

ENCOURAGEMENT OF INVENTIVENESS AND INNOVATION IN DEVELOPING COUNTRIES

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The most precious -- and concurrently the most appropriately distributed -- natural resource available in the developing countries is undoubtedly the human powers of invention and innovation.

Nevertheless, so far it is still one of the least if not the least exploited asset of all.

In my view this situation of non-working (to use an expression from the patent terminology) ought not and need not go on any longer.

It ought not go on because genuine and sustained economic and social development essentially is a process from within, it cannot possibly take place only through economic priming and transfer of technology from technologically more advanced countries, however important these factors may also be.

The fundamental elements of genuine development include an active and constructive indigenous participation in, and being in command of, the choice and adaptation of imported technologies - and they include the indigenous development of new technologies.

Also, this situation of non-working of the human powers of invention and technological innovation need not prevail much longer, since the processes of invention and innovation are now sufficiently well understood to be taught as subjects at universities and other educational establishments, in industry and even -- in a basic version -- to the common man, woman and child.

I shall shortly return to and elaborate on this latter statement of mine.

Who are the inventors?

Let us for a while look at who are the inventors, in what kind of environment do they thrive...

The references that I am going to quote in the followings, are exclusively from the industrialized part of the world. This fact however, only make the conclusion so much the more interesting from the point of view of developing countries. This you shall see in a moment.

Until recently it has been assumed both by laymen and by governments, that in this era of highly sophisticated technology, the bulk of new inventions in general and of significant inventions in particular are the results of the teamwork of scores of -- chiefly anonymous -- scientists and engineers in large futuristic development laboratories of huge corporations.

However, a number of studies made during the past twenty years seem not to bear out this assumption. On the contrary, the general conclusion of these studies is, that in several major industrial fields the main initiative has come from independent inventors and smaller firms, and in the latter case the inventor has quite often been the entrepreneur-manager himself.

I shall now quote a few of the more interesting findings:

In their book 'Sources of Invention' Jewkes, Sewers and Stillerman (McMillan, II edit. 1969) showed, that of all of the important inventions in this century investigated more than half were made by independent inventors or in small firms.

A survey of British industry made in 1967 by Eiloart indicates, that the inventors from small scale environments account for as much as about 80 % of the notably striking inventions. Also according to Eiloart, the same percentage -- that is 80 % -- of all technological breakthroughs are the result of 5 % of the total expenditure on research on development.

If we now turn to look at specific areas within industry, I may start by quoting M. J. Peck from his book: 'Competition in the American Aluminum Industry 1945-1955 (Harvard University Press, 1961) in which he concludes, that major producers within the aluminum industry accounted for only one-seventh of the significant inventions in aluminum welding, fabrication and finishing.

The situation within the petroleum industry is described by Enos, who says: 'If the most radical departures in thought have been made by inventors on the periphery of the oil industry, the least radical have been made by inventors working for the large integrated oil companies. Of all the major inventions in petroleum cracking only one was discovered by such an employee'. All the other major inventions were made by independent inventors.

As far as the United States steel industry is concerned, D. Hamberg, who is quoted in an important book called 'Creativity and Innovation in Engineering' (edited by S. A. Gregory and published by Butterworths 1972) claims, that not one of the major innovations came from within that industry.

The same D. Hamberg expresses the provocative but not quite unfounded view, that larger industrial laboratories are likely to be minor sources of major inventions and major sources of what he calls 'improvement' inventions.

It is noteworthy that seemingly only of one industry has it been claimed, that the majority of inventors come from the largest companies. This is by C. Freeman in his paper 'The Plastics Industry' (National Institute Economic Review, Nov. 1963). Nevertheless, W. F. Mueller in his book: 'The Rate and Direction of Inventive Activity' (Princeton University Press, 1962) states, that according to his study of eighteen new products put on the market by Du Pont, only five were invented by employees in the firm, while they shared in the invention of one other of the eighteen new products.

Also, it may be worth noting the decisive contributions of individual inventors within such important materials as polyethylene (Ziegler), polypropylene (Natta), terylene (Winfield) and silicones (Kipping).

In rounding off this point about who are the inventors, I wish to give you a case story by briefly telling you about my compatriot, G.A.L. Thorsen, who invented the process of deep-drawing of stainless steel plates (for inst. for kitchen sinks and similar). He made the invention at a time, when it was taught in the leading technical universities of the world, that such a process is impossible - both in practice and in theory. But Thorsen did it, and he uses to say when asked about this invention of his, which alone brought him an income of millions of dollars: 'I just didn't know that it was impossible - that's why I did it'.

As far as I recall, Thorsen's whole school attendance amounted to each other day during 6 years in an elementary village school. He started his adult life as a porter in a hotel, but being of the entrepreneurial type, some years later he started a small mechanical workshop, where eventually he has made his inventions and innovations.

Significance for developing countries

Now, what is the significance for developing countries of what I have presented here about inventors? For me to see, it should be encouraging indeed to ascertain that a very important part of all recent inventions -- and not the least of the significant recent inventions -- made in industrialized countries have been made by independent inventors or in small laboratories, more often than not on a 'shoe-string' budget.

In order to complete the picture, I have to add though, that many of the significant inventions originally made on 'shoe-string' budgets later have been taken over by large firms, who were in a much better position to support the necessary development costs.

I feel certain, however, that in the developing countries there are thousands of people who in a climate friendly to inventors could come to make significant inventions and innovations - many of which because the inventor just doesn't know that his invention is impossible...

A stimulating environment

How then may a stimulating environment for invention and innovation look like?

Indeed it has a great many facets. I shall try here in the very short time at my disposal to describe some of the more important ones.

Possibly, the most important one of all is socio-psychological. It is the general attitude in the society towards inventions and innovations. If everything new invariably is the work of the devil, it is -- to say the least -- very difficult and frustrating indeed to be an inventor and innovator.

Another essential factor is: due recognition and remuneration of inventors, not just because it is clearly stated in the United Nations Covenant on Economic, Social and Cultural Rights -- which came into force 3rd January 1976 -- but also, because it has proved to have a tremendously stimulating effect, which is very much to the benefit of the community at large.

As indicated previously, a small-scale informal environment seems to be inducive, mind you, provided an abundance of channels of communication are open to the world around, that is not only to colleagues, but also to widely different sciences and technologies, to markets, exhibitions, at conferences in the home country and overseas -- and also with the common human being, whether a factory worker, a farmer or a fisher.

Reasonably easy access to relevant technological information is of paramount importance, and here I do not only mean patent abstracts and patents, which are often written in a language, which is hardly understandable even for a great many very good inventors. I rather would like to see among others, special cross-profiles worked out in layperson's language on available alternative products and processes especially relevant in developing countries. The profiles should include information on costs and degree of labor involvement. Such reference information usually is a very useful starting ground for an inventor. For the professional inventor who makes inventions to order, such basic information is a must.

Aspects of the Patent System

It is also essential, that the patent system is adapted to the current needs of a developing country. In this connection I wish to mention the so-called 'year-of-grace', which is practiced in the United States of America and a few other countries, and which could be very useful if not essential to a novice inventor in a developing country, provided the necessary adjustments be made in the patent system.

The year of grace entails, that the inventor can freely manufacture, use, sell and in other ways publicize his invention up to one year before filing his application by the patent office.

In situations where the invention is a first-time invention and grew out of the mind and hands of the inventor, often in response to the needs and encouragement of customers or the society at large, and especially so in the developing countries, it is generally unrealistic to expect and also unpractical indeed, that the inventor first register his invention with the patent office before he show it to and get a response from his clients and the community.

At present time this year of grace does only appear in a very rudimentary form in the Paris Convention, that is in connection with specially acknowledged international exhibitions.

Therefore so far, a patent application filed in a country on the basis of the year of grace excludes the possibility of patenting in other countries.

But maybe it is a thing worthwhile looking into in connection with the revision of the 'Model Law', even though the suggestion may grate on the ears of many of those having been brought up in the shades of the traditions of European patent legislation.

After all, the year of grace seem to have been a most stimulating element for US inventors - so why not also for inventors in developing countries...

I even know a good many European inventors, who would wish that the practice of the year of grace eventually would become universally accepted.

Another feature which I feel is worth while studying seriously in connection with certain kinds of more generally applicable kinds of inventions, is a kind of inventors certificates which contain the principle of 'license of right' and which are devised to fit market economy countries as well as countries exclusively with state-owned industries.

I shall not at this time go more into details regarding the role of the patent system. Only I want to express the wish, that the subject would be treated somewhat more inventively from now on, than it has been in recent time.

The next group of important stimulating factors I want to mention are a number of aids to the development of useful and viable inventions.

These aids include among others

1. An independent technical-economical-environmental evaluation of new inventions.
2. Financial and technical assistance for making models, filing and following up patent applications, carrying out experiments and making prototypes and pilot plants.
3. Aid in securing the first customers and/or licensee(s) for the new products and processes.

Such aids may be channeled through a special invention promotion office or organization as is found and operating with a considerable measure of success in all of the Scandinavian countries and in a number of other countries as well.

Also inventors associations and societies for the promotion of inventions have proved to be important factors in the encouragement and carrying out of inventions and innovations. The International Federation of Inventors Associations (IFIA) has dedicated much effort towards the same ends on the international level.

Spreading the Knowledge of the Processes of Invention and Innovation

I shall now return to the question of spreading the knowledge of invention and innovation.

Bluntly expressed there seem to prevail in the developing countries a practically total ignorance about the processes of invention and innovation. Yes, these are strong words, and I regret to say, that even in the industrialized countries the state of affairs in this field is not much better.

To substantiate my claim, I wish to quote a statement in the report of a special panel of experts set up to advise the Secretary of Commerce of the United States of America about the situation of invention and innovation in the USA. Less than ten years ago they said, that there is an 'abundance of ignorance about the processes of invention, innovation and entrepreneurship'.

Today much concrete and freely available knowledge is existing concerning this fundamental human activity.

It is my personal conviction and experience - based upon experiments I and others have made with both children and adults - that the ability to invent and innovate lie dormant in a considerable part of the population. However, the vast majority of people - in developing countries as well as in industrialized countries - have never been

taught creativity and never been sufficiently stimulated to practice their knowledge and further develop their creative faculties.

It is like learning to play the transverse flute. The first times you try, you may not even be able to get one single tone out of it. But all people can eventually learn to play that special kind of a flute, although only the fewest are allotted genius, in this field as well as in any other field of human activity.

What the developing countries need is, through their educational systems and otherwise, to foster the dormant inventive and innovative talents of their people, the common people as well as their geni. No better investment can ever be made for the progress of a country.

Permit me in conclusion to submit a few concrete suggestions:

1. That WIPO embark on a program of informing policy makers in developing countries of which concrete steps can be taken by governments to encourage and stimulate indigenous invention and innovation, and which benefits may be derived from it.
2. That governments in developing countries work out plans for integrating encouragement and stimulation of appropriate indigenous inventions and innovations in the general development programs
3. That teaching of processes of invention and innovation be included in the curricula of universities, secondary schools and other higher educational establishments.
4. That in the developing countries there will be established government supported invention and technological innovation promotion offices or organizations, which will be outside the ordinary administrative hierarchy and routine.
5. That private societies be formed for the promotion of invention and innovation, with members from among both inventors, industry and others interested.
6. That plans be set up for adequate recognition and remuneration to be given to originators of useful and appropriate inventions and innovations.
7. That adequate financial means be established in each country to finance or help finance the development of promising inventions.
8. That tax-incentives be given to both inventors and those, who take up local production of indigenous innovations.
9. That technical standards and other formal requirements and laws be revised with the aim of removing any hindrance for introduction of appropriate technological innovations.

Well, I could continue for quite a while mentioning many further suggestions. I hope however, that what I have said already, may have encouraged - or perhaps even in a friendly way provoked - some of you to approach the questions of inventions and innovations more inventively in the future.

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