?, and what is the role of the market creation of high tech. products to sustain the growth of economy?.

(3) The group of value systems and nature of high tech. industry.

Culture is a society's design for living, and includes the whole collection of things that members of the society say, believe, or do. The cultural system is specifically concerned with the system of meaning, the integrated total of learned behavior traits demonstrated and shared by the members of a society.⁽⁶⁾ In most general terms, human behavior is culturally structured. That is behavior becomes institutionalized because once members make investments in establishing and maintaining a social system, for they have an interests in assuring it's survival beyond the life span of the present members. The resulting social institution, such as enterprise and others, represents a widely shared complex configuration of cultural elements — valuesystem, belief, practices, techniques, and objects that have been inherited, adopted, or invented by the members.⁽⁷⁾ The value systems do evolve as time goes. Over time, they appear to change in such a way as to cope with the phenomena that confront them in their daily lives.

Let us assume a social system that consists of the three different

In producing activity system, we usually behave as a member of an enterprise. Behavior in an enterprise is governed by the similar value system at large, though each enterprise has its own corporate culture. The goal of enterprise is to seek the increase of viability of his resources by way of continual profit making and ploughing it back. When we work, we are governed largely by the value system that is consistent with this goal of enterprise, which compels us to work with efficiency and no-waste. Here, it is demanded that our behavior be positive toward competition, rational, and ascetic. The value-system met with the efficiency, rationality and asceticism works well in the competition of exisiting product with the production process oriented. This value-system contradicts, at least partly, the value-system of the traditional society and early stage of the take-off. In a static economy like traditional society, material advancement by way of competition of one group will be tied together with a inducing other group for the worse. So, the positive attitude to competiton, efficiency and rationality is against the value-system of the traditional society. Older people are required to change these value-sytem when they work in a modern production system. Otherwise, they are very slow in learning the skills and techniques of a modern production system, and they are not motivated to work. In the end, the production system does not work well. As to the value-system of the production sector, we can say, as time of take-off sustained goes on, the number of people engaged in modern production system increases and more people have the value-system that is consistent with the modern production system. So the value-system of production sector evolves gradually into the modern. Therefore, the configuration of the elements of a value-system of an individual at work, and of whole production

system do change. As one element of this value-system, efficiency should be emphasized, especially in mass production system. In most modern production systems in less developed countries, efficiency and cost saving is the first priority to be achieved, because it is the only means of survival. We may assume some hypotheses on time required for the evolution of this value-system. But we do not go further here. Let us assume the closed - two sector economy model for the time being for simplicity. Under this assumption, output of the production sector goes to the consumption sector by way of marketing activity. Output of a modern production system is different from the output of an old production system. This different kind of product invades in quantity into the bundle of product of living in consumption sector. This follows the changes in the way of living. Sometimes, this change is done more easily than expected in some societies. The changes in way of living affect on the value system of consumption sector. In Japan, we experienced rapid and noticeable changes of this kind.⁽⁸⁾ It is said prevalence of automobile, modern housing with individual rooms and others in our way of living resulted with the rise of individualism as a element of value system of consuming sector (route-K). The richer bundle of this products affects largely the configuration of the elements in value system of this sector(route-K), and therefore affects social value system(route-A). It is the consumer or buyer to determine the value of output of the production sector. The acceptability of existing and new products in the consumption sector is governed by the value system of the consumption sector through their evaluating processes when they purchase a product and service(route-B). In the production sector, there exists a value-system of their own as mentioned earlier. The value system of the consumption sector and

social value system play a part in moulding the value system of production sector, as the person who works has the value system of the two (route-C). As such, these three value systems are interrelated.

In developing countries in 1980's or 90's, the required condition of the development of substantial manufacturing sector with a high rate of growth is considered to be in high technology industry by various economic reasons. And in any economy, to realize the investment required for economic growth, we have to have the investment of type (b) and (c). Most of the investments of this type are of high technology. The value-system to induce an innovative investment of high technology is somewhat different again from the value-system of modern industry of old type products. Here again a mangle of value-systems is assumed. As the economic growth goes on, the standard of living goes up. The consumer makes his bundle of products richer for his living. In early stages of take-off, people know the products to be added by referring to their value-system of consuming and social activity. That is, he evaluates the product to buy in terms of physical characteristics or functions which are clearly defined. But those who have almost every product they want consciously do not have definitive criterions to evaluate product to be added into their bundle of products to consume. It is said that they evaluate products in terms of image characteristics associated with.⁽⁹⁾ In developing countries, the structure of income distribution changes dramatically. So the distribution of various classes of living standard is different from the one of developed country. This is why we can assume that various distinctive and dynamic segments are co-existing in developing country. In a high technology industry, the product is generally light and small in contrast to the heavy and large

products of the industry of yesterday. High technology of today is capable of designing and making a production system with many controllers which satisfy delicate requirements of production. Output from the production system of this kind can be in small lots with many different specifications in contrast to the large lots of one specification. The value system of a production system with high technology would be different from one of a heavy industry or a mass-production system of yesterday. Effectiveness instead of efficiency, and challenge to innovate with risk taking instead of rationality, are emphasized in the value system of today. We can assume a mingle-mangle of various elements of value system which consists of what inherited from traditional society, mass-production system and come from production system with high technology.

(4) Marketing of high tech. products.

Let us examine the market of high tech. products. A typical product of high technology is in the field of electronics. In this field, we have many kinds of parts such as resistor, condenser, semi-conductor, integrated circuit, L. S. I. and V. L. S. I. These parts are used in many durable goods such as personal computer, electronic calculator, I. C. card, radio, T.V., automobile, and other numerous items. They are utilized in many industrial goods or systems such as robots, airplanes, ships, many kinds of machines, warehousing systems, store automation systems, communication systems, and many others. Thus, we have so many kinds of parts and goods of electronics. And we can design and produce new systems which perform delicate functions specified, in most cases, if it is

demand in market. The kinds of high technology product are increasing very rapidly. That is, the rapid transition of high technology into products is being made.

This requires a technology base to translate or to apply, if a company wants to be in the business of high technology. A company's technology base is the level of technical achievement inherent in its current products, level of technical expertise throughout the organization, and the accessible technology it can draw upon when required to do so by the need of the market place. This technology base is different by company or by country. With a given technology base, the kinds and quality of products that a company can produce are limited. Improvement or management of this technology base is important in high tech. industry.⁽¹⁰⁾ We can make an advancement of this base, though there are problems or hurdles in doing so as everybody knows. We, however, discuss the home marketing of high technology products under a given level of technology base, which in turn links tightly with the advancement of the base.

The social characteristics of market demand for high technology products in developing country can be imaged using the materials of section (2) and (3) of this paper. The market is segmented into many parts and the pattern of the segmentation is changing rapidly. And almost all segments have strong demand for the products to be newly added into the bundle of commodity for their living. In their evaluation processes of product to purchase, they have to have more information processes including image characteristics as well as product characteristics for alternatives.

This kind of market is very meaningful, and it is a happy challenge to

a marketing manager. Because there must be a market for his product somewhere in the country, he may use his marketing techniques effectively to create the demand for his product. In order to make his marketing techniques effective, it is decisively required that marketing managers find appropriate marketplace needs in which company can utilize the technology base to its best advantage and in which its high level of marketing techniques are properly deployed. As to the marketing techniques of consumer product of high technology, it is not different from ordinary products. So we go to the problems of market creation of industrial goods in high technology industry. The buyers of this market are other member of the production sector and institution such as government. Government is a single biggest buyer. And government is responsible for providing a proper social overhead capital such as communication system, transportation system, health care system, defense system, and the like, if an enterprise does not offer the necessary services in commercial basis. These systems require an abundance of high tech. products. And from the arguments of section (2) above, we can see some concrete potentialities that the high technology industry can be the sector developing with high rate of growth, which is the condition (2) of developing country. To make the high technology industry the candidate of this condition two, government can play a certain roles by forming various policies to enhance the technology base. Generally, the technology base is low in developing countries. But even when the technology base is low, they can find a market of low level products or parts to export by the power of cost advantages. And they can import highly advanced parts from foreign country. They can produce unique products by using the parts imported, but only if the knowledge and skills of people of

system engineering and technical marketing are qualified. Although it is not easy to enhance the ability of system engineering and technical marketing, a company can find its domain of high technology business because of the characteristics of both production systems of high technology business and the groups of value systems in the developing country.

In an industrial society, a company should make their efforts of technical marketing. As to the characteristics of demand for the products of high technology in developing countries, we can imagine a rapid increase of the variety of needs which the production systems require. This is because of a mangle-mangle value systems in the production sector in addition to the production facilities of many ages. It follows that there are various and unique needs for high technology system.

So it is possible to find opportunities to fit together of the technical base and needs. As to the marketing of high technology products, it is first necessary to learn the needs of his customer thoroughly. The required performance of the product in any customer's system is not easy to know and communicate to engineering or seller. We must translate the language of the market place of our company. User needs are usually not expressed in terms that will allow us to directly apply them to our technology base and product line. Likewise, the products we offer may not satisfy user need in all respects. The key to a company's success then is the efficient interoperability of these two systems. This is determined mostly by how well the interface system has been configured and how well it functions. When we visualize the conditions of market needs and a company's technology base, it will help us to identify the market that we may do profitably in business. Foreign companies are at great disadvant-

age in finding the needs at marketplace with a precise specifications of high technology systems. The unique needs for high technology products are not confined in modern objects. The most successful example of store automation system is the one applied to the native first foods in Japan.⁽¹¹⁾

(5) Conclusion.

We can emphasize the necessity of investments for the growth of high technology industry in the developing countries. Especially, innovative investment must be made. So entrepreneurship is in high demand in the high technology industry of developing countries. Some companies may rationally invest in seeking competitive cost advantages, especially for products to export. At the same time it is very desirable for companies to make investment in seeking the competitive differential advantages for the domestic market. Relating to this investment, quality of system engineering and technical marketing is noticed as a requirement of technology base. Still, with a given technology base, we say the entrepreneur can find opportunities of investment. Opportunities of innovation are richer in developing country than developed countries because of it's social characteristics. As the conclusion, there are ways to get the economic development on-going in developing countries.

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