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Industrial Processing of Natural Resources

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...and not necessarily those of the World Bank.
INDUSTRIAL PROCESSING OF NATURAL RESOURCES

David Wall

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Synopsis

In the various fora in which discussions on the New International Economic Order have been taking place, attention has been drawn to the fact that most developing countries export the bulk of their primary products in unprocessed or semi-processed form. As such exports undergo further value-added processing abroad it has been suggested that developing countries could augment, or initiate, their industrial development effort by moving into downstream processing activities. This paper argues that the notion of processing activities is loose and undefined and, indeed, cannot be unambiguously defined in terms of statistical classification systems or in terms of common economic characteristics. This makes it impossible to provide quantitative estimates of the potential gains from moving into downstream processing activities. It also is not possible to generalize meaningfully about the factors which have determined the existing locational structure of industrial processing activities, or about the likely consequences of removing policy distortions and market imperfections presently considered to be preventing the transfer of such activities to developing countries.

The paper argues that only an activity by activity, country-by-country, case study approach can identify possibilities for successfully establishing processing activities in any given country on an internationally competitive basis. It is suggested that orthodox theory is an inadequate basis for carrying out such studies. The concepts of competitive advantage and input dominance are introduced as being likely to be more analytically fruitful devices in a world of many countries, many inputs, and many commodities. Finally, it is pointed out that even if economic evaluations indicate the existence of competitive advantage on a positive rate of return basis for an industrial processing project, it might not be invested in by private firms. The commercial evaluation of the risks associated with the project may lead such firms to consider all politically acceptable rates of return offered by the project as unattractive. In such cases only state initiative and state ownership can lead to the establishment of the processing industry.

1/ This paper was prepared by David Wall, Reader in Economics at the University of Sussex, with the collaboration and editorial assistance of his wife, Nancy Wall. The author wishes to acknowledge many useful comments made on an earlier version of the paper by members of seminars held at the World Bank and International Economics Study Group, and also the critical comments made at an earlier stage by John Black, John Cody, Robert Eastwood, Isaiah Frank and Paul Streeten.
A. INTRODUCTION

1. The notion that there is some scope for developing countries to extend their industrial bases by moving into downstream processing of their exports of primary products has been around for a long time. In the last few years it has been raised to the status of a strategy, embodied and advocated in such global resolutions as the UN General Assembly's Program of Action on the Establishment of a New International Economic Order, 1/ the Lima Declaration of UNIDO's Second General Conference, 2/ and the International Development Strategy of UNCTAD. 3/ The establishment of industrial processing of natural resources as a strategy in itself arises from two frustrations. First, developing countries have become frustrated with the failure of the various North/South dialogues to generate any significant agreement or progress on measures to augment their earnings from exports of primary commodities. Second, frustration arises from developing countries' awareness that while many of them encounter considerable difficulties in identifying and establishing competitive manufacturing industries, they help maintain such industries in the developed countries with their exports of unprocessed, or semi-processed, raw materials.

2. A strategy of export-oriented processing of natural resources has found some support in the international community since it appears to match up the industrialized countries search for "secure" sources of raw materials with a moral sense that source countries have a "right" to process their resources. As a result, the study of the issues involved has been incorporated into the work programs of such institutions as UNIDO, UNCTAD, ILO, FAO, the Commonwealth Secretariat, the World Bank, the ACP Group of States, OECD, and the UNCTC.

3. The literature which these work programs have generated has for the most part followed what might be called the barriers (or obstacles) approach to the issue. This approach seeks to identify those policy distortions and market imperfections which have led to a lesser development of processing industries in the Third World than would, prima facie, have resulted from the unimpeded operation of competitive market forces. It is attractive because it carries the implicit policy prescription that in order to increase the extent of processing of natural resources carried out at their source in the Third World, barriers in the industrialized countries should be removed. After discussing the nature of, and statistical issues associated with, the concept of "industrial processing", this paper evaluates the barriers approach and examines the theoretical issues associated with "industrial processing" as a basis for an export-oriented industrialization strategy.

1/ U.N. General Assembly, Resolution 3202 (S-VI), Section 1(1), paragraph (3).


3/ UNCTAD, Trade and Development Board, Resolution 124 (xIU).
B. THE CONCEPTS OF PROCESSING AND PROCESSING CHAINS

4. On a common sense level commodities are regarded as undergoing a series of transformations between their primary production and final consumption. "Processing" is seen as the stage between primary production and fabrication (manufacturing) of the commodity into a product for final consumption. On this common sense level the only characteristic which can be attributable to processing is a time dimension — one stage in a sequence of events. Most of the literature introduces the concept of processing in this way. Unfortunately there is a tendency to then go on to discuss processing in general as if there were other characteristics which are common to the stage across a wide, if not the whole, spectrum of processing chains. In fact, this stage, seen solely in its time dimension, has no other characteristics common to all or even most processing chains so that on a commodity-wide basis it is not possible to discuss the economics of processing meaningfully.

5. In other words, activities at the processing stage cannot be characterized, or defined, in such terms as factor intensity, transport cost requirements or energy requirements, so that all other activities at all other stages would be excluded. This has important implications for both analysis and policy, as will be seen in later sections.

6. Even if it is accepted that the processing stage can only be defined in common sense terms as that stage in a chain falling between primary production and manufacturing, or fabrication, the problems still remain of distinguishing that stage conceptually in specific chains and in terms of the standard statistical classification systems.

7. On the conceptual level in some cases it may be possible to distinguish the processing stage in a way which conforms broadly with common sense notions, but close examination of such cases reveals that the non-existence of a scientifically valid criterion for determining the point in a processing chain at which processing ends and manufacturing begins necessitates the introduction of arbitrary rules of thumb. For example, in a standard work on mineral processing 1/ all processing stages up to and including the production of refined metal ingots are regarded as belonging to the processing stage in the cases of bauxite, copper, lead, nickel, tin and zinc, while in the cases of iron ore, manganese and phosphate rock, the processing stage is considered to end with the production of pelletized or sintered iron ore, ferromanganese, and superphosphate fertilizer.

8. The conceptual problems associated with the definition of processing activities are reflected in the problems faced in empirical research based on standard international production and trade data. The classification systems

1/ Rex Bosson and Bension Varon, The Mining Industry and the Developing Countries, Oxford University Press, 1977, p. 87.
themselves have arbitrary elements which create problems in quantifying the structure of production and trade according to stages of processing. The following list exemplifies some of the more common problems:

(i) Some processes result in data on a product being moved to another classification, while some do not, and the distinction appears to be purely arbitrary. Running logs over a fixed circular saw results in data for the output having a classification of its own, while freezing fish -- a technically more sophisticated, more skill-intensive and relatively more capital intensive process -- does not. Both processes transform the nature of the input by adding characteristics which make it more valuable.

(ii) Some processing chains are simply not identifiable in the standard data, as the output at each stage is aggregated with data from several processing chains. For example, none of the forms of furfural or pyrethrum, from their raw material sources to end-products, exist in the data as separately identifiable classifications.

(iii) Some processing chains "explode" in the data, in that the output of one or more stages is used in several activities, so that the separate identity of the processing chain is lost in some of the statistical classifications. For example, the mica processing chain starts out in trade data as SITC 1/276.5(2) Mica (including splittings and marble), a classification which aggregates primary production with the first stage of processing; various mica using activities are then aggregated into SITC 663.4 Worked mica (including agglomerated mica splittings) and articles thereof, a classification which aggregates processing and manufacturing activities; but some of the output at the SITC 276.5(2) stage has escaped into SITC 641.2(2), 641.9(5) and various subheadings of SITC 665 where articles embodying mica are not separately identified. Another form of the "explosion" problem occurs when one raw material is decomposed to generate different processing chains — timber and petroleum are obvious examples — with different statistical classifications. This problem becomes particularly acute when not all of the elements of the decomposition are traded, and there is no clearcut correspondence for the items in the trade and production data.

(iv) Another serious data problem arises when processing chains "implode" in the sense that at a given stage chains merge to produce a "mixed" product; shoes, tinplate, various chemical compounds (e.g. paint) and vegetable oil products are obvious examples.

1/ Standard International Trade Classification, Revision 1.
This is not an exhaustive list of the data problems but it is sufficient to illustrate the difficulties of using the standard classification systems in empirical work on processing chains.

9. In sum, processing activities as understood in arbitrary common sense terms have no economic characteristics which distinguish them from any other industrial activities in a processing chain. They simply occur at an arbitrarily specified point in a time sequence of processes between primary production and final consumption. If such definitions are used as a basis for research, it is unlikely that quantitative specification of the processing chain will be possible. Standard data classifications do not correspond to such breakdowns. General statements about processing activities (such as indications of potential gains to developing countries moving into downstream processing activities) based on such data will be arbitrary, imprecise, and, having no economic content, misleading as a basis for policy discussion. Meaningful research has to be carried out on the basis of specific processing chains for which the nature of the arbitrariness can be fully specified.

C. POLICY ISSUES

10. Whether or not the concept of industrial processing of natural resources can be given a clearcut definition in terms of either economic characteristics or statistical classification systems is operationally irrelevant with respect to the policy issues involved. While there may be political significance in focussing attention on a subset of general industrial development policy issues, the operational questions remain those associated with the more general issues. The methodological approach to the question "which industrial activities involving the processing of domestic natural resources for export can a country establish on a competitive basis?" is the same as that used when addressing the more general question "in which industrial activities does a country have comparative advantage?"

11. Whether or not developing countries will receive more support for their industrial development plans by stressing a perceived moral right to process their natural resources for export is an important but moot point. The adoption of such a strategy would affect only the structure and timing of industrial investment proposals; the methods for evaluating the economic feasibility and the commercial viability of such proposals would not change. As industrial activities at the processing stage are a subset of all industrial activities, the identification and analysis of policy issues related to industrialization per se remains relevant. For example, the barriers to the expansion of developing countries exports of processed natural resources identified in much of the literature on industrial processing are relevant to all industrial exports from developing countries. Similarly the criteria for (and problems associated with) identifying a country's comparative advantage in processing its natural resources are the same used for evaluating any proposed industrial activity in that country. These two topics are the subject matter of the next two sections.
12. The consideration of industrial activities at the processing stage as a separate category of industrial development possibilities does not, then, raise any new policy issues. Nonetheless to the extent that the issue has been raised on the political level and that there may be some positive response to the strategy, there is merit in examining the policy issues from such a viewpoint.

D. THE BARRIERS APPROACH

13. That most developing countries' primary exports undergo further processing in the importing countries is generally accepted to be a fact. Most of the literature addressed to the issues involved presents (arbitrarily classified) data to illustrate this. The literature on processing then sets out to explain this export structure. The explanations suggested usually involve the identification of barriers to the growth of processed exports. The barriers referred to can be classified as artificial and natural. The artificial barriers most frequently referred to are: (a) trade distorting policies introduced by the developed countries; (b) restrictive business practices introduced by private firms which have some monopoly or monopsony power; and (c) production distorting policies introduced by the developing countries. Natural barriers are those underlying economic characteristics of countries which determine that they do not have a comparative advantage in given processed products. Natural barriers are the subject of the next section; this section discusses artificial barriers.

14. Trade barriers. Non-tariff barriers no doubt have a significant restrictive effect on specific imports from specific developing countries into specific developed countries, but there is no evidence to prove that by the 1970s tariff and non-tariff barriers of the industrialized countries had a substantial effect on overall imports from developing countries or on the composition of those imports. The various GATT tariff reducing rounds, the Generalized System of Preferences and the Lome Convention have reduced tariff barriers on imports into developed from developing countries to insignificant levels and coverage. Even where they remain in operation, with an escalation of nominal tariffs according to stage of processing, such nominal escalation is theoretically neither a necessary nor a sufficient condition to produce escalating effective protection.
Since the appearance of the concept of effective protection it has been commonly assumed in academic texts, research reports, and official documents, that escalating nominal tariff structures result in escalating effective protection. The general use of this assumption arises out of the tendency to apply the concept to collapsed forms of simple processing chains in which the only inputs at each stage are the output of the preceding stage and primary factors. Problems which effective protection theory has in coping with varying degrees of value-added at different stages and the existence of non-traded goods, input substitution possibilities, and forms of distortion and imperfection other than tariffs also are assumed away. Seminal contributions to effective protection theory show quite clearly that except in the very special simple case, escalating nominal tariffs are neither a sufficient nor a necessary condition for ensuring escalating effective tariffs. The simple case in which correlative symmetry is found is dismissed by Johnson with the words that, "The assumption that the productive system can be arranged in a chain such that each process uses only original factors and the output of the preceding chain is clearly unrealistic." The solution for the general case in which higher stage outputs are inputs into lower stage processes establishes the conclusion that in order to achieve any given structure of effective rates of protection "the required (nominal) rates will depend on the specific values of the input coefficients."

1/ For example, G.K. Helleiner and D. Welwood in "Raw Material Processing in Developing Countries and Reductions in the Canadian Tariff," Discussion Paper No. 111 of the Economics Council of Canada, April 1978, orientate their whole argument to the pivotal role of tariffs on the grounds that "The effect of... progressivity in nominal tariff rates, together with a low degree of value-added in many raw-material processing activities, is to generate high levels of effective protection for developed country processors; and these rates of effective protection themselves rise with the level of processing." (p. 29) An official UNCTAD document (TO/B/C.1/197, Geneva, 25 October 1975, Annex Page 3) makes a similar point when arguing that "As a result of tariff escalation, the rate of effective protection to domestic industries is, in general, several times the nominal rate." (Italics added).


4/ Ibid., p. 320. Johnson is referring to the structure of nominal rates required to achieve uniform effective rates, but the same model establishes the conclusion given in the text. Corden, op cit., p. 60 "escalation of nominal rates may not mean escalation of effective rates".
16. Even in simple processing chains any tendency of escalating nominal tariffs to generate an escalating effective tariff structure can be outweighed by a technologically determined production structure in which value-added increases from one stage to the next, either for all stages or for some subset of the chain. In such cases it is possible for the rate of effective protection to decline for one or more processing stages compared to earlier stages. In chains in which secondary inputs (from later stages in the processing chain or non-traded goods or exportables) are used, in different ratios at different stages in the chain, the effective protection provided by any given nominal tariff structure will be "shared" between the value-added by the primary factors and the secondary inputs, and the effective protection for the activity in question reduced. It will be further reduced by any tariffs or distortions or imperfections which artificially raise the prices of the secondary inputs above free trade levels. There will always be some combination of value-added ratios, and artificially priced secondary input shares which would be consistent with any given effective protection structure — including some which decline with stage of processing, sometimes to the point where some higher stages may receive negative effective protection. 1/ 

17. Whether or not the actual effective protection afforded by developed countries' tariff structures to their industries increases with stage of processing and is therefore biased against imports of processed and manufactured goods from developing countries is, then, an empirical issue. The difficulties of carrying out calculation of the effective protection afforded by real world tariff structures on a processing chain basis are overwhelming; only two such studies have been located by the present author. 2/ One of these, a study by UNCTAD, has a very restrictive coverage but it does indicate that there are some processing chains in which effective protection declines. For example, it gives the following effective protection levels in the EEC at different stages of selected processing chains: jute fabrics 57.8%, jute

1/ For a thorough taxonomy of the consequences of complex processing chains, non-traded inputs, and artificially priced tradeable secondary inputs for the theory of effective protection, see Corden, op.cit., Chapters 3, 5 and 8.

2/ The two studies are: An Integrated Programme for Commodities: Measures to Expand Processing of Primary Commodities in Developing Countries, a report by the UNCTAD Secretariat, TD/B/C.1/197, Geneva, 23 October 1975, Annex Tables 1 and 2; and A. Yeats, "Trade Barriers Facing Developing Countries," Mimeo., Institute for International Economic Studies, Stockholm, March 1978, Tables 4-7. Yeats points out one of the situations in which escalating nominal tariffs will not lead to escalating effective rates — i.e. that in which weighted average nominal tariffs on inputs are increasing faster than tariffs on outputs — but does not indicate how far he understands that this would explain his conclusion that "no overall evidence of effective rate escalation clearly emerges." (p. 138)
sacks and bags 9.8%; leather 21.4%, footwear 12.8%; cotton yarn and thread 22.8%, cotton fabrics 29.7% and cotton clothing 17.6%; flour and cereal preparations 48.9%, bakery products 0.9%; and pig iron 6.0%, steel ingots 51%, and metal manufactures 13%. A study, by A. Yeats, has a wider coverage (although some coverage is based on an earlier paper by B. Balassa) including 40 stages in 12 processing chains with more than two stages for the USA, EEC, Sweden and Japan. In the 28 comparisons of effective protection at one stage with effective protection of the preceding stage which this affords, the comparison shows a decline in 11 of the 28 cases for the USA, 10 for the EEC, 8 for Sweden and 5 for Japan. Only 3 chains of the 12 in the USA and EEC, and 4 in Sweden show continuous escalation of effective protection, while in Japan 7 of the 12 do. While it is true that the evidence available is limited and subject to qualification, such as there is, it is consistent with the theoretical proposition that in some processing chains the level of effective protection is lower in some later stages than it is in earlier ones.

18. Another qualification which must be placed on the interpretation of data purporting to show levels of effective protection in developed countries concerns the incidence of the nominal tariffs used in the calculation. All the studies of effective protection are based on MFN tariffs and are not adjusted to allow for the fact that under various preferential trading arrangements, such as the Generalized System of Preferences and the Lomé Convention (between 52 African, Caribbean and Pacific States (ACP) and the EEC), those tariffs do not apply to imports from developing countries. There are no estimates available on how many imports from developing countries enter developed countries' markets on a reduced or free of duty basis, but such trade is sufficiently extensive to allow the dismissal of calculations of effective protection based on MFN rates as irrelevant. The fact that in the Yeats study quoted above 11 of the chains in the case of Japan and 10, 7 and 6 of the chains in the cases of the EEC, USA and Sweden respectively are shown as having higher effective protection at the second compared to the first stage is meaningless with respect to developing countries' export prospects unless we know how many of the imports of products in these categories are subject to preferential duty reduction or removal.

19. It is not being argued here that tariffs constitute no obstacle to the growth of imports of processed and manufactured goods into developed countries from developing countries. Rather the point being made is that their relative significance as trade barriers in this context has been exaggerated by a misunderstanding of the theory of effective protection and a failure to allow fully for the reduced incidence of tariffs resulting from various preferential trading arrangements. As Helleiner and Welgood conclude, 1/"The reduction or removal of developed countries' tariffs on processed raw materials originating in developing countries may not, therefore, by itself, do much for the level of processing activity in the Third World."

1/ Helleiner and Welgood, op.cit., p. 34.
20. Similarly, while in theory non-tariff barriers are potentially more restrictive than tariffs, there is no evidence to support the view that they have had any significant effect on the overall level of exports from developing countries or on the structure of such exports according to the processing stage. While many reports 1/ provide extensive taxonomies of non-tariff trade barriers by type and product incidence, there has been no serious study of their quantitative significance in trade restriction. One study 2/ suggests that, outside textile products, only about 1.5% of all imports of manufactures (not including food and other natural resource processing) from developing countries were subject to quantitative import restrictions in 1975. In addition many of these restrictions make allowance for the growth of imports of products covered (such as the Multifiber Arrangement which is even more flexible in this way than the 6% annual growth in physical ceilings would suggest). Also they do not "bite" in the sense that many quotas are not filled by the countries thus restricted.

21. Even if it is accepted that residual tariff and such non-tariff barriers as do exist do affect trade, in the particular items covered, there is no hard evidence to indicate that, except in a few narrowly specified product lines on specific trade routes (e.g. Caribbean rum to the continental EEC), their overall restrictive effect has been significant in distorting the composition of developing countries' exports to developed countries. Data by processing stages are not available. However, in the usual primary commodities (SITC 0-4 plus 68) versus manufactures (SITC 5-8 less 68) format, trade data indicate that the real growth of exports of manufactures from developing countries over the last two decades has been greater than the real growth of their total exports, and greater than the growth of exports of manufactures from developed countries. 3/ While in absolute terms this performance is largely accounted for by a relatively small number of countries, World Bank data show that of 66 low and middle income countries for which data are available for the years 1960 and 1975, 7 countries raised the percentage share of their exports of manufactured products by a factor in excess of 10 over the period, while 12 raised it by a factor between 5 and 10, 9 by a factor between 3 and 5, 12 by a factor between 2 and 3, 5 by at least 1, and 13 between 0 and 1. In only 8 cases

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1/ Such as that by UNCTAD referred to above.


3/ Ibid., Keesing, Tables 3 and 4 show the real growth rate of exports of manufactures from developing countries over the period 1960-74 as 14.7% (exclusive of non-ferrous metals) as against 5.1% for their total exports (exclusive of petroleum) and 9.6% for the developed countries' exports of manufactures (exclusive of non-ferrous metals).
did the percentage decline. 1/ The average share of manufactured exports, in their total exports, from the 34 countries classed by the World Bank as low income countries rose from 1% to 8% over the same period, and for the 58 middle income countries the share rose from 5% to 17%. This growth in exports of manufactures from developing countries took place over a period in which MFN tariff rates were being reduced as a result of the Kennedy Round and in which the various preferential trading arrangements were being introduced or extended. There are, however, no studies which have attempted to relate growth rates of specific trade flows with changes in the tariffs and non-tariff barriers. We may note, however, that those products, such as clothing, textiles, leather goods (including footwear) and simple metal manufactures such as hand-tools and flatware, which were by repute those most seriously affected by tariff and non-tariff barriers, were among those trade flows which grew most rapidly.

22. While the presumption must be that tariffs and non-tariff barriers do have some restrictive effects on some exports of processed natural resources from developing countries, and that the general reduction or total removal of such barriers would be favorable to some specific products, there can be no presumption that the overall impact on the level and commodity composition of developing countries' exports would be significant.

23. Commercial Barriers. The second group of factors which are usually 2/ identified as impeding the growth of exports of processed natural resources from developing countries may be labelled as commercial barriers, i.e. those impediments which are introduced as part of their commercial strategy by the private firms engaged in the relevant trade flow. Such potentially trade restricting practices are identified as cartelization, restrictive business practices, and excessive advertising.

24. Cartels in developed countries could restrict imports of processed goods from developing countries in several ways. Most obviously, to the extent that the participating firms have a collective monopoly of their markets, they could simply agree not to import from any specific source, or even not to import from any source at all. Nevertheless, such import restricting cartels are not likely to be effective unless the monopoly position of the companies involved is protected by the relevant governments, e.g. by import licensing. In any case, such a situation is unlikely to occur unless the market imperfection on which the monopoly position of the cartel's


members is based is intrinsically import restricting (e.g. transport costs, patented technology, copyright law, or imperfect capital markets). In such cases it is that imperfection which should be regarded as import restricting, and not the cartel. The cartel is the symptom of the existence of, and monopoly profits to be derived from, market imperfections. "remedies" directed to the symptom may have no effect on the import restriction itself. For example, outlawing a cartel which is exploiting patented technology will not remove the import restricting effects of that patent, and may (by inducing competition among those members of the cartel with access to the technology) worsen the competitive position of potential developing country suppliers, by reducing the market price of the product.

25. Cartels exist to maximize "rents" from a monopoly creating factor. If there is a potentially lower cost source of supply the question is raised as to why one or more members of the cartel do not move their processing to that location. The only valid general explanation is the existence of perceived risks associated with such a move. The risks involved are many, ranging from fear that breaking the cartel might lower the market price of the product so that actual profits earned might not provide an adequate return on the investment involved, to fears of potential, full or partial expropriation of investments.

26. There is little evidence of a widespread existence of import restricting cartels. On the other hand there is documentation on the existence of the use of potentially export restraining restrictive business practices by firms in developed countries which invest in processing facilities, or which sell technology or the use of brand names to local firms in developing countries. Export restraining practices can take many forms. They may be implicitly or explicitly imposed on the developing countries' governments or on subsidiaries or other enterprises associated with foreign firms. Such restraining clauses in contractual arrangements may be accepted as a price to be paid for the privately owned assets (e.g. technology, brand names) to which the developing country or its entrepreneurs wish to have access. Private benefits do not always equal social benefits. There has been little evidence, however, in recent years of major losses of exports by the developing world as a whole, or of frustrated attempts to move into downstream processing activities. On the contrary there are indications that access to foreign know-how of all varieties, obtained under various contractual arrangements has enhanced the export performance of developing countries and has moved them into downstream processing activities. 2/ In the absence


2/ One observer has calculated that 15% of manufactured exports from developing countries is accounted for by just the majority-owned subsidiaries of transnational corporations. D. Nayyar, "Transnational Corporation and Exports", Economic Journal, March 1978. Exports by domestic firms with collaborative arrangements with foreign firms would raise this figure, probably substantially.
of any hard evidence either way it is not possible to determine whether or not action to outlaw defensive restrictive business practices would increase or decrease the developing countries total export earnings or their move into downstream processing activities. It can be predicted with a reasonable degree of confidence that if export restricting devices were to be in some way outlawed, the defensive reaction of the monopoly capitalists involved would be to raise the cash price of whatever asset over which they have monopoly control. Such price increases might often be established at levels which effectively prohibit developing countries from having profitable access to the assets.

27. The UNCTAD document cited above argues that the conference shipping lines "in many cases" escalate their freight charges according to the degree of processing embodied in a product solely because of their superior bargaining power and without any justification based on increased costs. No evidence has been produced to indicate that such monopoly pricing exists on any significant basis. Unit freight charges do, undeniably, frequently escalate with the degree of processing (just as they sometimes decline) but research as to whether or not such escalation could be explained in terms of higher unit freight costs would have to be carried out on a case-by-case basis. There are no economic reasons why freight charges, determined as they are by several factors in the freight market, should be proportional to value-added in all processing chains as suggested by the UNCTAD document. 1/

28. Another commercial restraint on the development of processing industries cited in the UNCTAD document and similar literature is "excessive advertising expenditure". 2/ There is no evidence of any widespread prevention of market entry due to prohibitive advertising costs. On the contrary, the evidence suggests that in markets characterized by product differentiation, advertising has helped developing countries to establish markets which would not otherwise have been available. In the first case, much brand name advertising is product and not production facility specific, and in many such cases developing country suppliers of the product have been able to "free ride" on such advertising in the absence of which they would not have had a saleable image. Typically, for products which are quality sensitive, the use of established brand names acts as a guarantee for suppliers in developing countries. Significant inroads into developed countries' markets have been made by (domestic and foreign owned) developing country suppliers of such products as processed meats, fish, vegetables, fruit, fruit juices, clothing, electrical goods, engineering products (e.g. bicycles, automobiles, cutlery, and hand tools). And, in the second case, where developing countries' 


2/ Op. cit., p. 9. Emphasis added. No indication is provided on what criteria should be used to identify when advertising expenditure becomes excessive.
producers are confident of their competitiveness in terms of price and quality and have assured supply conditions, they have been able successfully to establish markets for products on the basis of advertising relating to the location of processing facilities. Examples are processed coffee 1/ (Brazil and Colombia), fashion clothing (India, Kenya, and Brazil), rum (Jamaica, Guyana, and Bahamas) and canned fruit (Malaysia).

29. **Domestic Distortions.** The same economic logic used to argue that the commercial policies of developed countries restrict imports of processed goods from developing countries, can be used to support the argument that the commercial policies of developing countries restrict their exports of processed goods. It is a moot point whether or not the anti-trade bias of developing countries' import substitution oriented commercial policies are a greater obstacle to the growth of exports of processed goods from developing countries than the residual protectionism of the developed countries. Tariffs, both nominal and effective, are higher in developing than developed countries, and developing countries resort much more extensively and intensively to direct quantitative restrictions on imports and to import reducing exchange controls. The anti-trade allocative distortions attributed to the policies of developed countries should then be attributed a fortiori to the policies of developing countries. While this reasoning is theoretically valid the existence of varying degrees of substitutability and mobility of domestic industrial inputs among different industries, and the international mobility of some inputs within industries, raises some important empirical qualifications to the theoretical generalization making it necessary to examine the effects of given domestic policy frames on the specific export potential of given processing industries on a case-by-case basis. 2/

30. Some natural resources such as minerals, forestry and fish are processing chain specific. Others, such as land and labor are in theory mobile and substitutable among processing chains, but in practice past decisions may tie them to specific processing chains in the medium or even long term. The same is true for some forms of physical capital. In such cases even though distorting protection may artificially raise the rate of return to investment in other processing chains, "locked in", immobile factors will still be employed and export output will expand as long as the net rate of return is positive. In these cases relative rates of return are irrelevant.

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1/ Curiously used by UNCTAD as an example of a product whose exports from developing countries have been impeded by advertising costs.

2/ It may well be the case that in some instances the structure of domestic distortions in a developing country results in excessive subsidization of the overall export sector, or some specific export activity, to the extent that the marginal social gains from exporting may be less than marginal social costs, although the marginal private benefits to the exporting firms may be positive. Such a possibility is not considered in the barriers approach to the analysis of domestic distortions.
31. Secondly, import substitution protection policies can attract factors which are not competitive with domestic factors to migrate into processing chains which could not have been established without them. In such cases unless the elasticity of supply of any domestic inputs used is very low any negative impact on the level and structure of output in other processing chains will be minimal (and possibly, via linkage effects, positive and substantial).

32. On the basis of the two preceding points it might be possible to generalize to the extent of saying that the less processing chain specific are the natural resources, or other factors in which a country has an international price advantage, the more likely it is that any policy intervention of the government will produce allocative distortions. However, because of the international mobility of some factors, and because of the existence of complementary and/or offsetting allocative distortions in the economies of trading partners, it is not possible to say a priori whether the establishment or non-establishment of any particular processing industry as a result of a given distortion will be welfare improving or reducing.

33. In sum, extensive import substitution protection introduces an anti-trade bias into an economy. Whether or not that bias is an effective obstacle to the establishment or expansion of export oriented processing industries is an empirical point which can only be evaluated on a case-by-case basis. Similarly, whether or not the non-establishment of any given export oriented processing industry is welfare reducing can only be evaluated on a case-by-case empirical basis in a general equilibrium setting. Finally, while the non-existence of a given, or indeed any, export oriented natural resource processing industry is consistent with the various barrier hypotheses, it does not prove that any or all of those hypotheses are correct. While attempts to remove policy distortions and market imperfections which are thought to distort the export prospects of developing countries should be applauded, it has to be recognized that many other factors can explain the slower than desired move into downstream natural resource processing activities.

E. COMPETITIVE ADVANTAGE AND INPUT DOMINANCE

34. Introduction. The fundamental thrust of the paper so far is that because (a) processing chains do not have a common structure of processing stages, and (b) similar time sequence processing stages do not have any common economic characteristics across processing chains, it is not possible (1) to generalize about the optimal location of processing activities simply seen as time stages in processing chains or (2) to generalize about the impact on the location of processing activities of the removal of distortions and market imperfections considered as barriers to the transfer of processing activities to developing countries. The previous section examined the operational relevance of "artificial" barriers (prior distortions and market imperfections) to exports of processed products from developing countries. This section examines natural barriers and analyzes the operational relevance of some theoretical issues concerning the determination of optimal location of processing activities.
35. The operational relevance is introduced by carrying out the analysis within the conceptual framework defined by the policy issues identified earlier. That is, having accepted that for political reasons a specific developing country wishes to examine the prospects for establishing or expanding an export oriented industrial base, it may decide to focus on the potential for moving into downstream industrial activities involving the processing of natural resources it currently exports in unprocessed or semi-processed form. Two questions then arise: (1) which of the processing chains involving its natural resources should it concentrate on, and (2) which (not necessarily sequential) of the downstream stages should it establish in those processing chains into which it decides to move. First the response to these questions suggested by orthodox trade theory will be examined, and then some alternative concepts will be introduced as providing a possible basis for an operationally relevant methodology for responding to the basic policy issues.

36. The concept of comparative advantage is frequently proposed as the criterion which countries should use to decide whether or not a particular industrial activity would be optimally located within their boundaries. The standard factor endowment theory of comparative advantage, however, although of considerable heuristic value as a pedagogic device, provides an insufficient basis for the empirical identification of the structure of a country's comparative advantage. The concept of comparative advantage can only be given unambiguous specific product, location and trade flow characteristics in the context of the two factor, two commodity and two country model, where all elements in the textbook set of assumptions hold. Similarly, factor intensity only gives an unambiguous indication of comparative advantage in the two factor, two commodity and two technology model — and then only in the absence of demand induced factor price reversals and technologically feasible factor intensity reversals.

37. The notion, "derived" from comparative advantage theory, that developing countries should specialize in labor intensive activities, while having intuitive appeal as it apparently reflects factor endowment advantages, is simplistic and misleading. Whether or not any ex post examination reveals that according to some arbitrary criterion developing countries' industrially processed exports are produced by relatively labor intensive techniques, it can be easily shown that in an ex ante comparison of two or more investment proposals, there is a significantly positive probability that the relatively labor intensive activity will not be the one with the greatest

1/ This point is generally recognized by trade economists (although not always by trade policy specialists) as, for example, by J. Harkness who says in his article "Factor Abundance and Comparative Advantage", American Economic Review, December 1978, that "with more than two factors, it is not possible to provide a unique ranking of technologies based on relative factor intensities and, therefore, the commodity composition of trade can no longer be determined by reference to factor intensities alone."
likelihood of international competitiveness. This would be true even in a world free of policy distortions and commercial market imperfections. The analysis which follows will, initially, assume that such distortions and imperfections do not exist. Theory and empirical research have taught us that the sort of policies, distortions and commercial market imperfections identified above as artificial barriers to the development of export oriented processing activities can and do prevent the competitive establishment of specific activities. As argued above, however, only case-by-case analysis can establish those, if any, which "bite" in any specific instance. The objective here is to demonstrate that, even in the absence of such factors, while the downstream activity in a processing chain which a developing country is considering establishing is relatively labor intensive it may not be able to establish that activity on an internationally competitive basis.

38. A full investigation of the issues involved would take us beyond the scope of this paper. The argument here will be restricted to a few realistic examples. First take the case of relatively capital intensive activities. In this case even though a developing country may have a substantially lower wage/profit ratio than some notional "world" ratio it may still be the case that the country could competitively establish the capital intensive activity. That transport costs, even in a two country world, behave like tariffs and ''protect'' such, domestic market oriented, activities is long established and well understood. It is less well established and understood that transport costs can ''protect'' relatively capital intensive exports from developing countries in the same way. For capital intensive products with high unit transport/production cost ratios, a developing country with higher production costs due to its higher profits/wage ratio may still find that, in a multi-country world, there is a transport cost defined zone in which it can successfully compete with lower production cost producers in developed countries. As trade grows among developing countries such trade in transport cost protected relatively capital intensive goods is likely to grow in importance.

39. The transport cost protection example arises out of the treatment of transport costs as a production input. Transport changes the physical characteristics of a product in a Lancasterian sense — i.e. it gives a product a characteristic — location — which opens up otherwise unavailable markets. The structure of locational competitive advantage changes as the structure of transport costs changes relative to the pre-transport structure.


2/ By trade economists; location theorists have long been aware of the possibility.
of production costs. Even if the transport/production cost ratio is small, variations in transport costs can still determine locational structure, for example in a situation in which the factor substitution possibilities result in production costs in the two production locations being the same. 1/

40. Except for the product characteristic change issue, the point about the location determining influence of transport cost variations can be generalized to other input costs in a world of multi-factor production functions. Where production technologies require inputs of human capital (skill), financial capital, auxiliary natural resource inputs (or intermediate goods), energy (and other public utilities), infrastructure and marketing facilities as well as the standard "labor" and "capital" (in the physical sense) then geographic variations in the prices of any of these other inputs can outweigh variations in the prices of labor and capital, regardless of the share of the cost of that input in total costs, thus determining the locational structure of competitive activities. If, for example, a developing country location has a cost advantage in energy greater than its cost disadvantage in capital, it will, other things being equal, be a competitive location for some capital intensive but energy using processing activities. To escape the confusion which arises over the distinction between the positive and normative interpretations of the theory of comparative advantage, such a situation can be described as one in which a country has a competitive advantage in processes which use an input, for which it has a relative cost advantage that dominates the location decision (input dominance). The dominant input in this sense would be that input whose cost advantage is sufficient to outweigh the locational effect of other input costs. 2/ This leaves open the question of whether or not the applicable welfare calculus would indicate that investment in any given capital, or any other input, intensive processing activities in which a country has a competitive advantage would improve its welfare to case-by-case study.

1/ A point recognized by Jagdish Bhagwati when he observed "that even if transport costs for any alternative location were a small proportion of total product price, they could still affect location if they varied geographically more than other costs of production. It is geographical variability in transport costs relative to other costs of production rather than their level which determines whether they are important for location decisions." Quoted in The International Allocation of Economic Activity, B. Ohlin, et. al. (eds.), Macmillan, London, 1978, p. 276.

2/ Thus in the example used by Bhagwati in the preceding footnote transport would be the dominant input where geographical variations in transport costs outweighed geographical variations in all other costs of production.
41. Just as a developing country may have a competitive advantage in some capital intensive processing activities, so might it not have a competitive advantage in some labor intensive activities involving the processing of its natural resources for export markets. And just as the above reasoning showed that a cost disadvantage on the capital input might be outweighed by cost advantages on other inputs, so might a cost advantage on the labor input be outweighed by cost disadvantages on other inputs. Similar reasoning to that used above can also be used to illustrate the fact that transport cost variations could make a developing country less competitive for some labor intensive processing activities than a developed country, in either the developed country's own market or in some third country market. Note that the existence of non-Leontief type production functions implies that minimum cost production processes may vary from location to location, depending on the relative availabilities of the many inputs. This will complicate the identification of competitive advantage but it does not affect the validity of the concept of input dominance. 1/

42. Other realistic examples of situations in which a developing country with a low wage/profit ratio may not be in a position to establish an internationally labor intensive processing activity can be easily provided. One example draws on the distinction between labor intensive products and labor intensive processes. A processing activity may involve a labor intensive technology but the share of the price of physical primary and/or auxiliary inputs in local costs may be high. For example, if the inventory requirements are large, due to long transport pipelines and large warehousing stock needs, then financial capital (credit) costs may (in a world characterized by imperfectly internationally mobile financial capital), dominate, and the competitive location for that processing may be in a high wage/profit ratio country.

43. A well established argument is that which draws attention to the fact that simple models which treat labor as a homogeneous factor may give misleading results when applied to real world data. The implication drawn is that when "labor" is disaggregated into basic labor time and various recognizable human capital elements such as "factory work ethic", technical skills, marketing skills, management skills and entrepreneurial skills, it may well be that a developed country in which basic labor time is relatively cheap on an international basis is also one where the human capital elements are relatively expensive. Again it is obvious that there can be some relative disadvantage in the price of skills which will outweigh (dominate) the price advantage in basic labor time, so that it may not be possible to establish some basic labor time intensive processing activities in that location on an internationally competitive basis.

1/ This point was drawn to my attention by Nancy Wall.
A less well established argument draws attention to the fact that much academic discussion of location determination ignores completely one important input required by processing activities. This is marketing. The nature, significance and cost of marketing inputs will vary enormously from product to product and market to market, depending on the commercial nature of the product’s market. Marketing covers such items as travel to establish and maintain sales and distribution outlets and agency arrangements; identification of, and arranging for, specialized packaging and documentation; establishment and maintenance of all forms of after-sale servicing (including specialized quality control and handling of rejects); and advertising and public relations. The level of such costs (which can include "goodwill" generation or market entry discounts) and their variability between producers and markets can be such that even though a developing country may have a competitive cost advantage in the transport cost inclusive physical production of a labor intensively produced processed product, it may not be able to achieve market entry in some or all of its potential markets because of the dominance of the marketing input costs.

Another example in this short list of situations in which a relative cost advantage in the cost of labor can be outweighed by cost disadvantages of other inputs into labor intensive activities is that represented by situations in which communication costs dominate. When the definition of market specification requirements varies continuously, the costs of communicating those requirements, and the costs of delays while waiting for responses, can dominate and determine that the most efficient location for the process is at the point of consumption. Shaping of timber and metals in construction and engineering activities, the cutting process in custom tailoring activities, and the customer specific compounding of chemicals, vegetable oils and pharmaceuticals are all relatively labor intensive activities (or can be, in terms of the cost of the process itself) where the requirements of the process are frequently specified at the point of consumption and close to the time of need. Locations close to the point of consumption will minimize communication costs and response lags in such situations so that even though actual production costs are higher (due to higher wages) the market will be the location with the competitive advantage. (International standardization can reduce the significance of such costs but will increase the relative significance of inventory costs, sometimes to the point where inventory costs will dominate the determination of the structure of competitive advantage between locations.)

Finally, an issue which is frequently referred to in connection with the location of processing industries is that concerning economies of scale. The issue is, however, a red herring. If the correct evaluation procedures have been carried out then the technological possibilities and cost accounting relating to known economies of scale will have been taken into account. If a given scale of output is considered necessary for international competitiveness then the issue simply becomes one of determining whether or not the inputs required are available to sustain that level of output at the required cost levels. If the inputs are available on that basis, either
domestically, or partially or completely imported, then the location has a competitive advantage in that processing activity, otherwise not. Foreign governments may introduce policy distortions, or foreign firms may introduce commercial market imperfections, which may effectively prevent the firm considering the investment from reaping the advantages of scale economies. The relevant issues are then those distortions and imperfections, and not the economies of scale.

F. PRIVATE VERSUS SOCIAL INTERESTS

47. Before examining this issue it is necessary to re-introduce the concepts of policy distortions and commercial market imperfections which were assumed away for the preceding analysis of the distinction between comparative and competitive advantage. That analysis sought to identify the factors which determine whether or not a country has a competitive advantage in any given processing activity in the absence of any policy distortions or commercial market imperfections which affect the prices of inputs or the availability of markets for outputs. In other words, the analysis assumed that prices in the market place are perceived exclusive of the impact of any distortion or commercial market imperfection (but inclusive of "natural" market imperfections such as internal and external economies and diseconomies, externalities, natural monopolies, and imperfect mobility of factors). Prices in the actual market place are, of course, inclusive of the effects of the sorts of policy distortions and commercial market imperfections discussed earlier. As argued earlier, it should be recalled, there is no way of generalizing about the size (and in many cases sign) of such influences other than on a case-by-case basis. It is enough to acknowledge that such price distorting influences do have an allocative impact and may move an economy towards or away from the socially optimal level and composition of output. Related issues are dealt with in the standard literature on the divergence of social and private interests and need no further examination in this context.

48. The important issue to be dealt with here is that any private entrepreneur considering the establishment of a processing activity in a given location in a developing country will evaluate the location on the basis of distortion and imperfection inclusive prices for inputs and outputs prevailing at that location. The government of that country should therefore evaluate the investment proposal on the basis of those prices it intends the entrepreneur to perceive. Those prices may not be the prevailing prices, as the government could change the perceived prices by policy intervention, in order to close the gap between estimated net social benefits and net private benefits. Assuming the government advises the entrepreneur of any such intended or conditional changes, and even though the entrepreneur calculates that he would be able to produce the product at competitive prices in some export markets at a positive rate of return to his investment, he may still not regard the investment as a viable commercial proposition. He may then invest at another, higher cost, location or remain in his existing higher cost location.
49. The basic reason why an investment, in a processing activity considered by a government as one in which its country has a competitive advantage, might be rejected as commercially unattractive by a private entrepreneur, even though offering him a positive rate of return, is his perception of the existence of risks. Such risks can take many forms. Among those frequently cited by businessmen (local and foreign) who have been involved in evaluating investment proposals in developing countries are:

- risks associated with political instability causing shifts in attitude to private (especially foreign) investment leading to changed policy frames, with — at the extreme — fear of expropriation without adequate compensation;

- risks associated with an unproven workforce, or unionized workforce, leading to fear of excessive downtime and, at the extreme, destruction of property or life;

- risks associated with uncertainty over future supplies and prices of public utilities, the basic raw materials, and auxiliary inputs (including imported raw materials, components and auxiliary inputs);

- risks associated with uncertainty over the appropriateness of the government’s macro-economic policies, with consequential fears of exchange rate changes altering the relative cost of imported inputs and the foreign exchange price of exported output; and

- risks of new competition due to the development of synthetics or new investments in other locations or intensification of existing competition via price wars or via protection induced market closure.

50. If a government finds itself in a situation where an entrepreneur is not willing to invest in a project which it is agreed can produce its output at internationally competitive prices (in some markets), and which offers a positive rate of return, then the government has two positive options open to it. First, it can enter into a bargaining situation with the firm, or group of firms, either offering it a higher rate of return via increased incentives embodied in variations to the originally proposed policy intervention, hoping to compensate for the perceived risks, or it can offer guarantees against some or all risks. There may, however, be no rate of return, or guarantee against risks within the bounds of political acceptability, which proves attractive enough to the entrepreneur to induce him to
invest. If no private entrepreneur can be induced to invest then the government can turn to its second option which is to establish the enterprise as a state owned firm. 1/

51. In conclusion then, governments which are considering adopting a strategy of moving into downstream processing activities should be aware that estimates of potential gains from such moves based on aggregate data will be gross overestimates. Similarly misunderstandings as to the significance of trade barriers will overestimate the impact of the removal of such barriers on exports of processed goods from developing countries. The diffusion of negotiating strength and political support on general measures to remove artificial barriers are likely to lead to limited success. While continued pressure to liberalize world trade and to minimize domestic distortions can only be helpful, a more useful approach would be to concentrate attention on the removal of specific barriers and specific domestic distortions where evaluation exercises on a case-by-case basis indicate the possible existence of competitive advantage. Governments should recognize that decisions on whether or not a particular processing industry is established are based on firm level criteria and they should concentrate their attention on policies over which they have some control in order to enhance the likelihood that positive decisions are taken where the establishment of such industries would be sociably desirable. There is no inherent economic logic behind the urge to process all raw materials at source, but drawing on the domestic and foreign political support for such a program could help ensure that processing industries for which developing countries do have a potential competitive advantage could be established on a more efficient basis.

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1/ For a discussion of the role of state owned enterprises see the chapter on "Public Enterprises" by Deepak Lal in Policies for Industrial Development, J. Cody, H. Hughes, and D. Wall (eds.), (forthcoming).
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Industrial processing of natural resources