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UNE STRATÉGIE DU DÉVELOPPEMENT DES RESSOURCES HUMAINES

COMMUNICATIONS DÉCOULANT DU SÉMINAIRE-ATELIER TENU À YAOUNDÉ, CAMEROUN, DU 2 AU 5 FÉVRIER 1988

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IDRC-MR260f
Octobre 1990

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Communications découlant du séminaire-atelier
tenu à Yaoundé, Cameroun, du 2 au 5 février 1988

TABLE DES MATIERES

CHAPITRE 3

EXPERIENCES AUTRES REGIONS DU MONDE

CHAPITRE 4

METHODES D'APPROCHE DU DEVELOPPEMENT DES RESSOURCES HUMAINES

CHAPITRE 5

POINTS DE VUE COMPLEMENTAIRES

CHAPITRE 6

LA SCIENCE ET LA TECHNIQUE EN AFRIQUE AU SUD DU SAHARA

CLOTURE

ANNEXES

SUMMARY OF THE SURVEY ON "A FORMACAO DE RECURSOS HUMANOS PAR PESQUISA NO BRASIL" PRESENTED AT THE REGIONAL SEMINAR ON HUMAN RESOURCES DEVELOPMENT FOR RESEARCH IN LATIN AMERICA" ORGANIZED BY IDRC,

SALVADOR, BRAZIL - MARCH 1987

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This survey is an additional contribution to the analysis of human resources related issues, regarding the objectives and resources of Science and Technology development policy in Brasil. In this context, it would be necessary before grasping the general elements of human resources development policy, to understand the role of research among the development options of the country together with its general application.

The background training of institutions in Science and Technology activities in Brazil started with a political and economic project with the country's industrialization as main objective. At that time, it was of utmost importance to protect strategic sectors leading to development, with a certain level of state-ownership and autonomy for internal activities.

The achievement of such objective required considerable investment in terms of Research & Development, in which the training of researchers is vital. Such policy is to be integrated in the productive sector for meeting national development challenges.

Up to the mid 50's, the policy adopted in Brazil tended to abandon the objectives of state-ownership and autonomy of the economy. The development strategy was based on direct foreign investments and on contributions from the Government. The foreign capital utilisation policy and massive imports of technology took away attention from science, research and technological knowledge in the country. During the second half on the 50's, such policy opened up into a decrease in investmens and many researchers migrated to work abroad, especially in industrialized countries.

Human resources training aimed mostly at labour force training for the application of foreign technology, without adaptation to national conditions or innovation. On the other hand, such investment was centered on theoretical training whithout setting up satisfactory and appropriate climate and conditons for scientific and technological research works.

Throughout the 70's, the scientific and technological policy was considered one of the priorities for planning and the basic instrument for reducing the gaps in comparison with industrialized countries. This option strengthened the policy of specialized training (Doctorate) as a prerequisite for guaranteing technical autonomy. Tables 1 and 2 show the growth of financial resources engaged in science and technology and the priority given to "Scientific Development and Human Resources development (Training)".

Studies at Doctorate level and MS.c multiplied from 1968 to 1973. However, the quality of such studies leaves much to be desired as shown in table 9, according to a survey undertaken by the CAPES/Coodonaçao de Aperfeiçoamento do Pessoal de Ensino Superior.

We have noticed two major mistakes in the application of this policy : the first one is to consider human resources as an adequate condition for research develoment ; the second one is their separation from the policy of economic development achieved.

The present study leaves behind naturally integrated issues. This is due to many reasons ranging from the necessity to legitimate the power while taking into account aspirations of some sectors of the society, to technical failures of the project as a policy instrument and without application of resources. It is true that immediate interests were privileged, together with aspiration of the prevailing authorities.

It would be convenien to bear in mind that a genuine evaluation of expected results will require an analysis of such policy by sector of activity and knowledge. The analysis has to consider proposals, initial objectives and the content, in relation to concrete achievements. The overall analysis has to deal with objectives and orientations of the general development policy of Brazil.

Human Resources training in this global activity was considered as an isolated priority, as if scientific and technological progress would have followed naturally. The possibility of the following linear development : fundamental research - applied research - developmen t- innovation was also believed in. But the example of India denies this linear relationship between human resources and research. Human resources are fundamental but are not sufficient.

In the 80's, the CNPq/Conselho Nacional de Desenvolvimento Cientifico e Tecnologico, made an evaluation of investments and achievements in scientific developpment and Human Resources Development (training) under the preceding policy.

Through this analysis, some problems appeared : "Specialized training in Brazil is not effectively incorporated by University Institutions. There is a heavy dependence on resources other than budgetary ; many programmes are of low qualify and very heterogenous ; resources are inadequate for funding projects over two years period. There is also the problem related to an inadequate distribution of programmes at regional level". (Açao Programada : 16).

Since its objective is to overcome such difficulties, the government proposed many 'Integrated Programmes" in order to secure from Human Resources Development support for research, development and Higher Education.

As regards financial resources engaged, tables 13-16 show their evolution in the first half of the 80's, financial sources and distribution according to their field of application (training, fellowship, research, etc.)

After the establishment of the MCT/Ministry of Science and Technology, a new Plan was developed in which Human Resources development was also given priority. Tables 19-20 show the qualitative objectives achieved through that period.

The MCT's main objective is to increase the national science and technology budget to represent up to 22% of the country's general budget. The economic crisis is deeply felt, however, and it is therefore not possible to make predictions as for stability of investments.

In conclusion, the survey has introduced some issues the analysis of which is very important for finding a way to understand the subject within the context of Brazil and of another developing country.

1. Human Resources Development as a Policy instrument

It is necessary while talking about training of researchers to make an analysis from the research policy stand point. It is necessary to know the general conditions existing for which research development of human resources are only one element.

The present survey requires a change in the former idea of the brazilian policy, as shown above. Such a vision focussed on supply, while expecting automatic results ; on the other hand, such policy has centered supply on partial elements considered as satisfactory.

The adoption of this partial and centralized vision, together with structural and economic obstacles of developing countries, multiplies possibilities of delay in the scientific and technological development.

In the case of Brazil, the gap between the policy implemented and the final objective resulted in Human Resources as an element and an instrument being discarded or given little attention. Training in Brazil was implemented through education to the detriment of other utmost necessity for the development of research.

2. National Research : A Political Issue

Given the social, political and economic context, one has to consider the political aspect of the decision to develop research in the country. The goodwill of the scientific community or other social groups is not enough, even if these are technical groups responsible for policy planning and application.

Although the initial step for research in Brazil started with a political

project aiming at scientific and technonogical independence to a certain extent, during the following phases such objectives was nothing but a rhetoric. In development strategies and in accordance with established conditions, research revealed not to be necessary.

Two contradictory positions prevailed in Brazil : 1. the economic policy whose objective was to achieve economic growth through capitalist production increase ; 2. the policy of the Science and Technology planning sector, where strategies and objectives were not taken into account by the economic policy.

The preference of multinational capital through imported technology is above all a technical advancement control problem. Such control strengthened the country's position as a dominating structure and in its global and sector-based relationship at international level.

Yet, the issue of research in a developing country is a political issue, which has something to do whith the national state this country plans to establish.

We can present many examples against the idea stating that scientific and technological development is impossible in the developing world, quoting the case of some sectors in Brazil, which experience a high level of development, with government support and appropriately applied resources.

These examples indeed concerned priority areas and almost always strategic sectors. Anyway, they prove that such development is achievable and that solutions can be found to problems when they are coherent with the desired society. Thus, the first thing to take into account is the national project.

3. Research institutions and the productive sector

Despite all efforts and proposals often made to promote closer collaboration between Research institutions and the productive sector, no significant result was achieved so far.

In fact, research institutions suffered from the consequences of their research and technology supply strategy. Investigations are almost always carried out away from the productive sector and from the state's options to meet social and economic challenges.

Research was concentrated within universities and mainly on fundamental research ; but here also it was away from the productive sector. This trend was strengthened by the political isolation of researchers who stayed in the country to work in University.

Thus, the point of view of researchers on possible solutions to social and economic problems were contrary to the Government's opinion. At the same

time, and under the same pretext, the Government is not interested in this type of research, and preferred education for labour force training and political legitimatization.

In this context, researchers focussed on fundamental research with many problems and little support. At the same time, they were totally against applied research or government works. Such conflicts were strengthened and engendered the analysis of the role of applied research as a prostitution from the researcher"s point. As a consequence, neutral science was destroyed and researchers were alienated about their roles in the change and development of the country.

As most analyses are linear, another mistake would be to consider the above mentioned observation as the single reason why national research is of poor performance. It represents indeed a serious problem within a specific context, but is not the "cause" of distance from the productive sector or the government. We have seen that any policy development is Brazil was based on imported science and technology, with some important exceptions.

4. The role of the State in Research within border countries

The importance of the volume of participation of the State in Development within border countries is well recognized, in spite of efforts made to prove the contrary. Yet, the importance of state investments for Research and Development does not seem to appear in developing countries.

In Brazil, however, this issue has some peculiarities. As shown above, the structure of the government in Brazil, for instance, made it possible to establish precarious conditions for Research and Development Promotion ; but at the same time it is almost because of its mere participation that the possibility exists to overcome the problem.

On one hand, private interest and investments do not favour research ; on the other hand some interests of the State make it difficult to undertake research at national level. However, the State is responsible for building up Nationality, the National State. Scientific and Technological development is very important in the achievement of such objective.

Thus, understanding the action of the State requires an analysis of its relationships with the economy and society and also relationships between political and economic processes and structures.

Science and Technology policy in Brazil, its interaction and contradictions are related to this issue. This way, despite the integration of objectives and strategies hindering research, it is the State which create conditions and

incentives for its development. In fact, the Brazilian State is the main agent for scientific and technological investments.

In general, Brazil acts on research in the following way :

1. Trough the design and creation of infrastructures characterized mainly by the action of agencies analysed in this survey (CNPq, CAPES, FAPESP, etc.)

2. Through the induction and creation of demand by State-controlled firms in the productive sector ;

3. Through the direct execution of research and Training. We can quote here the role of the State in relation to University and to direct investment in research, as is the case of agricultural research.

To these activities correspond some researchers training patterns in Brazil:

1. Training with the support of the official encouragement system analysed in this study. The design directed by action depends on the general demand from researchers;

2. Training related to sector or theme-based policies. In this particular case, there are some other forms of training for researchers :

a) the example of state-controlled firms working in the productive sector. They have research centres and researchers training is achieved through agreements with Universities or through training ;

b) the typical pattern of EMBRAPA (Agricultural Research Company) where the government has established a research company developing a specific human resources strategy. This is done without the creation of an internal education structure ;

c) there is at last the creation of an integrated education - research- production system, in accordance with priorities by sector (aeronautical industry for instance).

Conclusions

The main recommendations to be derived from this work are as follows : first of all, knowledge of the researchers training issue should be developed ; then some points are to be highlighted in the action of an international agency for training on research.

For results to reach the areas where investments are made it would be necessary to have a preliminary knowledge of problems and the existing institutional capacity. It is also necessary to set up a well established linkage between sector-based policy structures and national research institutions.

It is thus absolutely necessary to recognize sectors where exists a real shortage of human resources for research advancement ; efforts should also be centered in some sectors or institutions, mainly in the case where resources are limited.

Because the starting point is directed action which does not aim only at increasing the general knowledge or number of researchers in the country. It is recognized that these objectives are of utmost importance, but they cannot by themselves guarantee a satisfactory Development of research or innovation.