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APPROPRIATE TECHNOLOGY FOR THE PRODUCTION OF TEXTILES

DUALISM AND TECHNOLOGICAL HARMONY FOR BALANCED DEVELOPMENT

Background Paper

DUALISM AND TECHNOLOGICAL HARMONY

FOR BALANCED DEVELOPMENT

by

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I. Introduction

The objective of this paper is to explore the possibility of a two-tier industrial development pattern in the Third World and the role technology should play in it. Such a development is aimed at reducing the dualism of these societies and therewith to improve the fate of the vast majority of the population living outside the modern sector. Somewhat more in particular the possibilities of a semi-urban industrialization in textiles is explored.

1. Scope of the paper

In order to comply comprehensively with this subject matter, a relatively extended number of issues has to be reviewed. Major issues touched on are the following:

- the nature of the dualism in the Third World,
- the causes of it,
- characterization of the available technology in the world,
- the economic logic in the design, manufacturing and the supply of the available technology
- the international trade in technology
- a potential, future international technology trade pattern,
- world technological harmony versus confronting, disharmonious attitudes on technological matters leading to a technology split,
- technological dependence, independence or interdependence,
- technological and economic sectoral quantitative and qualitative assessment methods to evaluate according to economic and extra-economic criteria the need and the feasibility of a Third World textile technology,
- the design of such a technology,
- the international infrastructural framework in the Third World instrumental in the design of such a technology

- the implementation of such a technology,
- the agreed economic and other conditions to come to such an implementation,
- the policy component of an industrialization and technology implementation drive.

These points concern the major topics discussed, but by its mere size it is obvious that several of the issues mentioned are only summarily touched on.

The question of a semi-urban industrialization and the role of technology in this is highly complex and involves many more aspects than economic and technological ones alone. Possibly in this paper the complexity of the problem becomes somewhat clearer besides, hopefully, the paper may improve the insight in the problems around the semi-urban industrialization drive and with the various recommendations provided contribute to its ultimate solution.

The various points subject to discussion show that it is tried to see the problem of the design, manufacturing and supply of a semi-urban technology comprehensively. Nevertheless, it is outside the scope of a paper like this to analyze all these issues in any depth. They are brought into focus in relation to the subject matter of the paper which is well reflected in its title: Dualism and Technological Harmony for Balanced Development.

2. Organization of the Paper

The subject matters discussed in this paper are organized in four sections. In section II, the economic and technological dualism in the world is shortly reviewed. The economic dualism in the Third World is characterized and mainly explained by technological causes and the implied

economic and political powers associated with technology. Although the degree of dualism is too extreme and therefore harmful in the Third World, economic dualism as such is not necessarily wrong - to the contrary, it may be even desirable in certain situations. It is argued that a certain socio-economic dualism in the First World may be needed. Although the technological dependence of the Third World on the technology of the First World will continue, there is true possibility that the Third World could become the supplier of a semi-urban technology which also could be of interest in the sub-urban industrial sector of the First World. If that materializes, a technological interdependency would be creative which implies technological harmony on the world level.

In the third section of this paper, a few methodological questions are reviewed in relation to the technological and economic, sectoral assessment while also a few classifications for technology, and economic sectors are reviewed. Questions discussed also refer to the economic feasibility of a two-tier industrial development design and in case a feasibility is believed to exist, how should such an industrial development design look like and how should it be implemented? Further, the question is explored if the technology for semi-urban industrialization exists already or if it has to be developed. Pre-conditions to come to implementation of a semi-urban industrial development design are discussed.

In the fourth section of the paper the question of the feasibility of a semi-urban textile industrialization is explored. As well as, in case of its feasibility, its interrelation with the modern and the rural sector. Next the available textile technology is explored and its appropriateness for semi-urban industrialization reviewed. The question of the design of a specific semi-urben tech-

nology for textile production is briefly discussed as well as its production, its supply, its implementation and application.

In the final section of the paper the major points of the paper are summarized, and some concluding remarks are made. Also, the policy implications and necessities are summarized. Particularly the need for a Third World International Institutional Framework is emphasized.

II Economic and Technological Dualism

1.Factual Dualism in Third World

Developing nations are commonly characterized by a dualism in their development. In their desire to develop, First World expertise, experts and technology of the embodied and disembodied form have been infused accompanied by various types of capital transfers. Essentially the effect has been the establishment of pockets of economic and industrially development which may have more resemblance and linkages with the First World than with the country in which these pockets are located. This dualism between a small modern sector usually concentrated in and around a number of big cities and the largest remaining part of the country which virtually is unaffected by this type of development creates several import imbalances, which are felt as undesirable. One of the fundamental causes of this type of development is the lack of Third World internal development mechanisms. Given the fact that a desire for development was felt, the easiest and quickest way out was to use the human, physical and technological resources from those areas in the world which were developed. Without a clear conception and strategy in the beginning of the development process, obviously the First World firms got the opportunity to establish themselves and gradually the economically and industrially developed islands were created which in these aspects are copies of the First World.

Although this was intended or hoped these developed islands despite growing in size, did not happen to be a nucleus for a balanced development throughout the country. The reasons for this are numerous and complex and it is outside the scope of this paper to try to explain this fact comprehensively. An important reason, however, is based on the fact that First World technology had to be chosen, by lack of other relevant supply sources, and that this technology directly or indirectly was transferred by First World agents, for the use and control by First World company's operating in the Third World, usually on the invitation or the consent of the Third World authorities.

The absorptive capacity of the Third World as to financial and human resources for this First World Development pattern is restricted. The employment generating and the surplus cummulative effect of these investments is also limited. Therefore the economic spinn off, the direct, the indirect, the cummulative and the external effects are too restricted to create the momentun for a dynamic development process which should have little by little, affected the entire economy. Due to this reason the greatest part of the population remains in a traditional socio-economic structure, which stands in sharp contrast in almost every respect to the so-called modern usually mostly urban part of the economy. This imbalance creates tensions and may lead to social and political conflicts. The relative glamour of the cities exerts a strong impulse for the poor, landless, rural workers to migrate only to find their fate has worsened by doing this. Clearly the Third World has to reduce this internal dualism to a more acceptable level, the question, however, is how this has to be accomplished. As said this question is highly complex and its comprehensive discussion is outside the scope of this study but it is clear that technology has to play an important role in reducing the magnitude of the dualism in development. Before going into

more detail in this question it might be of interest to enlarge the focus a little by having a look at the First World.

2 Planned Dualism in the First World

May the Third World have realized that the development strategy followed has not yielded the effects desired, the First World has also some doubts about its strategy. Although economic growth in this area is sharply lower as it used to be, it is not certain that a return to a subtantial higher growth is possible or even desirable. If so this area may have problems in realizing its aim of full employment. In addition to this labour does not only want to be employed but also is demanding about the substance of its daily activity. It wants meaningful employment in a psychological sense. That is, it wants to obtain creative satisfaction by its work, besides it desires to be paid well.

To realize such a social-economic development model it may well be needed to create to a certain extent a dualism in the economy applying the latest most efficient technology in a high growth, surplus generating sector which yield relatively little but highly professional employment, while a decentralized, semi-urban type of industry, together with a growing service sector yields the bulk of the employment. Also in the case of a by purpose creating of a certain dualism in the economies of the First World, technology plays a key role.

The First and Third Worlds are interlinked in many ways. Most of the Third World before 1950 was subordinated to the First World politically and economically. Although now politically independent, still a considerable dependence economically but therefore also politically prevails. Nevertheless

there exists a dependence of the First World on the Third World also and surely an interdependency always gives a better base for a relationship on mutual advantageous terms than a dependency situation. In the field of technology, however, still a one way avenue prevails and surely the dependency of the Third World in technological matters is almost complete. This implies largely that the available technology in the world is a First World technology, while in certain technology areas, the Second World is a supplier also. In other words, there is, speaking in global terms, only one technology and technological progress in the world and that originates from the economically and technologically dominant area that is the First World. As said earlier, one of the important causes of the dualistic, unbalanced development in the Third World is the intrusion and often also the control of the technology of the First World by the First World in the developing countries. If the technology is one of the important causes of a type of development in the Third World which is judged to be highly undesirable, as it creates more problems than it solves and particularly leaves a large majority of the population at a subsistence level, a few fundamental questions are in place. These are:

-can a technology be conceived which is more instrumental to fulfill the basic development aims and needs of the Third World.

-does this technology reduce the pronounced, dualistic characteristic of the economies of the Third World.

-is it needed to enforce a technology split in the world and to create a Third World technology which is distinct from the technology originating from the First World?

3 Technology Split

These questions will receive an answer in the course of this paper. It is imperative to be realistic if one deals

with such serious and vital problems of economic and technological development. One cannot strike away the industrial development which has already taken place in the Third World and which in certain countries amounts to a period of thirty to fourty years. In other words the modern industrial sector in developing countries is a realitv. This sector is dependent on First World technology and also in the future this dependency will largely continue, although this is not in all cases a necessity but a policy option. By the time production installations have to be replaced in the modern sector, one may chose domestically or a Third World manufactured technology, for example, produced under license. In any case it is safe to assume that the First World technology will be dominant in most modern, high technology production areas for many years to come.

Instead of a technology split which would have significant economic and political implications and which in any case would be very difficult to materialize consistently in a technological sense, one may chose for a situation of technological harmony in the world. That is, Third , Second and First World basically would apply the same technology in the modern, high technology, large scale production areas which principally originates from the First World. Hence a technology split is not seen between Third and First World in these production areas but rather between the modern sector on the one hand and the semi- urban and rural sectors in the Third World on the other hand. No doubt a more balanced development in the Third World also can be accomplished by moving up the technology of the semi-urban rural areas instead of moving down, technologically speaking somewhat, the modern sector. Hence, there might be a need for a Third World semi-urban rural industrial technology which would generate the most fundamental basic need of this area that is employment.

4 Technology Trade

Although in the vital and urgent problems of technology and economic development, economic theory is hardly looked at as a source of inspiration or solution recent research by this authour has shown that neo-classical theory of international trade is of some help with regards to technology trade. Very briefly this theory states that each area in the world should produce for trade those commodities or services in which it has a comparative production advantage. A comparative production advantage is based on the production factor endowment of these areas. The relative abundance and scarcities of production factors finds expression in their local prices and products containing a large input of abundant and therefore cheap production factors may end up to be the products in which the area has a comparative production advantage in the international trade. Empirical evidence shows that the First World has a comparative production advantage in the high-technology content equipment and machinery fields. In technology classes where alternative techniques of production do exist as to technology content and therefore to capital-intensity also, the First World hardly can produce the more simple versions any more on a profitable basis essentially because in these simple technologies the area looses its comparative production advantage. The interesting point, however, is that it is not losing its comparative production advantage to a competitor in first instance, but relative to its own produced superior technological alalternatives. In the latter technological manifestations the area does have a comparative production advantage. Therefore it is able to produce these technological products relatively cheap. In the simple technological alternatives the area does not hold any longer a comparative production advantage. By continuing the production of these simple versions their manufacturing costs and their price increase, which makes the economic difference between the simple and sophisticated alternative techniques smaller to the extent that it largely may fade away. The implication is that the

simple, technological version is pushed into obsolescence and eases to be an economically viable alternative, with all the consequences for the industrial development in the Third World.

In the context of this discussion it is worthwhile to introduce the concept of geo-technology. A geo-technology is a technology in which an area has a comparative production advantage. The high-technology content equipment and machinery is the geo-technology of the First World, the more simple low-technology content machinery and equipment is the geo-technology of the Third World. The latter technology although technologically speaking simple, more labour, less-capital intensive in its use, nevertheless is not a simple technology to produce because it often requires high precision production and skillfull accurate assamblying. Often these products are the result of a long tradition of precision mechanical engineering and therefore reality shows that although theoretically speaking on the basis of its simplicity and labour-intensity in production it ought to be the geo-technology of the Third World, so far that has not materialized.

Nevertheless little by little it is a necessity that the Third World is going to produce its geo-technology. Certain specialized inputs are not sufficiently available and therefore have blocked the materialization of a logic division of labour in technology production. Other inputs and their relative prices, however, do make this Third World technology production, economically highly attractive, besides for political reasons almost a necessity. On the basis of a well-planned, technical assistance the bottle-necks in this development may be gradually lifted, and the Third World, geo-technology production will become a fact.

The Third World semi-urban, rural technology intended to develop the stagnant part within the Third World may well become the

appropriate technology for the labour absorbing sector of the planned dualistic economy of the First World also. If the idea is correct that gradually a necessity is felt for a relatively small-scale, decentralized dual industrial pattern, where the excess labour of the First World economies meaningfully can be employed, it needs a technology which is close or comparable to the technological requirements of the Third World in its semi-urban sector. That is the Third World in addition to supplying its own geo-technological needs could well find that its technology is a desirable product in the First World. This then also would imply technological harmony on the world level. In this view on the world technology picture there are basically two technologies around: the high or sophisticated, capital-intensive and often large-scale technologies and the more simple, relatively labour-intensive technologies. The first technology group is the geo-technology of the First World, and therefore this area will be the major supply source for this technology, the second technology group is the Third World geo-technology and this area will become the major supply source of this type of technology. Hence a technology international trade should develop on the basis of comparative production costs of these two technology types. This vision is based on technological harmony in the world in contrast to the alternative possibility of conflict and confrontation in technological matters . It also implies international trade, and integration in this matter rather than alternative opposite solutions.

To make the picture complete it is needed to look also at the final commodity trade. According to the neo-classical theory of trade the final output trade is an alternative for the movement of the production factors. One may well argue that from a purely economic viewpoint the

final output of the high-technology content sectors, if tradable, ought to be produced by the area which has a comparative advantage in its production and internationally traded for the final output produced by the low-technology content sectors. This, however, is for economic and political reasons an international development structure which is less acceptable to the Third World. Many countries in this area want to control the final-output production of the high-technology sectors for economic strategic and political reasons. Therefore the movement of production factors, which substitutes the international trade of final outputs, particularly of technology, which ought to be conceived as a production factor, is more acceptable. This implies technological dependence but in the vision presented here essentially in the future it will concern a technological interdependence. Although the Third World is dependent for the sophisticated technology on the First World, the latter area is dependent for the simple technology on the Third World. If indeed this division of labour in technology design and production is materialized the dependency of both these areas will be pretty much in equilibrium, that is then a technological interdependence in the world will prevail.

Further it should be kept in mind that the theory is not based on an absolute comparative production advantages but rather on a relative one.

Clearly the real world differs considerably from the theoretical, abstract conception. This reality creates all kinds of imperfections and therefore the theoretical optimum in the international division of labour, in the production and trade of final outputs and technology will never be reached. This, however, is an advantage rather than a drawback as it may imply a greater trade diversity in the sense of a combination of commodity trade and international

movement of production factors particularly technology. Autarky, block formatiom, confrontation, conflicts and international trade reduction are also a possibility. If these possibilities are used as threats for manoeuvring in the political power struggle which underlies the relation of the Third and First World it is not harmful, if these possibilities would become a permanent reality, it would be regrettable.

III. Choice of Technology and Economic Sector

1. Technology, Sector Classification and Criteria

In the previous section, roughly technology was divided into two groups, that is sophisticated technology and simple technology. Is such a division indeed meaningful?
There are obviously many more possibilities to classify technology. Another important classification distinguishes monopolized technology and freely available technology, in which as a criterion the accessibility and the market or tradability of the technology is used. By monopolized, in various degrees, technology the trans-national companies appear on the scene. Another technology classification which this author likes to introduce is process, flow or continuous technology and discrete or discontinuous technology. The criterion in this classification is the nature of the production process. The products in the process technology concern often liquids, gasses, or currents, the input, the throughput and the output are carefully, electronically, controlled, but are not tangible, directly handled by man. These industrial processes are highly capital-intensive and characterized by scale-economies. The discrete or discontinuous production processes yield concrete parts, produced by individual machines or groups of machines, which are assemblied to larger units, sub-assemblies, which on its turn may again be assemblied to larger units. Examples are the metal product, including the machinery, industry, but also the manufacturing of most household durable goods, wood-working, the confection industry and several other industrial activities. Also certain industries are partly flow, partly discrete in several gradations.
Although there are many more possibilities to classify technology, for the present discussion the three classifications introduced are sufficient. These use the following criteria:

the degree of technological sophistication: high and low technology content, the accessability or marketability of the technology: monopolized or freely available, the nature of the production process: flow or continuous in contrast to discrete or discontinuous production processes.

The economy as far as industry is concerned was roughly divided into the modern sector and the semi-urban and rural sector. Clearly for the semi-urban and rural sectors a more simple technology would be applicable. However, the fundamental question is, what are modern, and what are semi-urban and rural sectors? Which industrial economic activities can be fruitfully decentralized and which are the relevant criteria in this decision. It is assumed that one of the criteria in this decision is the economic feasibility of the decentralization. The development of the rural areas naturally can be conceived of in various ways. One may think of huge agricultural communes or cooperatives, which have complementary industrial activities to process the agricultural products and to produce certain commodities for consumption and production for these, to a certain extent, self-contained units. Such a development pattern also affects the interrelation with the modern sector and the criteria of economic feasibility do not have to adhere to private economic profitability criteria.

However, if one thinks in terms of a capitalistic or semi-capitalistic, market-oriented development pattern, the decentralization of industrial activities needs to be economically feasible, preferably also in a private-economic sense. If this is one of the basic assumptions for rural development, a very important criterion for decentralization is whether or not the unit cost price is affected by producing at a smaller scale. This depends largely on the fact,

whether or not the technology available has scale effects. Scale effects may be distinguished to capital, to labour and to overhead. Scale effects happen if by applying larger productive indivisibilities, the production costs per unit output, as to capital, as to labour or to overhead, decline. Generally one may state that in all industrial processes, where important economies of scale occur, decentralization is from a private-economic point of view, less attractive.

Since the scale phenomenon is believed to be a central consideration in the question whether or not an economic sector can meaningfully be decentralized, a classification of economic sectors is introduced using as a criterion, an essential aspect of scale, namely production capacity and technology. Consequently, economic sectors are classified as capacity-choice sectors and technology-choice sectors. In the capacity-choice sectors, a technology is applied which comes available in various output capacities all applying essentially an identical technology. Therefore really the choice concerns the productive capacity. Normally, economies of scale are involved and higher capacities yield, when fully utilized, lower cost per unit of output than smaller capacities. Given this characteristic of these sectors, they qualify for centralization although, clearly, there is a trade-off between the greater transport costs of inputs and outputs and the reduction of unit production costs caused by the centralization of production. In case transport costs are heavy, there certainly is a possibility for some decentralization in the capacity-choice sectors. For example, in cement and in beer and soft drinks a certain decentralization appears to be economically rational. The technology used in the capacity-choice sectors is usually of the process, flow type, concerns more the sophisticated - at least the more capital-intensive - technologies which also usually are controlled by trans-national companies.

The technology-choice sectors apply a technology where a choice among alternative technologies, each with distinct factor proportions, does exist. Therefore, these sectors particularly qualify for decentralization. However, the pure theoretical case of capital - labour substitution in production on the basis of the prices of capital and labour is relatively uncommon. Other important aspects do play a role. First of all, in the technology-choice sectors which apply a discrete, discontinuous type of technology, production indivisibilities do play a role, and therefore the scale phenomenon, although less pronounced, happens here also. Further important, complementary considerations may be involved in the choice of technique such as the quality of the output, which among the various alternatives may differ, also the skill and interface requirements usually differ among the technological alternatives. With the interface requirements is meant the dependence of the normal functioning of the technology on precise standards, for the complementary conditions and inputs. Examples are the quality of raw materials, the humidity and heat conditioning of the air, the internal product routing and the general planning of the internal production process.

In these technology-choice sectors, the available technology can be classified into the two groups mentioned earlier: the sophisticated technology and the relatively simple or conventional technology. The sophisticated technology as a general rule is less appropriate to the Third World, not only is it capital-intensive and labour-saving, but it also is demanding on the human skill factor particularly for repair, maintenance, internal planning and management in general and on other interface conditions. However, in the more simple, conventional technology also a choice remains to be made. Economically important crite-

ria in this choice then are the capital - labour substitution possibilities, the relevance of economies of scale and the quality-output differences among the production techniques. Here also the transport costs of inputs and outputs may put a limit to the decentralization potential. The relevant economic sectors which apply discrete, discontinuous technologies of which an ample choice in the conventional technology type exists and which definitively belong to the technology-choice sectors are the following: wood working, metal working, leather working, foot-wear manufacturing, spinning, weaving, apparel production and construction materials to mention a few important ones. It concerns the economic sectors where industrialization started, where human transformation processes happen since thousands of years and which all are related to consumer durables for basic needs.

2. Technology Assessment

So far, some economic qualitative criteria have been mentioned applicable to chose sectors and technologies capable for centralized and decentralized industrialization. Naturally, one may introduce several types of quantitative methods to assess the various technological alternatives and to characterize the various sectors more precisely. In this paper, this cannot be done in any detail as it is considered to be outside its scope*. Briefly, these topics are reviewed now. As far as technological assessment is concerned, an operational, useful and simple method is believed to be the DOS method. This method can be carried out at various levels of data aggregation concerning production tasks, products or factories at various scale levels. The method determines the least-cost technique for key parameter vari-

* See by this author: Technology and Sector Choice in Economic Development, Sijthoff International Publishers, Alphen, The Netherlands, 1978.

ations, for example, in physical characteristics of the output, in scale of production, in utilization levels, in capital, labour and technology prices, in labour efficiencies, in skill differences or in any other quantifiable parameter. For all such parameters, sensitivity (S) analyses are run.

By applying a preference or choice criterion, the preferred technology among the alternatives introduced shows up. The preference can be an economic optimality (O) criterion, which in a next stage by introducing qualitative aspects can be enlarged to an appropriateness criterion. Finally, by means of a decomposition (D) criterion, it may be established which of the parameters introduced is most instrumental or decisive in the shift in technological preferences. This enables the classification of technologies according to their sensitivity to major parameters, considered crucial in the evaluation variation. Systematic information on alternative technologies and to their sensitivity to key parameters would be extremely helpful in the decision on its suitability for decentralized application. An advantage of this method is that it can be centrally applied, say in one place in the world. The method provides the relevant information on which choices of centralized or decentralized industrial application can be based. Besides, the information obtained is instrumental in determining the preferred technology for all countries in the Third World, i.e. for wherever such decisions have to be made. The only necessity is to include a complete range of relevant discrete parameter values on which the sensitivity analyses have to be run. The general validity is further enhanced by the fact that the method, although static in origin, becomes essentially dynamic, due to the multiplicity of production circumstances, based on whatever parameter value combination one desires to know, which the model simulates. Due to this feature of the method present as

well as likely future production circumstances can be simulated in order to be able to make a deliberate choice of technique. Such a choice can be based on present or future exogeneously determined market or accounting prices.

Obviously, the model can only consider the existing technology, but as soon as new technology comes available, it may be fed into the computer model as well. Besides, the results of the method are helpful to evaluate product and technology adaptations both, while they provide also some insight when the design of an "alternative technology" would be desirable to make the choice spectrum more complete.

So far, all the aspects mentioned concern those which are quantifiable. Clearly, there are considerations in the choice of technology which are not quantifiable and which nevertheless may have to be considered. Examples of these qualitative aspects are: the contribution to the domestic technological capability which may differ from one technique to another, the contribution to the aims of self reliance or to satisfying the basic needs of the populace. Although often these more qualitative considerations are hard to quantify, that does not mean that no quantitative methods can be applied in their assessment. It is quite possible to attach to these various considerations ranking numbers according to their importance. Such a numbering can be accomplished, for example, by a group of wise men on the basis of objective judgment. By means of the ranking numbers again a quantitative element is introduced, which therefore makes these aspects also subject to quantitative treatment*.

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* See for such a procedure G.K. Boon, Technology and Sector Choice, op. cit., chapter 9.

3. Economic Sectoral Assessment

In the decision which economic sectors are suitable for decentralization, evaluation methods based on input-output analyses are particularly helpful. The input-output tables make it possible to establish the foreward and backward linkage effects of sectors. Certain sectors have more linkages than other sectors. Also the backward and foreward linkage effect of sectors among each other differ. The foreward linkage effect can be measured as the ratio of the inter-industry output of a sector to total output, the backward linkage effect is measured by expressing the sum of the intermediate inputs for each sector as a percentage of the total sectoral inputs. Hence, sectors can be ordered according to the importance of their backward and foreward linkage effect. The five most important receiving or delivering sectors can be ordered further on the basis of the other criteria introduced. Particularly by applying the one of capacity and technology choice sectors, a further deepening of insight can be obtained in the decentralization potential of those sectors with a high linkage effect*.

Indeed, if among the development aims is the reduction in the dualism of the economy, a strong interlinkage of the modern and rural part of the economy may be preferred. More important than the linkage effects which are based on the direct effects are the indirect effects. The indirect effects are caused by the interdependent relations in the economy. Although it is important to be informed about the direct increase in, for example, employment by means of a unit increase in final demand, it is of great interest to know also the indirect employment effect and its distribution among the various sectors. The indirect effect and the cumulated effect, the sum of the direct and indirect effects,

* See: Technology and Sector Choice, op. cit. , for an empirical application.

can be obtained by inverting the matrix of technical coefficients which is deducted from the identity matrix*. The most important sectors according to their indirect effects can again be further ordered according to their decentralization potential. This combined insight is informative for the assessments of the indirect effects in case of decentralized industrialization. In case of planned semi-urban and rural industrial development, one has to be informed about these effects. A similar method as described in the case of the evaluation of the qualitative aspects of a decision on technology may be used to assess the qualitative sectoral considerations. Clearly by the present popularity of the concept of appropriate technology, the qualitative aspects in the technological and sectoral assessment may become more important.

4. Some Vital Questions.

So far, it was implicitly assumed that the available technology is a datum. The question if the technology which is available is appropriate to further the aim of semi-urban and rural development is not yet discussed. Implied in the discussion has been that given the objective to reduce the economic dualism in the economy, the emphasis must be on developing the less-developed part of the economy rather than putting a direct stop to the growth of the modern sector. One of the most important instruments to realize this objective is the infusion of an appropriate technology. Whether or not this appropriate technology is at present available is, as said, not analyzed. The fact is stressed that this semi-urban and rural technology is a Third World geo-technology which ought to be produced in the Third World. A very important aspect which so far remained in the dark

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* See for a simple sector evaluation model either based on the complete or a relevant part of the input-output table: "Technology and Sector Choice", op. cit.

is how this semi-urban and rural industrial development programme can be implemented. Indeed, this is one of the most crucial questions.
So far, some classification of sectors and technologies were provided mainly on their potential for decentralization. Further, an assessment procedure for technology and for sectors was briefly described. Fundamentally, however, an answer is needed to the question if indeed a two-tier development design, as much as possible interlinked, is at all feasible. Hence, the following questions need to be analyzed to some extent, in order to accomplish this development design:

1. Is a two-tier industrial development of the modern and traditional parts of the economy at all possible?
2. If such possibility is believed to exist, how should this development design look like, and how can it be implemented?
3. Needs appropriate technology for the semi-urban and rural sector to be designed, or is it already available?

The first point mentioned, one may say, ought to have been a point of discussion on the first page of this paper. That the point is explicitly mentioned much later in the discussion is already indicative for the answer. Indeed, a two level industrial development is believed to be possible by this author, but it is not, as reality shows, automatically forthcoming and it also is not easy to materialize.
If the starting point of the discussion is kept in force, that is a kind of capitalistic, free market economy functions for final outputs and for the production factors, some type of balance between the two economies must exist. If wage and labour costs in the modern sector are substantially

higher in the modern part of the economy than in the traditional part, the cost of living must be substantially lower in the traditional part, will not a constant incentive exist to migrate from the rural areas to the modern centres.

Not only migration can be avoided by having a reasonable balance between income and living costs. Practice shows that great discrepancies in educational, recreational and cultural facilities between urban and rural areas are a sufficient incentive for migration. Also, to induce the use of more simple alternative techniques which are more labour and operational, skill-intensive, the cost of labour definitively has to be lower. If the government has a system of minimum wages, distinct differences in the minimum wage level are needed and the social legislation in force in the modern part of the economy can in no way be made applicable to the rural areas. In other words, a two level industrial and economic development in general needs a two level economic, social, institutional legislation, should such a development be at all possible. Such a two level socio-economic legislation may imply legal complications which cannot be fully judged by this author.

Also the government has to supply a certain infrastructure. If, indeed, linkages between both the country's sub-economies are desired, there ought to be rail or truck roads and not too much internal toll barriers as sometimes is a common practice in developing countries. A very important infrastructural facility concerns the availability of educational facilities, not only for the primary school, but also for the secondary school and in particular for vocational training. In many developing countries, no vocational training facilities exist, not even in the modern sector. It is, however, also outside the scope of the present paper to discuss all the aspects relevant to this question if a two level development is a realistic option. The major point is that according to this author, it is economically and technically possible, although such a development is not automatically forthcoming and needs to be carefully thought over and "coached".

The scope of the second question : how the two-tier economic development design should be conceived and implemented is very wide. Indeed, as discussed, sectors ought to be evaluated on their decentralization potential and alternative technologies assessed on their major characteristics, economically, physically, socio-politically. Presuming, as is assumed throughout this paper, that a kind of market economy is in force in which the profit motive is an important, basic consideration, the government would like to bring the two-tier development scheme into motion by using this market mechanism and profit motive. Hence, preferably private initiative should come forth and in order to bring it about the government may want to make certain signals stronger. By means of direct, or indirect subsidies the attractiveness to organize some type of production on a certain place can be greatly increased. If this is done there are basically two possibilities, the opportunity is taken up by local that is semi-urban or rural entrepreneurial talent or by experienced and strong, urban entrepreneurs. The urban entrepreneurial initiative may be domestic, purely, but it may also be affiliated to international and multi-national companies. Whatever the urban, entrepreneurial affiliation, in any case it is used to order production around First World technology, moreover, it is economically and financially strong and, speaking in general terms, highly experienced.

The interrelation and basic dependency situation between the modern and the traditional sector within developing countries is fundamentally similar to the relation between Third and First World countries, even, in certain aspects, the internal dualistic differences are more pronounced. This implies that urban, economic, financial and technological resources easily may dominate any industrial

development forthcoming in the traditional sector, a dominance which may lead to dependence and to an imperialistic, exploitative, colonialistic type of development. Given the fact that no political frontiers exist and that the urban political elite also politically dominates the countryside and often is close to the business elite, it almost is unavoidable that the countryside's development can only be conceived in the form of a satellite, at the mercy of the powers in the urban centres and therefore basically exploited.

Under such conditions the availability of a semi-urban, rural technology hardly may change the picture because it may not be applied anyway. Essentially the problem is the implementation of an appropriate technology which may lead to its application. The implementation of a technology instrumental in the development of the traditional sector is essentially a political issue and thereto subject to the power realities between classes or groups in the country concerned. About the internal power realities of developing countries adhering to a type of capitalist development model, particularly in those countries which are in the earlier stages of development, one cannot be very optimistic. Nevertheless how gloomy the situation may look, there might be some reason for hope for the appropriate technology and for the two-tier development scheme also.

Earlier industrial economic sectors were divided in two classes: capacity-choice and technology-choice sectors. In the capacity-choice sectors a basic capital-intensity prevails, the productivity of capital is positively correlated with the scale of output, the higher the latter the higher the former. These types of sectors do not only demand relatively vast amounts of investments, also they are demanding on technology and R. and D. and know-how

in general. For these reasons, the capacity-choice sectors are more dominated by the big and powerful enterprises and therefore also more by international and particularly transnational companies. Almost logically the capacity-choice sectors are typically First World, technology-dependent sectors, they are typically centralized, modern-sector oriented economic activities. However, since their potential for decentralization on the basis of the existing available technology is limited, these sectors, the enterprises operating in these sectors and the often strong affiliation of the economic powerful elite from these sectors with the political elite are no fundamental danger for the second-tier industrialization drive. The relevant economic sectors in this drive are the technology-choice sectors.

As the name suggests, in the technology-choice sectors a choice of technology is possible. Basically, two sub-groups may be distinguished. In some sectors a rather wide difference in the capital-intensity among alternative techniques may be observed. In another group of sectors, the technical options vary indeed in a more narrow range, all relatively labour intensive. As a generalization, one may state that the degree of control in an economic - urban sense is larger, the higher the potential capital-intensity of the technology-choice sectors is. For example, the economic control in the sense specified is higher for metal-working than for wood-working industries, higher for textile spinning than for apparel, higher for plastic footwear than for leather footwear manufacturing. Therefore, in those technology-choice sectors with a wider spectrum of alternative techniques, the modern sector powers have a stronger foothold and therefore will be a greater competitor than in those sectors with a more limited variation in technology, all relatively labour-intensive.

Looking at the real situation, one may observe in certain developing countries that textile, apparel, wood and sometimes even metal working and leather footwear manufacturing all are more dispersed economic activities, and although some of these sectors certainly use First World technology and could be qualified as modern sectors, they are not urban. In Mexico, for example, the big urban modern industrial centres are Mexico City, Monterrey and Guadalajara. However, textile manufacturing is strongly concentrated in Puebla, metal-working industries such as motorcar manufacturing in Queretero and Puebla, leather footwear manufacturing principally in Leon, Guanajuato. Although Puebla, Queretero and Leon are urban centres, they are very considerably smaller than the three big Mexican urban centres mentioned. There are few developing countries where the centralizing force of the big urban centres will be stronger than is the case in Mexico, nevertheless the technology-choice sectors mentioned operate very successfully in a more decentralized way.

As mentioned, modern-sector, national, international and multinational economic control does occur in the technology-choice sectors also, particularly in those sectors with a greater diversity in capital-intensity of the technology. Clearly, in all developing countries motorcar manufacturing is dominated by automobile manufacturing, multinational companies, but also textile, wood-working and even apparel and footwear may be controlled by multinational companies. Before pointing out the potential dangers of such an economic control particularly if it concerns multinational companies, the economic need for multinational economic control in the technology-choice sectors differs greatly between sectors. In automobile manufacturing, a complex product, the need is by far greater than in apparel and foot-

wear. Besides, Third World car manufacturing companies, fully or partly subordinated to foreign companies, practice a great deal of subcontracting manufacturing activities to much smaller local firms which are, legally at least, fully independent and domestic. Apparel and footwear are very much less complex products and the economic justification for foreign economic control is much less. There are, however, a few aspects which may explain in these sectors the possibility of foreign economic control. Three important ones are exports, fashion and quality which all three are interrelated. Exports are hampered by lack of familiarity with the appropriate channels besides, to come to exports, more initiative is demanded of the entrepreneurial capacity. Exports may require different, not necessarily higher, qualities, different sizes, colours and packings, of which it is essential to know of, will exports at all be possible. To be informed about fashion in time and of its change over time is usually essential in the case of apparel and footwear exports to the First World.

Obviously, multinational and international companies may have an enormous advantage in these aspects and if intruded in these sectors in developing countries may become so dominant, that local entrepreneurial initiative cannot anymore come to effective competition and therefore is not sufficiently forthcoming. Such a situation may be disastrous for the second-tier economic development design and on the accompanying semi-urban employment possibilities. This may, as said, be the result - it is not necessarily so.

It may indeed be helpful to use the know-how of multinational companies to overcome export, quality and fashion barriers in case the country wants to effectively compete in the international market. However, established alternative sources to acquire such know-how exist, which as to the substance of their transfer have to be carefully negotiated. The acquisition of know-how from other sources than multi-

national companies usually may be preferred. If one wants to export by means of particular trade-marks, for example, of male shirts or certain boots and shoes, an affiliation with the company bringing internationally these trade-marks is almost always a necessity.

However, for the domestic market there is no absolute necessity to permit multinational companies to enter into these manufacturing branches, although in developing market economies there is a pressure to do so by the affluent part of the consumers. This brings into the discussion the question of income distribution, its influence on the quality and quantity output mix and the influence of the latter on the technology mix. Will a two-tier development be possible, the demand of the affluent group of the population for consumer products and makes of the First World should be checked. The demonstration effect in consumption is strong, the well-off class of the population has the desire to imitate the consumption pattern of the First World. Such a desire, if not controlled, brings in all the famous multinational companies of the First World in the consumption good and technology-choice sectors.

The physical characteristics of the output are, in first instance, the major determinant of the technological feasibility of the various alternative techniques. Therefore, it is obvious how the choice of alternative products influences the choice of alternative techniques. Multinational companies associated with the choice of products fix the production technique further. Such a development, as is typical for several Latin American countries, severely diminishes the possibility for an industrial development outside the modern sector. The reasons, to formulate it in different words, are that First World firms bringing First World consumer products and qualities to be produced with First World

techniques, applying First World consumption-technology principles, become dominant also in these sectors which economically and technologically are suitable for decentralization. The greater the dominance of the First World affiliated firms in these economic activities, the less the chances are for a balanced two-tier industrial development.

One may argue that domestic firms defined as firms without any type of foreign affiliation have a chance to compete, for example, by producing products for the population in the modern and traditional sectors both and are free to locate their production also in the rural areas. Indeed, this possibility exists and also can in practice be observed. However, a few points should be mentioned:

1) the consumption demonstration effect internally between groups of the population within one country also is strong;

2) the competitive strength of domestic firms vis-à-vis firms with a foreign affiliation is stronger, the more the domestic firms have received a chance to develop.

If foreign firms in the consumption good sector are allowed to enter, the danger of domination by these firms becomes less if the time of entrance is duely chosen with regard to the degree of development of the domestic firms.
By means of a differentiated domestic policy relative to foreign affiliations, these latter can be made conducive to certain development objectives such as exports, efficiency in production by greater, including foreign, competition, increasing the domestic technological capability and other aims. Also, if the affiliated firms are only permitted to produce for export, little or no influence by these firms on the domestic market can be exerted.

However, the ability of Third World countries to effectively implement such a flexible and diversified policy relative to powerful and experienced foreign firms requires already a certain level of economic and political independence and development. Such a level is usually the result of at least a generation, say thirty years of development and therefore it is irrealistic to assume such an ability in the very beginning of the development process. As an implication, countries in the earlier stages of development may possibly be better off by saying no to applications for foreign affiliation in the consumption good sectors and rather use the services of independent experts, which also may be requested through the United Nations System.

A condition believed to be basic to the potential success of a two-tier industrial development design is discussed so far, that is the careful and selective permission of First World firms in the consumption good sector and in the technology-choice sectors, in general, to enter. A selectivity to product area and to time of entrance may be required in order to give the semi-urban, rural development design a fair chance. A few other points basic to the success of this development design were also already mentioned, that is a sufficient difference in the minimum wage between modern and traditional sectors and a complementary two-tier labour and social legislation implying a significant difference of total labour costs between those two sectors. Indeed, in the present discussion, modern and traditional sectors are conceived as geographically separated which in reality is not always the case.

A further pre-condition mentioned was infrastructural facilities particularly also educational, transport and recreational ones. Another important basic facility, part of the

needed infrastructure, is credit facilities and industrial advice and extension facilities. To stimulate local initiative, the market mechanism is assumed as the basic instrument for allocation, certain incentives may be needed, which in last instance affect the profitability. Although all these kinds of facilities are basic conditions, they do not yet explicitly determine the design of this type of rural industrial development. However, again as the market remains to have a major function and indeed the industrialization largely is confined to the technology-choice sectors, with restricted indivisibilities and scale effects, the most important step to come to action is to create the pre-conditions. That is, amongst others, by supplying the basic facilities mentioned plus an appropriate mix of incentives. On the basis of this, theoretically at least, development should come about.

Possibly, little by little, industrialization may start, possibly it may not. In any case, a thorough understanding is needed about the economic, sociological, anthropological, cultural and local political conditions, is needed in the areas where this type of industrialization is hoped to come forth. What are the present incentives of the people, how is the economic power and income structure, which classes, sub-classes, dominating families and, if relevant, racial differences can be distinguished? If no knowledge, insights and understanding on these basic human facts and relations are available, no appropriate essential facilities, conditions and incentive systems to induce some form of industrial take-off can effectively be formulated. In contrast to the development pattern in the modern sector, which is a copy of the First World economic model, the industrial development in the traditional sector should fully consider the existing realities. This is essential, will such a development at all be possible and will alienation and new types of destructive dualisms in that area be avoided.

Indeed, by studying carefully the structure of the traditional society as to all relevant aspects, one may conclude that the market as a principal allocation mechanism is, for some time, inappropriate. However, it is difficult to discuss into detail the design for the industrialization in the semi-urban and rural areas for the Third World in general. As far as this author may judge, a market mechanism is normally feasible because it does exist already for those products which this area produces, and does not need introduction, but only widening.

The third point mentioned earlier, namely, is there a need for a specifically designed Third World industrial technology, needs still to be discussed. To summarize a few relevant points earlier mentioned, the technology-choice sectors are believed to be the relevant sectors for decentralization. The characterization of these sectors is a technological one, namely the availability of alternative techniques. The feasibility of these techniques on the basis of economic, physical and other criteria determine its appropriateness under certain conditions. The First World has a technology available for these sectors. Within the various relevant technology families, alternative techniques do exist. The more simple alternative techniques become less and less profitable to be produced in the First World because, as explained earlier, it is not the First World's geo-technology any longer. Production by the Third World itself of these technologies is only slowly materializing, due to some structural Third World conditions. To use a general and vague term, the technological capability is often not yet sufficient to make the Third World automatically and self-evidently the producer of this technology.

Although Japan, the Second World and some developing countries with a substantial internal market become production

sources, there is a real danger that some quite useful, simple technologies disappear from the market. If this is happening, this technology in new condition is not anymore part of the available technology. The choice spectrum in the lower labour-intensive part of the spectrum is narrowed down. By means of this phenomenon it can be understood that among the technologies available in the world at a given moment, not necessarily a real appropriate technology for the two-tier industrialization of the Third World is obtainable. The question which technology is and which is not available is now discussed in some more general terms.

5. Third World Technology Available?

A meaningful way to start this discussion is to review in more general terms the presently available, simple technologies. In first instance, the discussion is confined to the technology-choice sectors. Earlier, a number of these sectors have been mentioned: metal- and wood-working, textile, apparel, footwear, non-mineral products like earthen ware, plastic products, even certain chemical products, certain types of food processing industries, certain types of building materials. A general characteristic of the feasibility of this simple equipment is the absence of ecomies of scale. Generally, the lower the scale effect, the more chance there is for appropriate semi-urban industrial application.

In most of the sectors mentioned, simple, small capacity industrial equipment is available. An important other category of simple, First World produced equipment, more recently has become available. In the First World, on the basis of decreased work hours, the desire for creative,

manual work in the leisure time and the high cost of manual work to have things done by outside skilled workers, simple, electrically-driven hand tools and small machinery have become available which are mass produced and cheap. The difference between this type of equipment and the simple, semi-industrial and industrial equipment is not so large in various cases. Some design inbetween these two types of equipments, the one for the non-professional hobbyist and the other for the small professional workshop, could possibly yield an appropriate production technique for the Third World second layer industrialization drive. The equipment is not particularly skill-demanding, is not complex and not in the class of high precision machinery. For these reasons, it can still be profitably produced in great quantities in the First World, but could equally well be produced in the modern sector of the Third World for application in the traditional sector. In first instance, referred is to simple wood and metal working machinery.

In earthen ware, in tanning, in footwear and in simple textile processing, the traditional sector in many developing countries has already indigeneous techniques available for a long time and therefore a true, traditional expertise in these production fields may exist. Sometimes experts are able, by relatively minor changes in this traditional technology, to introduce significant improvements in the efficiency and in the quality output of these production processes. Also, in copper, silver and gold ornaments and jewelry, a high class of craftsmanship, know-how, is available in the traditional sector. Not to speak of the handicrafts in wood, metal, stone, earthen ware, textile and other raw materials. Indeed the very labour-intensive, handicraft cottage industry is a major factual or potential employment source in many developing countries, which by all means should be stimulated and improved. Close to this activity is the manufacturing of toys, of labour-intensive apparel

and footwear specialities which indeed are frequently occurring. Introduction of certain simple tools and machinery may open up the growth of rural cottage industry into something more.

Very essential to the healthy growth of these manufacturing semi-urban and rural activities is the access to small credit amounts at reasonable terms and the establishment of an intermediary system which is free of exploitation and abuse. The economic power of the cottage industry and of the small-scale manufacturing units is very weak, unfortunately exploitation is common practice and this may be one of the principal reasons why further industrial growth on the basis of the existing facilities and structures has not been happening more than in fact it did.
Indeed, all energy and talent in developing countries has been and still is directed to enlarge the modern sector. No sufficient effort went into the development of the major part of the country which indeed usually has become a powerless satellite, sucked out and exploited by the modern sector.

Hence, simple low-technology content equipment and machinery usually seem to be available although a specific effort to design on the basis of the latest know-how, a certain class of equipment, specifically to be used in the semi-urban industrialization drive, seems to be useful. In the next section this question is explored for textile technology in particular.

A question which, so far, received no attention is if new technology particularly designed for the Third World and possibly by the Third World may break through the various technology and sector classifications presented in this

section, which all essentially are based on the existing technology. How likely is it to design a technology for a capacity-choice sector which is not high-technology or capital-intensive, which is not characterized by scale effects and which, therefore, would make this economic activity suitable for the semi-urban industrialization drive? Such possibilities indeed exist, but they require much more research and development time and cost than the design of a specific semi-urban technology for those industrial activities which on the basis of the present know-how are suitable to decentralized application.

New technologies in energy generation, in water generation and purification are for decentralized application. Similar possibilities exist in synthetic fibre production and other chemical-process industries. Most likely, research will show that, potentially, possibilities for a technology suitable for decentralization exist in most industrial activities. However, the distance between a potentiality and a reality can be so wide that it may be virtually impossible to bridge.

IV The Role of a Semi-Urban Textile Industry

In this section more in particular the subject of this paper relative to the textile industry is discussed.

1. Its Feasibility, Interrelation

In order to evaluate the economic, feasibility and usefullness of semi-urban textile industrialization in general terms, a few cases have to be distinguished:

1. the developing country does not have any textile industrial activity as yet,
2. the developing country has only rural, cottage textile activities,
3. the country has only modern centralized textile industry,
3. the country has modern and rural textile manufacturing,

As far as the first case goes, semi-urban textile manufacturing almost certainly is to be preferred over modern-sector textile or rural textile industrialization. Although a country without a textile industry of any kind does not have skill availabilities a more labour-intensive textile industry creates employment and brings in the need to develop skills which are, however, of a relatively simple type also. Such skills are easily to acquire and might be a worthwhile step into the formation of an industrially minded labour force. The systematic build up of industry indeed makes it logic to start with relatively simple, industrial processes, within this category again with a type of technology to which the labour force easily can be acquainted. In the textile needs of any country

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This section is mainly based on G.K. Boon; Technology Markets and Transfer Dynamics, the Case of Textiles, pending publication by Sythoff International Publishers, Alphen, The Netherlands and in Spanish by El Colegio de Mexico, Mexico,D.F.

there is a considerable amount of output to be produced within the capability of the more simple textile technology. To be sure this type of technology although relatively simple is seen as fully modern, for example, in case of weaving machinery it concerns fully-automatic shuttle looms, sturdy machines with little output versatility, without additional, optimal automatic devices and with a restricted choice in width of the reed.

In the textile industry in the final stage of spinning and in weaving the technology is not characterized by scale economies at least, not as far as the capital invested in the equipment is concerned. As discussed at length in the previous sections, this makes the technology suitable to decentralized application. Therefore it is possible to apply modern sturdy equipment in relatively small production units either as integrated entities , that is spinning and weaving together, or specialized by process. There are certain scale economies in overhead and in the textile finishing processes such as dyeing and printing. But in the latter processes also a choice in technology exist and in certain technological options scale economies are less pronounced. Nevertheless a certain concentration of textile industrial activities may be worthwhile although still the production can take place in a relatively large number of production units. Such a concentration can be helpful as vocational training centres may be centralized or because the raw material production is concentrated in a certain area. Also ideally decentralized relatively small-scale textile production would be helped by a centralized marketing organization for buying and selling the raw materials and final products. As small-scale industry implies restricted economic power of the producing units, the possibility of exploitation by more powerful sellers and buyers

is a real problem, which can be reduced by cooperative or unified bargaining with third parties.

In the particular case under discussion, the start up of textile industry in a country without any such activity, indeed some protective measures according to the infant industry argument are needed. Certain output types can without doubt be produced competitively in the country. In certain other outputs the country may have to rely on imports. For example, for yarn of the coarser types and for polyester staple or filaments as these raw materials use technologies of a more sophisticated nature, requiring more specialized know-how, more capital and which cannot or less easily be decentralized. Therefore these outputs should not be domestically produced in the beginning. For the reasons mentioned, in the case position under discussion, decentralized semi-urban textile industrialization is recommended over a centralized capital-intensive textile industry and over a cottage type of industry. In a situation of a new industrial development, the unique opportunity exists to make a well considered choice. One is not hampered by any given industrial investment in place. Given the fact that textile industry has the potential for economically, feasible decentralization it should be applied in the case discussed in this way. By doing this , important development objectives can be adhered to such as : increased employment, self-reliance in a basic need, reduced dualism in the economy, improved income distribution in a geographical sense, furtherance of the industrial technological capabity and reduced economic and technological foreign dependence.

Whether or not a country should start a textile industry if no industrial activity of this kind exist is a question of a different order. This question has to be

answered before one start to judge the type of textile industrial development wanted. Obviously a country always has the option to import its textile needs from abroad and this may be a perfectly, economical rational, decision because the country may be specializing on outputs where its comparative production advantage is stronger. Nevertheless few countries want to be completely dependent on imports in covering a basic need, which textile certainly is.

In the second case position, a country has only a cottage textile industry, the development of semi-urban textile industry is also to be preferred over a modern more capital-intensive textile industry. The reasons are basically the same as those provided in the previous case.

In the third case, the country has already a centralized urban textile industry, the justification of a semi-urban industry seems to be less strong. By means of certain incentives one may induce capacity expansion of the existing firms to take place in the semi-urban centres. To start the development of an independent semi-urban, textile industry which, in a market economy, has to compete with the existing modern centralized industry may or may not be feasible, depending on the particular market and other relevant conditions. In these countries where the market is not the principle resource allocation mechanism, more possibilities do exist, but in general terms the feasibility of such a semi-urban textile industrialization cannot be meaningfully discussed either.

In the fourth case, the country does have in existence a centralized modern textile industry and a cottage textile industry as well, an intermediate, semi-urban textile industrial development may be a possibility whether or not it is feasible depends also on the situation. Incentives may be given to the existing industry for re-allocation

to semi-urban areas or to establish their production-capacity expansion in those areas. The technology to be applied in these semi-urban factories can be influenced by direct or indirect measures to ensure a decision in line with the development objectives. Also cottage industrial textile activities can be stimulated and certainly the most enterprising cottage industrial enterpreneurs have a chance to move up into a semi-urban type of production.

Hence to answer the basic question whether or not there is a real need for semi-urban textile industrial activity and if such a development is feasible, depends very much on the local conditions in the country. Speaking in general terms the possibility exists, if there is a need and if it is feasible cannot meaningfully be discussed in general terms.

In case it is possible and feasible how should then the interrelation be seen of such a semi-urban textile industry with the already existing textile activities?

In the cases that no-textile industry exist, the problem of the interrelation does not arises. In case of the existance of only cottage industry the interrelation is believed to be of minor importance as both type of activities are producing different outputs for different markets. Nevertheless industrial yarns produced in the semi-urban centres might become also an input for the cottage textile weaving industry which may enlarge its output mix and may yield improved qualities.

In the third case distinguished, the country has already a centralized modern textile industry in operation, the interrelation with the semi-urban textile industry is believed to be strong because most probably the existing industry will be largely involved in the more decentralized

textile activities. Also in the fourth case a strong interrelation between the urban textile centres and the semi-urban centres is envisaged, while possibly also a certain linkage exist with the cottage textile industry.

The question which technology would be appropriate to use in the semi-urban textile industry and whether or not this technology is already available, the next section is devoted.

2. The Available Technology, Its Appropriateness

In order to answer the question just raised, briefly the desired technology for the semi-urban textile industry should be characterized in general terms. The technology should be easy to operate, to maintain and to repair. The skill requirements needed in these operations should be relatively common and easily to acquire. The requirement of the equipment is not to minimize operating, maintenance and repair time. Although modern equipment should be used it must be more labour-intensive in all these aspects mentioned, which reduces its capital intensity. Although the equipment would be of a somewhat intermediate quality, its technical lifetime still could be long, due to timely maintenance and repair services. The equipment should have a restricted output versatility, specialization in output would be per firm. Reducing the output versatility simplifies the machinery, therefore it can be cheaper produced. Automatic greasing and other automatic maintenance options should be eliminated. Although the equipment should have about the same level of mechanization and automation in its basic performance as the technology for the modern sector, all other automatic features should be eliminated. Optional choices, for example, of reed width should be strictly li-

mited. Even possibly more simplified versions of the technology in certain areas of the world would be more appropriate to apply in the semi-urban sector. The reason is that the degree of development among Third World countries differs significantly and certainly not just one type of production technique could be proclaimed as the most appropriate one, throughout this part of the world. In any case, as a very general indication, the textile equipment for the semi-urban sector should be more labour intensive, less demanding on specialized skills in operation, maintenance repair and management, less capital and technology - intensive and therefore would have a greater divisibility. These features make the equipment suitable for decentralized application in areas where no textile production tradition exists.

True this characterization of the equipment is very general indeed but it is not the objective of this paper to specify the technological requirement of semi-urban textile equipment in any detail. Essentially the fundamental problem in the question of semi-urban industrialization is not a technological one, it is much more a problem of national and international power relations. Some of these questions were touched in the previous sections. Either a suitable technology is already available or it should be designed and supplied. Indeed in case the conclusion is that it ought to be designed and supplied, the interest of this paper is much more in the mechanisms needed to come to design and supply, rather than the precise technological content of these designs. The latter question should be answered by specialized technologists.

By having an idea what in general terms , the equipment should be, the available textile technology in the world

should be reviewed in order to answer the question whether a semi-urban textile technology is already in existence or that it has to be designed, manufactured and supplied. If the latter happens to be the case, then the next question which should be discussed is how this can be organized.

Earlier in this paper the concept of geo-technology was discussed briefly.* From this discussion it is obvious that the manufacturing of a semi-urban textile technology is not a profitable proposition for the First World technology suppliers. Nevertheless in this area some relatively simple modern equipment is supplied, which is excellent for application in the modern textile sector of the Third World. Other supply sources are from the Second World, and further Japan, China, India and more recently Brazil. In these areas First World textile technology is produced under license, but also indigenously technology is manufactured. The technology produced under license from a First World firm in other parts of the world, usually concerns frozen technology. A frozen technology is a technology which is not any longer produced in the First World and therefore no R & D is conducted on it any longer. It concerns technology which in the First World has been replaced by a higher technology-content version. For this reason, this technology is closer to a semi-urban textile technology than most of the technology produced in the First World. This is reinforced by the fact that the quality of this technology is somewhat compromised and that, it is produced in lower labour cost areas. Although the price of this equipment is attractive it has some disadvantages, particularly the after-sale service is often deficient. The same problem refers to the indigenously produced equipment from this area with the possible exceptions for the Japanese and some Eastern European equipment.

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* See Gerard K. Boon: Technology Markets and Transfer Dynamics for a more substantial discussion of this subject.

Not only is there a problem with the after-sales service, the diffusion of this equipment is hampered by an inadequate marketing behaviour of the suppliers although potentially it is available, in fact in most Third World areas it is not represented and basically can not be acquired.

3. Semi-Urban Technology its Design

The conclusion must be that the First World is essentially not a supplier of this type of equipment, the more simple models usually become a frozen technology which is licensed to Second and Third World countries and the latter suppliers are not yet capable to have an efficient world-wide dealer and service network. Another important factor is that the reputation of the First World suppliers is so excellent, that usually demanders in the Third World are preferring their technology over the cheaper alternatives produced in the Second and Third World. This strong preference for First World technology is an explanation why the other suppliers have difficulties in building up their marketing organization. However, even if this Second and Third World produced technology was an effective alternative it is not yet fully certain that this technology then would be the type appropriate to use in the semi-urban sector. As to capital and labour intensity it is preferred over the expensive high-technology content equipment produced in the First World, nevertheless since it often concerns a frozen technology it embodies the technological know-how of say twenty to twenty five years ago. Older vintage technology is not necessarily the best technology for developing areas. Conceivably a technology fully up-to-date making use of the lastest know-how, but basically simple and labour-intensive and not complicated in its production could be designed which suits the semi-urban textile industrialization drive in developing countries much better. May be , may be not

but it certainly is worth a try. The question then is how should this try be organized?

No doubt the Third World has suffient talent and expertise in textile technology to formulate design principles and to work out a blue print of the various production techniques and to build the prototypes. In order to materialize such an idea one could organize public, multi-national, Third World research institutes. The R & D work on new technologies could be financed by a Third World Research and Development Bank, to which each country, according to a certain formula contributes . This bank could be advised by a Third World Appropriate Technology Advisory Council, which received the R & D proposals from the various R & D institutes which could be organized around principal technology areas ; textile, metal working, wood working and so on. Such a Third World authentic, international institutional framework is entirely lacking. Principal reasons for this cannot be anything else than lack of internal unity in the Third World and lack of moral and other support of the First World, which presumably, rather sees a divided, weak Third World than a strong, united one.

Another avenue to come to the design of a semi-urban technology exist. This road should not necessarily be seen as a substitute but preferably as complementary, while also both roads may unite to cover a part of the way. Some reputated First World technology designers, manufacturers and suppliers are,in principle,interested to design a semi-urban textile technology using their whole considerable reservoir of know-how and experience. They do not have a desire to manufacture this equipment but again are, in principle, willing to assist in the establishment of local manufacturing facilities which indeed could be geographically dispersed at several places in that large part of the

world.

Obviously these First World technology producers, which business is the design, manufacturing, and sale of technology have to be rewarded for this work on the basis of a normal, private, commercial practice. Their R & D work could be done on contract for a third party, but, although this is subject to negotiation, they preferably hold title to any patents which would result from this R & D work. Also in the establishment of manufacturing facilities in the Third World their services could take the form of a technical assistance contract on the basis of a lump sum or running fee. This possibility has some attractive aspects. Use is made of the best, most experienced, practical know-how which is available in the world. If the name of the well known, reputed First World technology producer is linked to a certain machine design it will be of great help to sell this technology in the Third World market economies as well as to export this equipment to the dual First World economy on the basis of the idea mentioned earlier in the paper.

One does not need much imagination to see how these two roads to come to a specific semi-urban technology can be combined and therefore this possibility is not worked out here further.

4. New Technology Production, Supply, Application

Briefly here some relevant points on the manufacturing, supply and application of the new technology for the semi-urban sector are summarized and reviewed.

On the basis of the geo-technology concept the newly

to be designed or the existing adapted technology ought to be produced in the Third World. There are economies of scale in the production of machinery therefore some decentralization in the production is possible but certainly it is impossible for every Third World country to have its own textile technology production. In the design and manufacturing of the new technology it would be wise to use the know-how of a reputed First World technology supplier.

The semi-urban textile technology should be commercially supplied by the Third World manufacturers to the neighboring Third World countries and on the basis of a common export promotion plan be marketed in the First World. As explained earlier in this paper on the basis of the geo-technology concept and the international division of labour in technology production it is hoped that in the future a technology international trade may develop which changes the technology dependency of the Third World vis-a-vis the First World into an interdependent relationship more or less equilibrated and based on mutual advantage.

The materialization of a second-tier industrialization for textile manufacturing in the First World, in a kind of dualistic sub-urban way, may at first sight seem to be not feasible at all. This paper is written about the feasibility of semi-urban textile industrialization in the Third World and not about such a development in the First World. However, since these industrial developments are in the case of international tradable products such as textiles, highly interlinked, some attention is paid to it. Presently there is an enourmous trade in textile goods, particularly from the Third and Second World to the First World, while technology flows almost exclusively from the First World to the Third World. As the urban, modern textile industry in the

First World has a difficult time to compete with Third World textile imports, it is hard to see how a semi-urban technology imported from the Third World to apply in the sub-industrial sector in the First World could compete. Seemingly it is out of the question, that wages in the sub-industrial sector would drastically be reduced. Indeed, only by means of protecting measures or transfer subsidies on labour costs, from the surplusses generated by the ultra-modern industrial sector or by a combination of both those possibilities, such a sub-industrial textile activity seems possible in the First World.

Still, other possibilities are conceivable, although at present non-existing, and also not possible under present conditions. One can imagine a situation that male and female workers are willing to work a part of the day for a lower salary than is customarily and also are willing to forego the social security benefits*. This could reduce the labour costs by 60 to 70 percent. As was mentioned earlier in relation to the conditions to come to implementation and application of a semi-urban industrial technology in the Third World, namely that social security and labour legislation could not apply or at least should have to be differentiated, is a valid condition for the two-tier industrial development of the First World also.

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* Unemployed and underemployed male and female workers may be allowed to top their unemployment doll, for example, if they except a lower wage rate. As the work is of a principally different order, than normal industrial work, the remuneration may differ also.

Although in this way indeed employment in the First World may increase, Third World textile exports may suffer and unemployment may increase. This possible increase in Third World textile unemployment may not sufficiently be compensated by increased employment in the Third World textile machinery building industry. Besides, the Third World is very large and increases and decreases in employment in different sectors may happen in quite distinct places. Nevertheless, it is not yet fully certain that a development as discussed may lead to a substantial decline in textile imports of the Third World into the First World. Certainly, some shifts in output mixes will happen and possibly textile would be less feasible for First World sub-industrial production than some other outputs which, although labour-intensive, are less subject to international trade, due to their bulkiness, for example.

The application of the technology for the semi-urban sector is envisaged by means of the market mechanism to which some particular incentives could be added. In order to design operational incentives it is essential to be informed about the decision making process in the textile demanding firms. In this process two decisions stand out one concerns the technology, the other the supplier of the technology. Sometimes both these decisions are very narrowly interwoven. In the decision on the technology a sequence of steps or phases can be distinguished as follows: the orientation, the preliminary technological, economic and financial evaluation of the various alternative technological options, the decision on the technology and the acquisition of the technology. On the basis of a comparative survey a supplier is chosen and the technology is acquired, transferred and finally

assimilated. With the transfer of the technology is ment the nature of the transaction as to the complementary conditions which accompany the purchase of the physical equipment such as to installation, running in of the technology, training of the operators and the supervisors, the after-sales service as to maintenance and repair subscriptions and the delivery of spare parts. With the assimilation of the technology is meant the degree and the duration of the technical assistance of the supplier, needed by the buyer of the technology. The more limited the technical assistance needs and the shorter its duration, the greater and the faster the assimilation process of the purchasing firm proceeds.

In this process a number of parameters play a key role in the decision on the technology and the supplier, by knowing these parameters one may judge how these key decision parameters may be influenced by direct or indirect policy measures of the public authorities, to enhance the choice of the semi-urban textile technology, which of course ought to be available by then. Recent research in this subject matter has shown that in the choice of textile technology principally three categories of demanders should be distinguished: financial strong, financial weak and an intermediate category of demanders.* One may savely assume that technology demanders in the semi-urban textile industrialization scheme belong to the financial weaker demanders, unless the modern-urban textile firms are involved in the semi-urban textile industrial expansion. Parameters and factors considered in the choice of textile technology are:

- the price of the machinery
- its technological capability
- its production effciency
- its quality

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* See Gerard K. Boon Technology Markets and the Transfer Dynamics, op. cit.

-the credit facilities
-the after-sale service
-the reliability of the supplier

The first three factors relate to the choice of technique. The price of the machinery is particularly for the financial weaker firms of outstanding importance. For the financial stronger firms the technological capability and the production efficiency are factors which carry more weight. At the level of the micro technology decision makers the labour costs and the capital costs are often not explicitly mentioned and the enterpreneur implicitly considers these factors in the price of the machinery and its production efficiency.

The last four factors relate particularly to the choice of supplier. Again for the financial weaker firms the credit facilities are dominating factors, which may outweigh any other consideration for the financially stronger firms, the other three remaining factors are of outstanding importance.

From this evidence follows that in order to induce a choice of technique at the micro level and to promote a particular choice of equipment by semi-urban enterpreneurs it has to be more attractively priced than alternative possibilities and should carry better credit facilities. Presuming a reasonable quality of this semi-urban equipment, if its price and the payment facilities are better than any other alternative, its choice is assertained and its application will be almost universal.

V. Summarizing and Concluding Remarks, Recommendations

In this paper a number of issues have been reviewed. It has been argued that the economic socio-political dualism of developing countries is too extreme, therefore potentially explosive, and, particularly from a humanitarian point of view, should be reduced. Technology is seen as a major instument to achieve this aim. Should this technology be effective in achieving its objective, it has to be designed in such a way that the basic conditions where it is going to be applied, are considered, while the effects of its application should contribute to the satisfaction of the basic needs of the population. One of the most essential basic needs is employment.

It has been argued that, according to the neo-classical theory of international trade, trade in the factors of production is an alternative to the trade in final goods. Further, that technology should be seen as a production factor and that as to technology content it reflects, the relative factor endowment of the area where it is designed, manufactured and applied. Therefore, it is useful to introduce the concept of geo-technology. The geo-technology of the First World is the capital-intensive and/or high-technology content equipment. The comparative advantage which the First World has in the production of this type of technology is such that preferably it should be the world supplier of it. This implies that the modern, urban industrial sector in developing countries will remain dependent on the First World for this type of technology. However, the technology for the semi-urban sector and, in general, the more simple, low-technology content equipment is not the geo-technology of the First World anymore. Essentially, this is the geo-technology of the Third World, which would better take

steps to secure its production as otherwise a part of this type of technology may get lost and is faded out of production by the original producers.

Is the dualism of developing countries a major obstacle for a balanced development, there might be a need for the First World to create by purpose a certain dualism in its development pattern. The need comes from the economic-social objectives of most First World societies for full employment. Full employment may result from a certain economic growth pattern. However, this growth is not always reached and a growth sub-optimal to the one, which secures full employment may become a structural phenomenon. This particularly may be so if certain side-effects of a high growth rate are felt to be undesirable by the populace. In case such a critical growth rate, defined as the growth rate which secures full employment, is not reached, a significant part of the working population may have to be absorbed by a more labour-intensive production activity using a technology very similar or identical to the semi-urban geo-technology of the Third World. Technological dependence of the Third World could be replaced by an interdependent relation if the geo-technology of the First World is traded for the geo-technology of the Third World. This would result in technological harmony at the world level instead of alternative confronting positions on the technology issue such as a technology split. In the latter concept, both parts of the world would become **autarkic** and therefore independent of each other as far as technology is concerned.

In the third section of the paper, a technology and sectoral, quantitative assessment procedure are described and also a qualitative evaluation procedure is shortly hinted at. More importantly even are the thorough under-

standing of the socio-economic and political conditions in the area where the technology has to be implemented. Certain conditions are mentioned which have to be fulfilled will such an implementation at all be possible. Application of a **semi-urban** technology is needed to avoid that this area and the rural areas become permanently a satellite economy, exploited and sucked out by the modern sector of the country. Before ordering and summarizing these conditions it should be mentioned that technology is classified on the basis of three criteria:

(1) accessability of the technology: monopolized or freely available;
(2) technology content: sophisticated or simple;
(3) applicability as to type of production process: continuous or flow - discontinuous or discrete.

Economic sector classifications introduced are:

- capacity-choice and technology-choice sectors. This classification uses a technological-economic criterion.
- the degree of linkage with other sectors.
- the height of their indirect effects of a sector.

The first criterion is somewhat more qualitative, the other two criteria are quantitative. In capacity-choice sectors economies of scale are strong, the nature of the production process is continuous or flow, usually the technology tends to be more monopolized, more capital-intensive and/or more sophisticated. In the technology-choice sectors the nature of the production process is discontinuous or discrete, the technology is freely available and usually two versions are around: basically sophisticated, basically simple.

It is argued that essentially the probem in the two-tier industrial development plan is the implementation and application of a technology conducive to the realization of such a development. Further, one needs to know the

characteristics of this type of technology and whether or not it is available.

The factors and conditions which should favour the implementation of the semi-urban technology can be ordered in various categories. Major categories are: socio-economic, socio-legal and socio-political ones. The term socio-economic factor does not mean to imply that private economic considerations are not considered. To the contrary, in this paper the market is throughout considered, in first instance as the major resource allocation mechanism. The cost of labour has to be lower in the semi-urban secor, in order to induce the use of more labour-intensive equipment. Capital ought to be equally or more expensive than in the urban sector, but at the right price amply available. Socio-legal conditions concern the social-security system and the labour legislation about the minimum wage, dismissal clauses and so on. Essentially, the conditions in the underdeveloped areas in developing countries are usually such that social security and labour law legislation is a luxury which that area cannot afford. The relative abundance of unskilled labour for industry is such that any factor or legislation which increases its costs or its fixity to the entrepreneur harms the employment objective.

Socio-political factors concern the implied control by economic and political power groups at the urban-national as well as the international level on certain types of technology. As a general rule one may state that sophisticated, capital-intensive technology is a First World, modern-sector technology which implies directly or indirectly economic and political control of important power groups. For this reason this technology is unappropriate for use in the semi-urban sector which needs a tech-

nology less or not controlled at all by economic-political power groups with an interest alien to that of a more balanced, less dualistic development pattern. This point does not only effect the technology, but through the technology also the economic activity sector or branch where it is applied. Therefore, certain economic activities are more suitable to semi-urban industrialization than others. All those concern technology-choice sectors for which basically simple, technological options exist. Examples are apparel, footwear, weaving, spinning, wood and metal working, jewelry, handicraft, toys and several others.

Essential is that in those industrial activities which are suitable to decentralized application, national and international economic and political powers if directly or indirectly detrimental to the semi-urban industrial development concept are minimized. For this reason as far as international, economic power is concerned, infiltration of transnational and international companies either through the technology or the final output should be carefully planned and checked. Such an infiltration at the wrong moment may kill the semi-urban industrialization drive before it can prove its feasibility and viability.

The question whether or not the technology appropriate to semi-urban industrialization is available is difficult to answer in a general way. In some activities, it is available, in others it would be worth while to try to design a more simple class of machinery, particularly suitable for decentralized semi-urban industrial application. For some of those industrial activities for which at present only First World technology for centralized application is available, different technological alternatives are known to be possible, although those

are not manufactured and supplied.

These potential technologies are much less characterized by scale economies and therefore would be ideal for decentralized, semi-urban application. Presumably, alternative technologies for most types of First World techniques, presently centrally applied in the modern sector, are feasible, but for some of these the R. and D. cost required to make these technologies to operational production methods would be excessively high.

Generally speaking, a semi-urban textile industrialization in developing countries seems to be useful and feasible. In the fourth section of the paper briefly the availability of this type of equipment is reviewed. Certainly in the Second and Third World, technologies for the textile production cycle are produced. Some of these are manufactured under a First World supplier's license and some are not. Some of these production techniques are appropriate to semi-urban textile industrialization, however, under present conditions their factual availability in the Third World is strictly limited. The reasons are deficiencies in the marketing, distribution and after-sales service of the suppliers. It might be worth while to research the possibility of a specifically designed Third World, semi-urban textile technology applying the latest know-how in this field, to come up with a simple, but fully modern textile technology. The Third World itself could by a common effort come to these designs. Also, the considerable know-how concentrated in the First World textile technology manufactureres could, and according to this author, should be used by sub-contracting certain R. and D. assignments to them or by alternative arrangements.

It is argued that on the basis of the geo-technology concept the production of this semi-urban textile technology preferably should take place in the Third World itself. Indeed, the production of this type of technology is more within the comparative production realm of the Third World than its design, which may require specialized know-hows, scarce in the Third World. But also in the production and marketing of this technology, advice from experts in this field may be worth while, even indispensable in certain cases. In principle, in the acquisition of this specialized know-how, one has a choice between independent experts, consulting agencies and First World supplying firms. In any case it would seem worth while to look carefully into the alternative supply sources of know-how and then it may be established that the transfer of such know-hows is less monopolistic than at first sight believed. Indeed, various supply sources may be available which essentially implies the possibility for better transfer terms.

A Third World institutional frameword is needed to materialize a two-tier industrialization scheme. Such a framework at present is entirely lacking. The design of a semi-urban technology needs a common Third World research effort. Research is very expensive and if one wants to get momentum in the results on various technology areas vast sums of money are involved. Thereto one of the policy recommendations is the creation of a Third World Research and Development Bank whose primary aim is to finance Third World relevant R. and D. work. Legally, such a Bank should be independent of the existing international institutional framework. More in general, a Third World international institutional framework is needed, independent of any other existing global framework. The Third World institutional set-up obviously can collaborate with

any other existing international framework according to convenience. It is extemely important for the Third World to learn to work together, to try to formulate a common standpoint to reach a consensus on major issues. Therefore the Third World R. and D. Bank is only one element of a much wider framework. Relative to the technology issue it would be valuable to create an Appropriate Technology Unit for the Third World which could evaluate the available technology on its Third World usefulness. The DOS method shortly described in the text could be helpful to this end. Systematically assessing the available technology would also supply insight in the need and the characteristics of a semi-urban technology. This unit could make suggestions and proposals on R. and D. technological matters and help in assessing R. and D. proposals on technology design by national and international technology research institutes. It could also have a coordinating task in this research work, to avoid costly duplications in this work.

Generally speaking, close collaboration in substantial matter concerning R. and D. work on industrial technology with UNIDO would be very helpful, but the nature and the extent of such a collaboration cannot be detailed here.

The Third World Technology Unit should also handle the negotiation with the First World technology suppliers. As mentioned, the First and some Second World technology suppliers are an unique source of know-how which could be used to materialize the objective of a semi-urban industrial technology. Clearly, the negotiating strength in technology and in any matter as such of the Third World is greatly increased if it is bundled. From such a bundled negotiating effort, better terms for the Third World will follow. In textile technology, as in all free-

ly available technology, the transfer may concern embodied and disembodied technology. The embodied technology concerns the machinery to producte final textile outputs, the disembodied technology concerns know-how for operation, maintenance and repair of the machinery, but also for building the machinery. The market position in the latter know-how is much better for the suppliers. Assuming it concerns a desirable technology, the transfer of the know-how to build this technology can, and then often even only reluctantly, only be sold to one or two demanding parties in the Third and Second World together. The transfer takes place by means of a license, which is a purely legal contract, with a flexible content. Negotiating such license agreements on technology by an agent acting on the behalf of the entire Third World greatly improves the possibility for a favourable terms for the Third World of such an agreement. The agent acting for the Third World can then, according to some decision procedure, coordinate the manufacturing of this technology at various places in the Third World. Although the First World suppliers will resent somewhat their loss in power by negotiating with a strong, central agent instead of a weak individual demander, they will like the higher sales volume to which their royalty is related.*

Also in the possible negotiations on the design of not yet existing technology, a central agent acting for the Third World is in a much better position to come to favourable terms for such an agreement with individual technology suppliers. Again as in the previous case an advantage to the First World suppliers is that the size of the contract will be much larger.

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* See for all this in much more detail: Gerard K. Boon, Technology Markets and Transfer Dynamics, op. cit.

The previous recommendations concerned the set-up of a Third World institutional framework at the international level. In relation to the technology issue it has to take care of the R. and D., the design, and the manufacturing of a semi-urban textile technology. Other policy recommendations should concern the other vital questions even more crucial, namely the implementation of this technology.

Before the technology gets implemented, it has to be acquired. In the context of a market mechanism, something, including technology, gets bought if it is attractive. At the semi-urban level, the attractiveness to acquire a certain technology can be accomplished by supplying it at favourable terms, particularly as to its price and to the credit facilities for its purchase. Although these facilities are helpful to come to acquisition, a more fundamental requirement in a market regulated sub-economy concerns the economic feasibility of the technology. The semi-urban technology will be more simple, more labour-intensive and therefore to make its application economically feasible, the labour costs in the areas where it is intended to be used have to be lower than in the modern sector where First World technology is applied.

The labour cost is composed of two elements, wage costs and social security and other related implied costs. Probably the best policy solution would be to have no minimum wage, social security and labour law regulations at all. This would set the cost of labour completely to forces of supply and demand, although due to labour's weak position, it will be exploited. Such a policy is needed to make a semi-urban industrialization feasible under a market mechanism, unless one wants to subsidize

the cost of labour to the entrepreneur. In this case, indeed, labour may receive a higher wage than the market wage*.

Two points, however, have to be considered, the subsidy mechanism is complicated and difficult to materialize and secondly, it is costly. Besides, a new dualism is created now outside the modern sector. Although even in the case of an absence of any legislation on labour and its social security, some dualism by a semi-urban industrialization is created between those employed in it and those not, this difference will be more pronounced if these workers receive a wage substantially higher than the market rate.

However, the market wage is above the so-called theoretical accounting price of labour in the semi-urban areas. The accounting price is the theoretical price of labour which equilibrates demand and supply presuming complete market insight and mobility in that area.

The possible funds which could have been used for these wage subsidies better can be used for building up the needed infrastructure in the semi-urban sector and for educational purposes in this area.

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* The market wages in the semi-urban areas will be below the minimum wage of the modern sector and even below the minimum wage in the semi-urban areas if that one is fixed.

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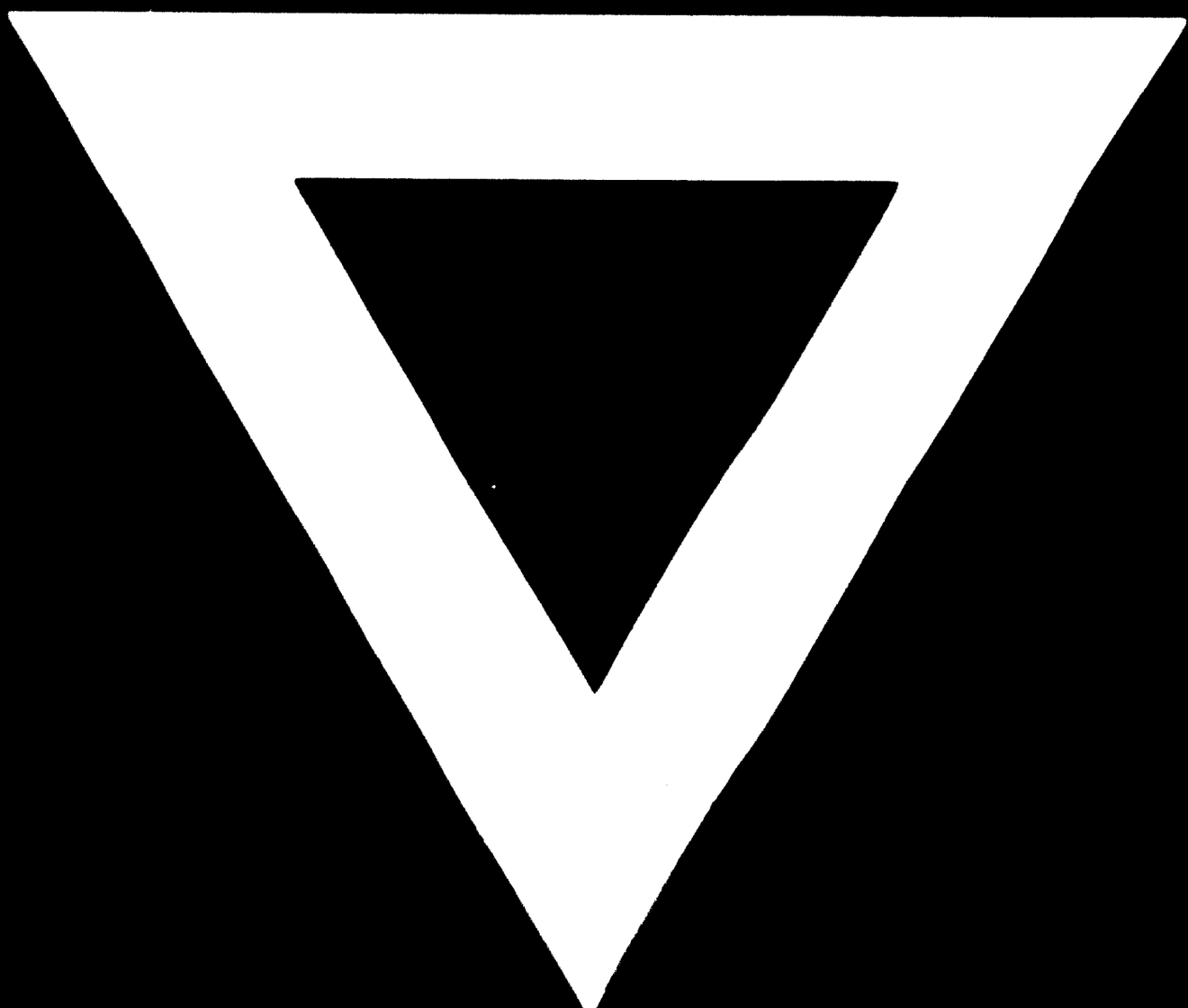

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