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THE DISTRIBUTION CHAIN AS A METHODOLOGICAL TOOL

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THE DISTRIBUTION CHAIN AS A METHODOLOGICAL TOOL ^{1/}

In its resolution on "Development and international economic cooperation" adopted in September 1975 ^{2/}, the General Assembly of the United Nations decided to set in motion a series of measures to serve as the basis and framework for activities of the United Nations System designed to increase the capacity of developing countries to pursue their development. Among these measures is a call for:

"Effective opportunities to improve the share of developing countries in transport, marketing and distribution of their primary commodities and to encourage measures of world significance for the evolution of the infrastructure and secondary capacity of developing countries from the production of primary commodities to processing, transport and marketing, and to the production of finished manufactured goods, their transport, distribution and exchange, including advanced financial and exchange institutions for the remunerative management of trade transactions."

Similarly, the Fourth United Nations Conference on Trade and Development, held in May 1976, was

"Convinced of the need for an over-all approach and an integrated programme for commodities which is a programme of global action to improve market structures in international trade in commodities of interest to developing countries, and which is consistent with the interests of all countries, particularly those of the developing countries, and assures a comprehensive view of the various elements involved while respecting the characteristics of individual commodities." ^{3/}

Therefore, in order "to improve marketing, distribution and transport systems for commodity exports of developing countries, including an increase in their participation in those activities and their earnings from them", the Conference agreed to take:

"International measures to improve the infrastructure and industrial capacity of developing countries, extending from the production of primary commodities to their processing, transport and marketing, as well as to the production of

^{1/} The present document is a major revision of a previous document by the same name published as E/CEPAL/L.149, and reflects the very valuable comments on the latter made by the Shipping Division of UNCTAD.

^{2/} Resolution 3362 (S-VII).

^{3/} Resolution 93 (IV).

/finished manufactured

finished manufactured goods, their transport, distribution and exchange, including the establishment of financial, exchange and other institutions for the remunerative management of trade transactions."

The above paragraph in effect describes the process of product distribution. Product analysis is by no means new, but most of the presently available studies tend to explore only a few of the aspects in the chain of events that form the process. This restriction can cause serious distortions of interpretation when aspects crucial to an explanation of how and why the process functions as it does are omitted. Minimization of omissions requires a methodological framework to orient the analysis, to form a checklist of relevant aspects and to serve as a structure for the storage and retrieval of information. The distribution chain concept described here provides such a framework by allowing for comprehensive treatment of all aspects including physical movement, storage, transformation, brokerage, insurance, banking, regulation and documentation at every stage between production and final consumption.

There are a number of ways in which this concept can aid in achieving the previously-cited goals for development:

- 1) The fortunes of many developing countries are closely tied to the foreign exchange they receive from the export of primary products. The amount paid for these products in the importing countries includes the cost of transport and related services, which in the case of some primary products may amount to more than half of the final price. To the extent that the developing countries supplying these products can find opportunities to provide more of the transport, related services or product elaboration, the portion of value added accruing to them will be greater and will add to their foreign exchange earnings. Similarly, if they can find ways to reduce the costs of these operations, part of the resulting savings will accrue to them as net increases in foreign exchange. An analysis that follows each link of the distribution chain between producer and consumer to determine how final price is formed can readily identify such opportunities.

/2) In both

2) In both the internal and the international trade of most developing countries, a few products account for the greater part of total transport requirements. Through analyses of the distribution chains of these products, it is possible to discover and formulate corrective measures for operative inefficiencies that lead to loss or damage to goods, time delays and the like and so cause unnecessarily high shipping costs. Knowledge of their chains can also lead to more accurate projections of future transport requirements, thereby permitting the identification of potential bottlenecks and the opportune programming of new capacity.

3) Many developing countries wish to expand their national merchant fleets but lack adequate information on which to base the difficult decisions regarding the types of ships to be acquired. Through analyses of the distribution chains for key products, these countries can select the vessels best able to compete in the complex field of international shipping.

4) Developing countries wish to discover and apply new technologies that are appropriate in terms of their economic and social goals. Because transport technology is often closely related to commercial practices and customs, a choice that does not take these factors into account can give rise to costly problems, including the loss of markets. Examination of the distribution chains for specific products can indicate what technologies --such as shipment in bulk-- are compatible with commercial practices, and thereby lead to more detailed study of possibilities for changing these practices so as to apply more appropriate technologies.

5) Developing countries also wish to expand their export bases and penetrate new markets. For this task, it is necessary to obtain accurate information on the obstacles that must be overcome in order to place new products in new markets. The distribution chain can provide the framework for establishing an information system designed to meet the requirements of potential exporters.

/6) There

6) There is increasing awareness around the world of the high cost of preparing and processing the documentation that must accompany any international transaction. Developing countries have not made all the progress they might in the simplification of trade and transport documents and procedures, an activity that is called facilitation. Through analysis of distribution chains, it is possible to identify opportunities for simplifying procedures and documents to permit more rapid and less costly flows of goods.

Methodology of the distribution chain

This paper presents the concept of the distribution chain as a methodological tool. The term "chain" reflects the fact that movement of a product from its point of production to its point of final consumption is a chain of events in time and space, where the event that defines each link of the chain is a physical operation performed on the product. Thus, for example, a very simple chain might consist of the operations production, storage, transport and consumption. However, the methodology proposed here goes beyond consideration of a mere series of events to recognize that every link in fact deals with a number of aspects related to the product distribution process and vital to its understanding. The framework provided by the chain encourages simultaneous analysis of all aspects, thereby leading to the identification of many critical interrelations among them and insuring that none is overlooked.

It is generally a simplification to say that a product has a distribution "chain". In reality, the distribution process is a network of pathways connecting many producers through various different operations to many consumers (see figure 1). The exact sequence of operations by which, for example, bananas from one producer reach a consumer may be different from the sequence taken by bananas from another producer. Nonetheless, within certain limits --particularly geographical-- it is valid to define a more or less typical sequence

/that can

that can be considered a distribution chain for a product. The chain then is an abstraction of reality that serves as a framework for analyzing a set of similar pathways.

The concept of a chain is an abstraction in another sense as well. It has already been mentioned that each link in a chain deals with a number of aspects related to the operation defining that link. Diagrammatically, information about the distribution process is organized as a matrix in which each column corresponds to a link. The rows, as described below, correspond to the different related aspects. Despite this matrix arrangement of information, the process as a whole is best thought of as being a chain.

When a specific product is to be studied, its distribution chain is first analyzed to determine the identity and sequence of the operations that form its links. These operations are entered in the first row of the information matrix and define its columns.

The matrix contains a total of 19 rows, which are organized in eight groups as follows:

A. Operation (rows 1 through 5)

1. Operation
2. Place/route
3. Average duration
4. Quantity
5. Agency responsible

B. Technology (rows 6 and 7)

6. Packaging/vehicle
7. Handling/storage

C. Ownership (rows 8 and 9)

8. Owner
9. Terms of shipment

D. Credit (rows 10 and 11)

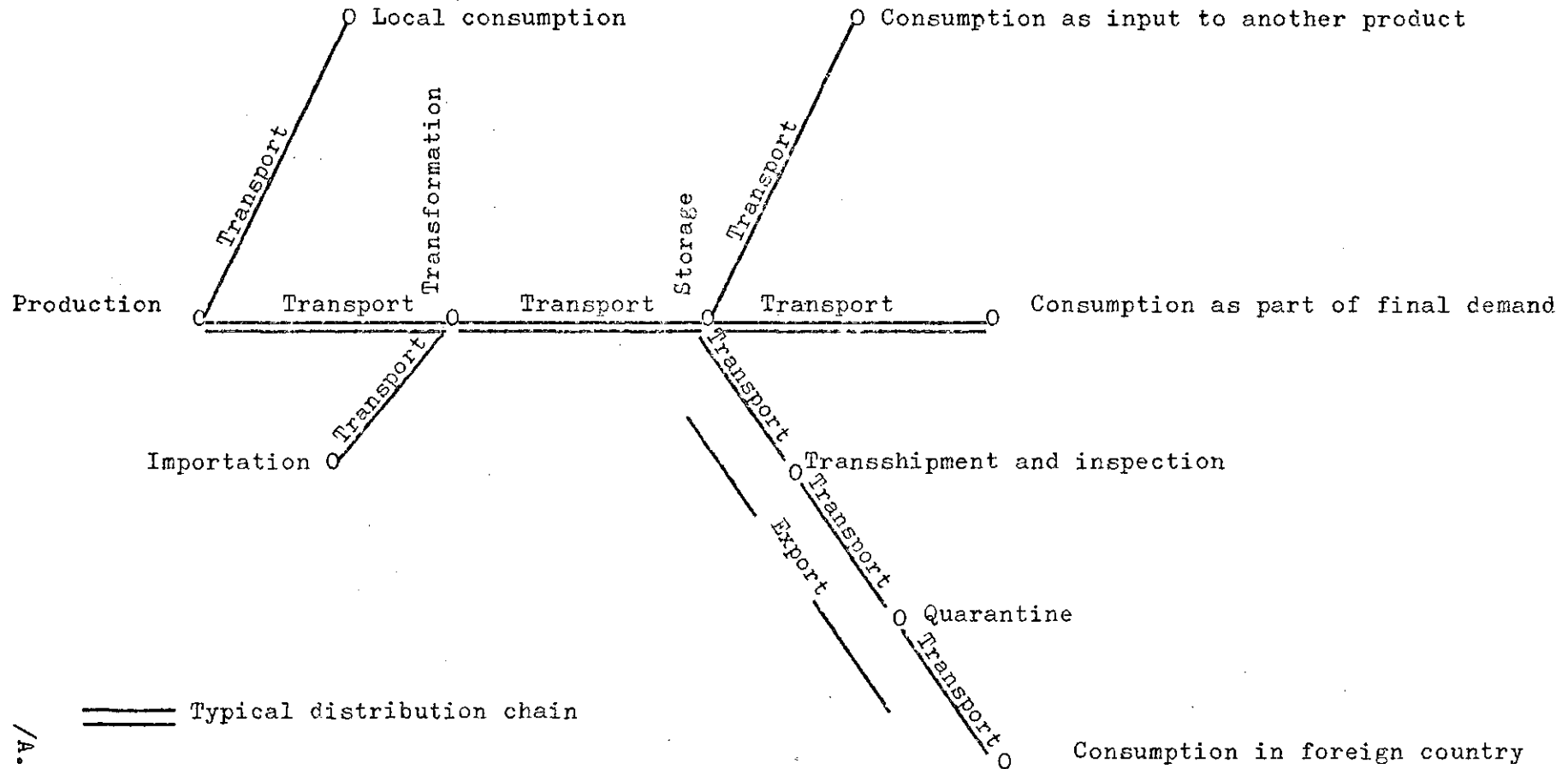
10. Financing
11. Terms of payment

/E. Insurance

- E. Insurance (rows 12 and 13)
 - 12. Cargo
 - 13. Civil liability
- F. Regulation and control (row 14)
 - 14. Regulation and control
- G. Documentation (rows 15 through 17)
 - 15. Transport
 - 16. Insurance
 - 17. Commercial and other
- H. Price formation (rows 18 and 19)
 - 18. Cost component
 - 19. Price/value of transaction

Figure 1

Hypothetical distribution network



A. Operation

Typical entries in these rows might be as follows (note that the fifth row includes an indication of the number of agencies active in each operation):

<u>Description</u>	Pro- duc- tion	Trans- port	Stor- age	Packa- ging	Trans- for- mation	Ins- pee- tion	Qua- ran- tine	Trans- ship- ment	Consump- tion
<u>Place/route</u>	200 km. radius around X	Farm to X	X	W	Y	Port P	Port Q	T	Z
<u>Duration</u>	5 months	1 day	2 weeks	1 day	3 days	Conti- nuous	40 days	2 days	-
<u>Quantity</u>	200 000 tons	50 000 tons	50 000 tons	50 000 tons	30 000 tons in 20 000 tons out	-	2 000 tons	2 000 tons	300 000 units
<u>Agent responsible</u> (number of agents)	Pro- ducer (100)	Trucker (5)	Ware- house (2)	Packing plant (1)	Fabri- cator (1)	Govern- ment agency (1)	Ware- house (3)	Terminal operator (2)	Consumer, exporter manufacturer (-)

B. Technology

The two rows under this heading refer to how the product is packaged and in what kind of vehicle it is transported, and to what kind of technology is employed for its handling and storage. These aspects are intimately related to the operations performed on the product, and they also have important interrelations with terms of shipment, insurance, regulation and control, and documentation.

Information recorded in these rows should be sufficiently detailed so that incompatibilities among operations can be detected. Basic incompatibilities are most likely to result in extra operations whose only purpose is to act as interfaces between technologies that are not directly compatible. If compatibility of technologies can be achieved, the interface operations --which are frequently quite costly-- can be eliminated. For example, present practice may be to store bags

/on pallets

on pallets in the warehouse, take them off the pallets and place them in containers for shipment, and then place them on pallets again at the destination. If pallet sizes were standardized at both origin and destination and scaled to fit neatly into a container, the interface operations of unloading and reloading pallets could be eliminated and the loaded pallets from the warehouse could be placed directly in the containers. Detection of this possible rationalization of technology requires at the very least that the unloading and reloading operations be specifically included in the chain.

The following might be typical entries in the two technology rows:

Packaging/vehicle: 200 liter steel drums; 12-ton unspecialized truck; Cardboard boxes within 20-foot refrigerated container; Fine granules in bulk in 6- to 8-ton lots.

Handling/storage: Fork-lift truck in warehouse; Hand loading and unloading; Container crane loading and unloading, deck stowage; Conveyor belt to silo within port.

C. Ownership

The rows under this heading refer to the ownership of the product. Typical entries might be:

Owner: Producer; Bank; Trading company; Wholesaler; Retailer.

Terms of shipment: Cost and freight (c. & f.); Cost/insurance/freight (c.i.f.); Free alongside ship (f.a.s.); Free on board (f.o.b.); Ex-works.

D. Credit

Under the fourth heading, the aspects financing and terms of payment have to do with the type and source of credit for each operation, and with the way in which payment is made when the product

/changes hands.

changes hands. The following entries might be typical for these rows:

Financing: Commercial credit; Working capital; Government export credit.

Terms of payment: Documents against payment; On delivery; Letter of credit.

E. Insurance

The fifth heading deals with insurance, both of the product itself as cargo and to cover the civil liability of the transporter or other agent to whom the product is entrusted during each operation. Entries relating to cargo insurance should indicate the type of coverage provided by the policy, as well as the nationality of the insurer. Entries relating to civil liability insurance should indicate the scope of liability and the nationality of the insurer. The following might be typical entries in these rows:

Cargo: All risks, Lloyds of London; Free from particular average; With average; Institute War Clauses; Institute Strike Clauses; Self-insured.

Civil liability: Hague Rules, P & I Clubs (maritime transport); CMR Convention (highway transport); CIM Convention (railway transport); Warsaw Convention (air transport); National legislation; Public liability and property damage (commercial insurer);

F. Regulation and Control

Almost all operations or their related aspects are in some way subject to governmental controls, the possible multiplicity of which is so great that it is not worthwhile to list typical entries. When dealing with a specific chain, however, the following information should be entered in row 14:

- what is controlled and why;
- type of control (regulation, technical specification, standard, technical regulation - see ECE document TRADE/WP. 4/R.24 for definitions); and

/- agency that

- agency that requires the control and agency that exercises it.

G. Documentation

Again, these aspects are exceedingly complex, but in general, documents fall into the following groups:

- Transport: waybills, bills of lading.
- Insurance: policies, certificates.
- Commercial and other: invoices, export and import permits, phytosanitary and zoosanitary certificates, customs declarations.

H. Price formation

Price formation consists of the cost component corresponding to each operation and its related aspects (row 18), and of the transaction prices at those points where the product changes ownership (row 19). Prices are usually easy to obtain, but cost components must often be estimated, as in the case of implicit interest on investments in goods that are not financed by explicit credit.

As a demonstration of how the distribution chain concept is applied, figure 2 presents an example information matrix that contains data on bananas grown in Ecuador and exported to the United States. Because only easily available published information was used, the matrix is merely illustrative and may not be entirely correct.

Applied as described above, the distribution chain can be an effective instrument for organizing an analysis of the process by which a product moves from its point of origin to its point of consumption, and for classifying the information gathered for such an analysis. To the extent that the chain concept thereby contributes to an understanding of the process, it can make a significant contribution to the objective of helping the developing countries increase their capacity to pursue their own development.

Table 1

Products: Bananas

Chain: ECUADOR (Guayaquil) to UNITED STATES (New York)

Date of information: Circa 1973

	1	Description	Production	Transport to packing plant	Packing	Transport to port	Ship stowage and export to U.S.	Maritime transport	Ship unloading and load vehicle	Transport to ripener	Ripening	Transport to retailer	Sale by retailer	Consumption
Operation	2	Place/route	200 km radius Guayaquil	-	-	Packing plants to Guayaquil	Guayaquil	Guayaquil - New York	New York	5 states	5 states	-	100 cities	-
	3	Average duration	6 months	1 day	1 day	1/2 day	1-1/2 day	7 days	1/2 day	1/2 day	As required	1/2 day	2 days	-
	4	Quantity	3 million tons	-	-	1.4 million tons	310 000 tons	310 000 tons	310 000 tons	-	-	-	-	-
	5	Agency responsible	3 000 producers	Truckers or producers	Farmers' cooperatives	Truck/lighter operators	30 exporters	Shipping companies	Stevedore companies	Transport enterprise	Ripener	Trucker	Retailer	Consumer
Technology	6	Packaging/vehicle	-	Stems/open trucks	Cardboard boxes of 18 KG	Non-refrigerated truck or lighter	-	Non-unitized	-	Reefer truck or rail wagon	Boxes	Non-reefer trucks	-	-
	7	Handling/storage	-	Manual	Manual/unrefrigerated plant	Manual	Hand trucks	Refrigerated hold	Conveyor belt	-	Controlled atmosphere	Fork-lift hand cart	Open bins	-
Owner-ship	8	Owner	Producer	Producer	Exporter	Exporter	Exporter	7 importers	Importer	Ripener	Ripener	Ripener	Retailer	Consumer
	9	Terms of shipment	-	C and F		-	FOB ship		FOB truck or wagon		-	Placed retail store		Ex-works
	10	Financing	Commercial credit	Commercial credit	Working capital	Working capital	Working capital	Commercial credit	Commercial credit	Working capital	Working capital	Working capital	Credit from ripener	-
Credit	11	Terms of payment	-	On delivery		-	Letter of credit		On delivery		-	Within 30 days		On delivery
	12	Cargo	Self-insurance	-	Self-insurance	Self-insurance	-	All risks	All risks	-	Fire insurance	-	Fire insurance	-
Reg.	13	Civil liability	-	National legislation	-	National legislation	National legislation	Hague Rules	National legislation	National legislation	-	National legislation	-	-
	14	Regulation and control	Quality standards	-	Quality standards	-	-	Export controls	-	Phytosanitary inspection	-	Quality standards	-	-
Documentation and Insurance	15	Transport	-	-	-	Highway or river waybill	-	Bill of lading	-	Waybill	-	Waybill	-	-
	16	Insurance	-	-	-	-	-	Certificate	Certificate	-	Policy	-	Policy	-
	17	Commercial and other	-	Commercial invoice		-	Export permit	Commercial invoice	Phytosanitary and origin certificate	-	-	Commercial invoice		Receipt
Price formation	18	Cost component	US\$ 44/ton	US\$ 4/ton	US\$ 27/ton	US\$ 5/ton	Port: US\$ 7/ton Tax: US\$ 6/ton	US\$ 47/ton	US\$ 25/ton	Unknown	Unknown	Unknown	US\$ 114/ton	-
	19	Price/value of transaction	-	US\$ 49/ton		-	US\$ 95/ton		US\$ 168/ton		-	US\$ 250/ton		US\$ 364/ton