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RESEARCH ARTICLE

A NORTH-SOUTH TECHNOLOGY TRANSFER METHODOLOGY

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ABSTRACT

North-South technology transfer in the crushing majority of the cases, are designed in northern laboratories and applied as they are to people of the developing countries. These approaches imagined out of context showed their limits. In spite of huge material and human means, these approaches did not yield economic development and social transformation in the societies of the South. In this paper we analyze technology transfers and show why these procedures cannot lead to successful technology transfer. We further propose a way out by setting a new methodology of technology transfer based on the paradigms of actors, intermediate objects and interactions.

INTRODUCTION

International transfers of technology are not exclusively a phenomenon of the 21st century. One of the first technology transfers known in history took place at the XII century of our era under the dynasty of Abbassides during the reign of Caliph *Haroun Alrachid* [1] (*A. Amin*, 1974). The scientific and literary activity was so intense that paper periodically was missed. Stocks were quickly exhausted and it was necessary to import the paper from China where, paper is manufactured. The sovereign decided not to have more recourse to paper importation from China, because the procedure was not only expensive but the voyages were very long and perilous. Then the Caliph brought the specialists of the paper mill to Baghdad, where they taught to local volunteers the paper mill trade. It was one of the very first successful technology transfers. The key to success, in this precise case, was the interaction which took place between the actors implied in the transfer operation. The Chinese specialists taught their methods to local disciples (it is what we call interaction); the latter with the assistance of the first applied to the ground the knowledge received by using local materials and local competences. Thus the technology transfer, that took place there more than eight centuries ago, was designed as a step of innovation. One recreates the conditions of paper manufacture by taking into account the new environment, stimulating thus local creativity. Today this method, which proved reliable in the past, was completely forgotten not to say completely ignored. The crushing majority of the technology transfers follow a rigid and unsuited scheme, which consists in moving technical objects having proven reliable in a given sociocultural environment towards another without taking account the characteristics of the reception environment. The reasons which one usually advances, to explain the failure of certain transfer of technology operations, are rather superficial. They concern "the opening" or the "closing" of the cultures to progress (*Desmorieux et al.*). Noted failures (*Akrich M.*, 1985; *Treillon R.*, 1992; *Fox R. D.*, 1996) have a rather deep cause: it is at the level of the conceptual approach in the technology transfers.

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[1]1. It is obvious that the case of the silkworm is much older than the paper of Caliph H. ALRACHID

Literature Review

In academic circles technology transfer is understood as the passage from *Laboratory Knowledge* to *Industrial Knowhow* (Yacoub *et al*, 2012, Yacoub, 2016). But at a global scale, it is rather technology implementation. Technology transfer is also regarded as technology exchange between a developed country (or stakeholder) and a less developed one. A review of literature on technology transfer reveals that technology transfer is a complex, difficult process even when it occurs across different functions within a single product division of a single company (Zaltman *et al*., 1973; Kidder, 1981; Smith and Alexander, 1988). Technology transfer is commonly acknowledged to be a complex process that needs time to

evolve (Agmon and von Glinow, 1981; quoted from Sazali *et al*, 2012). The literatures on technology transfer and international technology transfer are extensive and varied in perspectives from various disciplines, which include political science, economics, sociology, public policy, marketing and management of technology (Kumar *et al*., 1999). In general, TT is therefore a process through which a person or group of persons without prior knowledge on an innovation or material are enabled to acquire operational knowledge or skills of the technology or the material. According to Gee (1981), TT is the process by which technology developed for one purpose is employed either in a different application or by a new user. However, Agola (2016) observes that the last stage of TT is the design and development of new products and manufacturing processes based on the acquired skills. In addition, the ultimate end of technology transfer is the management of the end products such as the wastes and environmental impacts of technology.

In the context of developing countries, Hoffman and Girvan (1990) argue that technology transfer needs to be perceived in terms of achieving three core objectives: 1) the introduction of new techniques by means of investment of new plants; (2) the improvement of existing techniques and (3) the generation of new knowledge (Sazali *et al*, 2012). Since the term "technology transfer" has many dimensions, it has often been used to describe the process by which ideas and concepts are moved from the laboratory to market place (Phillips, 2002; Williams & Gibson, 1990). Autio and Laamanen (1995) suggest a broader definition by proposing that technology transfer involves an intentional, goal-oriented interaction between two or more social entities, during which the pool of technological knowledge remains stable or increases through the transfer of one or more components of technology (Sazali *et al*, 2012). Levin (1993) defines technology transfer as a socio-technical process; implying the transfer of cultural skills accompanying the movement of machinery, equipment and tools. This definition includes the transfer of the physical movement of artifacts and the embedded cultural skills. Zhoa and Reisman (1992) view that economists often define technology transfer on the basis of the properties of generic knowledge where the main focus is on variables that relate to production and design (Arrow, 1969; Dosi, 1988).

For the sociologist, they tend to link technology transfer to innovation and view technology as 'a design for instrumental action that reduces the uncertainty of cause–effect relationships involved in achieving a desired outcome' (Rogers, 1962; Rogers and Shoemaker, 1971). The anthropologists tend to broadly view technology transfer within the context of cultural change and how technology affects changes. Zhoa and Reisman (1992) identify that bulk of the technology transfer literatures have also been contributed by the management researchers. They argue that business disciplines tend to concentrate on issues such as stages of technology transfer, design and related stages and sales (Teese, 1976; Lake 1979). On the other hand, the management researchers tend to focus on intra-sector transfer and relationships between technology transfer and strategy (Rabino, 1989; Chiesa and Manzini, 1996; Laamanen and Autio, 1996; Lambe and Spekman, 1997). Most of the literatures on management have shifted their focus to alliances among enterprises and how alliances are crucial to the development of technology transfer (Zhoa and Reisman, 1992)

Agola (2016) further notes that unlike Western countries in which economic and indigenous technological developments evolved simultaneously, developing countries must deal with economic and technological developments separately. Developing countries must import technologies from other countries and must at the same time make efforts to building absorptive capacity needed for successful grafting of such imported technology to contribute to economic growth. For industrialists technology transfer is understood as a conquest of new markets. The actors of the Global South see technology transfer as a means to fill partly at least, the economic gap which separates them from the actors of the North. In short, technology transfer is the road from *Knowledge to Knowhow*. That passage from a state of knowledge to the ability to use this knowledge to manufacture an artifact or rationalize a method is full of obstacles and uncertainties. The existing schemes of technology transfer are mechanistic. They consist in transferring artifacts from a given socio-economic environment to another without taking into account characteristics of transfer places. In spite of consequent means these activities hardly yield expected results (Yacoub *et al*, 2012).

The example of what is known as the *Eastern Dragons* (China, India, South Korea, Indonesia, and Malaysia) or much earlier Japan, who copied the western way of industrial development, have succeeded to develop their societies by *Adaptive Adoptions* of Western Technology. Nevertheless, they are now facing pollution and climate challenges that seriously threaten their future. Someone may argue that Africa didn't participate in polluting the Earth in earlier industrial times, so we have the right to now pollute; adopt the path followed by the western world to develop. But, is it necessary to repeat errors for development sake? This paradox between industrial development and environmental concern is fundamental. Do we necessarily have to choose between development and safe environment?

The way out is to understand TT as a process of innovation and apply to it innovation's theories. To innovate is to come with the *right article* to the *right market* at the *right time***.** When one of these three conditions is not available the innovation cannot succeed (Callon *et al*, 1988). The case of the Diesel engine is a very eloquent illustration. When Diesel invented his revolutionary engine, he was mocked and severely criticized so that he went bankrupt and committed suicide. In the African context, we must summarize the indigenous knowledge that could be transferred. Here we have to find out what type of indigenous knowledge that has been successfully transferred (valorized). However, some historical success stories of TT from foreign countries to Africa exist. For example, Chinese telecommunications companies, such as Huawei are laying submarine cables, while ZTE is laying an optic fiber cables in Africa. These are riding on the crest of Africa's mobile telephony wave. The companies are working in Angola, Algeria, Libya, Ethiopia, Ghana, Nigeria and South Africa. They transfer their technologies by constructing training centers in Africa, which produce a local workforce that can operate the technologies and even develop new ones (SciDev, 2017). Another half-successful story is about the bamboo charcoal technology from China. A Chinese method for making charcoal from bamboo has laid the foundations for a booming cottage industry in Ethiopia. Several Ethiopian farmers are growing bamboo for energy production, and the

number of Ethiopian companies producing bamboo charcoal is growing steadily. China has benefited from sales of the processing machinery and by charging to train technicians and workers in Ethiopia. However, attempts to introduce technology in Ghana have not been as successful, despite support from the government. The incentives for farmers and small businesses that made the technology a runaway success in Ethiopia are not yet there. In Ghana forests are still plentiful, and while deforestation is a problem, trade in wood charcoal remains legal (Scidev, 2017). Furthermore in French literature, *Durand C*. (1994) defines the technology transfers as the transmission of knowledge between companies belonging to different countries. For him the technology transfer must be understood in a rather macro-economic meaning. For *Rouach D*. and *Klatzman J*. (1993), any diffusion of a new technique is a technology transfer. Or each time that a Man invented a new instrument and that this instrument was imitated and used by other Men, there was technology transfer. Seurat (*Drouvot H*. and *Verna G*., 1997) states "there is technology transfer when a group of men, in general belonging to an organization, becomes indeed able to assume under satisfactory conditions, one or more functions related to a given technique".

The contents of a technology transfer are a whole of tangible properties (machines, training staff, plane, etc.) and immaterial (knowledge, know-how, experiment, etc), allowing the implementation of a technology. The two actors are the transmitter and the receiver. As for the result, it is the capacity of the receiver to completely control the elements of the contents; the transfer will be finished only when this result is actually reached. So *Drouvot* and *Durand* (*Drouvot* and Verna, 1997) prefer to state "the technology transfer consists in selling to a country the means of manufacturing an artifact only after bringing the means to use it, for marketing it, and benefitting from it" *Zhan Su* (1997) states "the international transfer of technology is the dissemination of information on a worldwide scale" It adds that "the international transfer of technology consists in the diffusion of intellectual property, of a company or an individual, towards another company located in a foreign country" According to UN (*Rouach D*. and *Klatzman J*., 1993), the technology transfer is the transfer of knowledge necessary to the manufacture of a product, to the application of a process or a service and does not extend to the transactions comprising the simple sale or simple hiring of goods. The technology transfers include: the transfer, sale or concession of all the forms of patent; and constitute a kind of monopoly for the inventor and aim the stimulation of research and the application of its results for the benefit of the public (Convention of Paris); the communication of know-how and technical training specialized in the form of plan, graph, model, instruction handbook, formula, feasibility studies of basic or detailed technical studies; the communication of technological information, to acquire, install and use intermediate machines, material or goods; the communication of technological information necessary to the installation, exploitation of factories; specification of material for training, the services provided by technical staff, advisory and management, the staff training.

As an intuitive definition, we propose to define the technology transfer as *a space-time movement of technical objects, knowledge, know-how, and competences in the field of technology with an aim of social transformation and economic development.* According to this definition, which is far from being complete, one does not move only technical objects from a given environment towards another, but also the methods of production of these objects stimulating thus local creativity. The industrialists of the North think the technology transfer in terms of new markets conquest. However the actors of the South consider that technology transfers are the only effective means to come out from under development and to fill up the economic gap separating them from the developed world. This contradiction is fundamental in the study of the problematic of the fight against under development by means of technology transfers. The question which currently arises is to know if it is possible to cope with underdevelopment thanks to technology transfers. Can one reconcile the search for profit on one hand, and the development projects of the countries of the South on the other? Nothing is less sure.

We propose to think the technology transfer as a step of innovation

Classification of the technology transfers

Zhan Su (*Zhan Su*, 1997) classifies the technology transfers in three types: the inter-firm transfer, which is characterized by the passage of the R&D to industrial application; simultaneous technology transfers. The latter are characterized by the diffusion of the new technology at the same time between transmitter and receiver. It is the case of technology transfers between developed countries. Finally, there are sequential transfers of technology. This type consists in moving the technology already realized towards the developing countries, hoping thus to help these countries emerge from underdevelopment. But these technical objects intended for "rubbish" in the industrialized countries cannot fulfill the requirements of the developing countries because their functioning is dependent on enormous costs of maintenance. A living example in this case, is the power station of N'Djamena in Chad. The spare parts of the aforementioned power station are manufactured on order because they are not produced nowhere in series. The logical result of this situation is that Chad is the country which beats the record of the world in price of kWh. The frequent cuts of electricity are felt in all the economic activity. The loss of earnings due to these inopportune cuts of electricity is evaluated in several tens of millions francs. Nevertheless certain rather decayed technical objects from the point of view of the industrialized countries proved reliable in Africa (*R. Treillon*, 1992).

Limits of the traditional approach

The approach which consists in thinking technology transfers as the displacement of a technical object between two actors (a transmitter and a receiver) through a channel subjected to noises of all kinds, leads as well as possible to the recovery of the object transmitted and worst to the loss of the aforesaid object and thus to the total failure of the transfer operation.
Thus, whatever the refinement of the method, the diagram remains the same: The countries of the South are containers which it is necessary to fill of artifacts and knowledge. This channel is subjected to the action of the noises of any kind. We understand by noises the transformations which can undergo the object to be adapted to the local conditions and the measures of accompaniment required by this adaptation.

Such a diagram leads as well as possible to the recovery of the object transferred and worst to the loss of this object which falls in disuse as soon as the promoters of the step withdraw. What returns to same since that does not contribute to transform the life of the populations of the South and less still to support their economic takeoff. The reasons advanced until now to explain these failures are not very convincing since they are founded on arguments formulated according to Western criteria: lack of maintenance, the African spirit "nonchalant" (In a television broadcast one shows Africans which use computers as simple kitchen table). We think that there are no cultures "open" to development and others "closed" to development. All cultures are worth each other. The difference which exists between cultures locates at the level of the spiritual values and cannot be used as a base for the assertion which consists in binding the underdevelopment to the cultural identities of the people.

STOU Approach

One of the schemes, which in our opinion is most interesting, is that founded on STOU model (S- System T- Tool, O- Object, and U- User). This method consists in describing the relations created by and around an artifact, this one being applied to an object. The analysis is founded on the quadruplet represented on the figure below

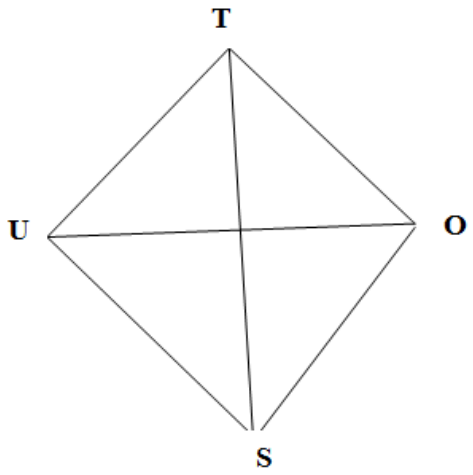

Fig. 1. Diagram STOU of technology transfer

- S- The surrounding system (for example: the support of the artifact, the price of the product, the use of the transformed product),
- T- the tool or Artifact
- O- the object (product),
- U- the user (of the Artifact),

The basic relation is consisted of the bond between the object O and the user U, the relation O-U (Product-User) creates the need materialized by the bond (U-T-O); what can be formulated as the user (U) needs the Artifact (T) to transform the product (O). This first analysis which gives the U-T-O triangle is not enough to define the real conditions of use since each element is in relation with a broader environment which is social, physical, and economic, etc. More generally the relation of the user to the system passes by the sequence of all the relations (U-T-O-S). Thus, the technical objects designed in the North are integrated in a system and found certain equilibrium within quadruplet STOU. The decision to move technical objects just as they are in a new socio-economic and cultural environment means to transpose STOU in S'TOU' brutally. What means putting an equality between S and S'; U and U' and this is not the case. Then, one easily sees the many failures noted in the transfer of technology operations. It should be stressed that even T in displacement become T' and O in the context S' is not inevitably the same one and becomes O'. This model explains the causes of the noted failures well but it does not propose any step which could lead to the success in the projects of technology transfer.

Proposal of a methodology of North-South technology transfer

It rises from our guiding principle that the object of technology transfer must emerge from the interactions between the actors taking part in the procedure and local actors must be associated to the step at the phase of design of the project. In our case the actors of the countries of the North on a side and those of the countries of the South must interact to lead to a technology transfer which is advantageous for all. We think that it is necessary to treat the two types of actors in a symmetrical way. This symmetry implies an equal engagement on both sides.

The methodology we propose, articulates around some paradigms: concepts of actor, network, interaction and intermediate objects.

To synthesize, we will say that to make a successful North-South technology transfer, it is necessary initially:

- To sufficiently study the socio-economic and cultural context of the transfer (Northern and Southern)
- To make a serious analysis of the needs that should lead to an acceptable evaluation of the demand.
- To carry out a market research in order to lead to acceptable assumptions on the state of the market
- To form a primary network gathering the local actors.
- Within the framework of the primary network, to create the intermediate objects necessary to the interaction of the members of this network and thus of the interlocking of its dynamics.
- The primary network being opened, it must be extended gradually to other members.
- The network thus widened must open to other networks, which would lead to the setting-up of new intermediate objects qualitatively and quantitatively new.
- Formation of a super network gathering the various networks (It is the mother of all networks.)
- This last mother of all networks has to concretely carry out the objectives of the technology transfer project.

We understand by network, the entity which gathers humans, artifacts and the products to which these artifacts apply. The actor is for us a human, an artifact or a product to which this artifact applies. The order is not obligatorily necessary: it is possible to start with the formation of the networks and then to carry out the analysis of the needs or conversely. Our diagram does not exclude the return tickets and the modifications during the step. The study of the actors' sociocultural context

taking part in the technology transfer operation fulfills the requirement which consists in probing the ground, on the two sides (North and South) in order to provide the foundations of the requirements in technology analysis.

side, to the setting-up of new intermediate objects and to the widening of the network. The widening of the network will inevitably lead to the association with other networks what in the final analysis leads to form a wide-area network which will

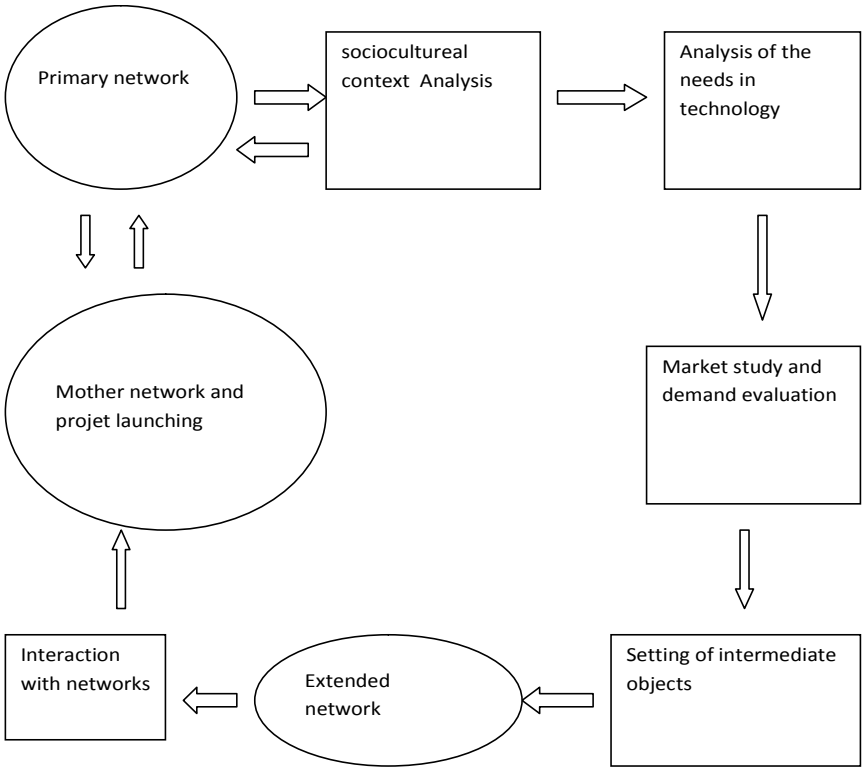

Fig. 2. Schematic representation of North-South technology transfer process launching

This stage is essential, since it must update the sociocultural characteristics of the various actors, in order to allow the promoters, to seek to transfer only the technical objects likely to answer, effectively target populations expectations, without running up against their spiritual values. The technology transfer is a step of innovation which meets multiple barriers at the entry. Only approaches based on local creativity and local expertise are likely to make a success because such approaches fall under the continuity of the action. The analysis of the needs is the following stage. But what kind of analysis has to be performed? What kind of needs? No step of technology transfer was done without an analysis of the requirements in technology. However these analyses were based on Western prejudices on what is necessary to the populations of the South and on what are not. But the experiment shows that such considerations are generally erroneous. What seems essential for the Westerner is not essential for the national of the South. This is why it is advisable to associate the recipients, at the phase of design. An analysis of the needs realized jointly with the local populations, is more realistic and would be adapted better to the local conditions.

During this stage, a group is necessarily formed, charged to formalize all the requests of the recipients in technical terms easy to interpret by Survey Office (SO). It is this starting group which forms the primary network, principally made up of local elements. The role of these primary networks consists in setting up intermediate objects, which engage its dynamics. These objects would be the privileged place for the interaction of the network actors. The network is by definition open. What implies the opening to other actors or networks; that leads on a be composed of the networks set up previously. It is this wide-area network which will interact with the external world, and will achieve the goals of the step of technology transfer. With regard to the primary network, it is necessary to raise the following questions: who has to be member of this network? How to carry out the formation of this network? Which are the intermediate objects which must set up the primary network? Good answers to these questions guarantee a successful interlocking of the action.

Intermediate objects

The intermediate objects are a production of the actors participating in the process and have a double role. They are at the same time representation of the product being done and mediator for the actors. It is a favorable place for co-operation and interaction. They are in fact objects produced or used during the process of design, traces and supports of the action to design, in relation to the tools, the procedures and the actors. Their empirical contents can remain fuzzy and to be given only with individually according to what is present on each ground. Their interest is to enable us to lay out on a concept of the same level of generality as that of organization to put questions relating to the study of the processes met without disregarding their concrete way and their instrumentation, their contents to function (*Jeantet A*, 1998). These objects are produced, circulate, or are tested, criticized, corrected, supplemented; in short at least constitute a support, when it is not a partner, to the work of the actors engaged in the process (*Jeantet A*., 1998). We thus propose to specify such objects and to use them to support the profit-sharing of

the actors and the engagement in the project. We list here some of the intermediate objects as examples:

The feasibility study of project consists in justifying to the public or private organizations and the financial organizations, the profitability and the economic effectiveness of the project. It is composed of a general presentation of the project, history of the question, program of development considered, technical studies on the realization of the sites of the project as well as the economic study of this realization. The essential goal is obtaining the green light for the release of the project and the agreement of financing.

Analysis of the needs: this stage is essential and it is recommended to devote a rather sufficient time to it, during and during the process of transfer and design of the equipment to be transferred. Indeed, one of the principal problems which one encounters in the developing countries, milked with the lack of reliable information and the difficulty of communication These problems result in the successive adaptations of the equipment to the potential users, without possibility to question the basic concepts, therefore this leads to technical complexity and an increase in the costs. It is also the stage which requires the maximum of competences. (Sale, economy, ergonomics, manufacture, processes, products, sociology, animation and marketing). Time will be a question, initially, during the listing of the difficulties which arise, that one intends to solve by the transfer operation, and to understand if these problems exist for a long time or if they are new. It is necessary to note, at this stage, that the encountered problems are specific to a given place or they can de met everywhere; if it is the case, it is necessary to get information about the means that use the others to solve them. It is then advisable to specify which are the users aimed for the use of the equipment which one wants to transfer and to associate them at the preliminary phase of the transfer operation. It is necessary to put the question to know which the awaited functions of the equipment are. Not only technical functions but also functions of use and functions of regard. Then, it will be a question of classifying these functions according to their importance. The observations necessary to the analysis of the needs will also use the ergonomic analysis of the behavior of the users with equipment existing in nearby fields. A market research is essential although the means are limited in the developing countries compared to the country of North. This phase must end in the drafting of *the Functional Task Book* (FTB). This FTB presents the awaited functions of the future equipment, their criteria of appreciations, their levels as well as the constraints of the project, without the fork of the cost of acquisition. One should not forget competition in the field. Displacements in zone of use of the material, carried out to analyze the need, will also make it possible to identify the modes of diffusion and maintenance of equipment similar to those considered.

- *A general presentation of the problem*: that consists of the orientation of VA (Value Analysis) action and the information retrieval.
- *the functional expression of the need* it is the essential phase of the FTB
- *the call to alternatives* if it is necessary
- *The framework of answer*: it milked with the research of ideas and the ways of solutions, the study and the evaluation of the solutions.

The FTB allows

- to express the needs of the users whom it represents
- to perform the design and the realization of the most efficient product
- to facilitate the examination of the proposals
- to support the dialogue between partners

The FTB is presented not as a plan of realization but as a framework for the search for the optimal solutions. After the setting of the FTB one proceeds to the choice of

- ***Concrete technical solutions***. These solutions are translated in the form of plans and of technological drawings which will be used as a basis for the development of the prototypes, which after tests on the ground, will open the way with the series production of the equipment considered.
- ***The definition of the artifact*:** it is the last phase of reflection before complete materialization of the equipment. It is now a question of defining, in a precise way, the future equipment, the manufacturing processes and the provisioning. The principal tools used are the instruments of the engineering design (worksheets, catalogues of components, drawing boards or CAD) and those allow the taking into account of the provisioning, the manufacture and the maintenance of the future equipment. It is essential to define the components of the product according to the constraints related to the manufacturing process, with the availability of materials and the functions to be fulfilled. Then, it will be necessary to inventory local know-how while specifying the possibilities of local maintenance. With the exit of this stage, the
- ***Product Functional Task Book*** (PFTB) will have to be written in the form of note and industrial development and computations.
- ***The construction of the prototype***: here, it is the turn of local equipment suppliers, associated at the beginning of the project, to make the financial decision to invest in the prototype, then to make all the financial efforts for the launching of the new products. The contribution of the foreign backers will come to supplement the effort of the local equipment suppliers and does not have to be the single source of financing, in order to avoid opportunist behaviors which consist in selling to foreign financial organizations the equipment at prices three or four times superiors at market prices. The prototype being built, one passes then to his validation before the launching of the production on a large scale of the product.

The essential difficulty that one meets in such projects is related to the continuity of the committed action and the risk of abandonment as soon as the promoters withdraw.

A sociotechnical network can be represented as on the figure below:

We illustrate the possible interactions between the actors participating in the step by the Interaction Matrix, below.

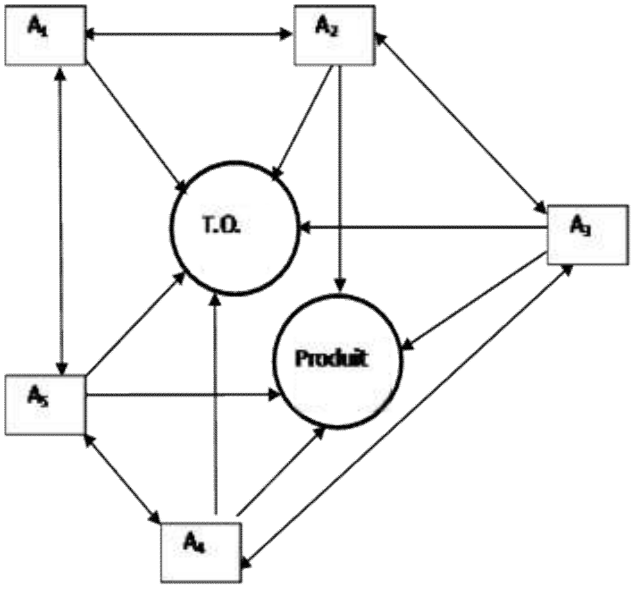

Fig. 3. Representation of a sociotechnical network

Caption: With A_I is an actor engaged in the project, TO is the technical object (drier for example) applied to the product (Food for example), the arrows with one direction indicates the interest of the actor for the TO and/or the product to which the OT is applied and the arrows with double direction indicates the various actors' interactions (sociotechnical relations) between the actors taking part in the step.

Fig. 6. Interaction Matrix of the actors by means of the intermediate objects

A O.I	$I.O_1$	$I.O_2$	$I.O_3$	$I.O_i$	$I.O_k$	$I.O_N$ …
A_1	C/V	V	V	V	V	V
A_2	V	C/V	V	V	V	V
A_3	V	C	C	C	V	V
A_i	C	C	C	V	C	V
A_k	V	V	V	V	V	V
A_N	V	C	V	V	V	V
A_{N+1}	-	C	V	V	V	V
A_{N+2}	V	C	V	V	V	C
A_M	-	C	C	V	C	V
A_{M+1} …	C/V	C/V	C	C	V	V

Caption: I. Oi – intermediate Object number i, Ai- actor number i C- likely to create the object; V- validates the object

Conclusion

Known technology transfer procedures are mechanistic and cannot answer the expectations of the people in developing countries. We proposed a methodology which may put all chances of success in the side of technology transfer promoters. The methodology can be used in the development aid of industrialized countries to the countries of the South.

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