OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

Distr.
LIMITED
ID/WG. 282/25
29 Sept. 1978
ENGLISH

08413

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

INTERNATIONAL FORUM ON APPROPRIATE INDUSTRIAL TECHNOLOGY

New Delhi/Anand, India 20–30 November 1978

WORKING GROUP No. 7

APPROPRIATE TECHNOLOGY FOR THE PRODUCTION OF AGRICULTURAL MACHINERY AND IMPLEMENTS

MEXICAN AGRICULTURAL TRACTORS INDUSTRY

Background Paper

id. 78-5879

MEXICAN AGRICULTURAL TRACTORS INDUSTRY

by

Rafael Carvajal
UNIDO consultant

The description and classification of countries and territories in this document and the arrangement of the material do not imply the expression of any opinion whatsoever on the part of the secretariat of UNIDO concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries, or regarding its economic system or degree of development.

The views and opinions expressed in this document are those of the author(s) and do not necessarily reflect the views of the secretariat of UNIDO.

Mention of firm names and commercial products does not imply the endorsement of the secretariat of UNIDO.

The document is reproduced in the form in which it was received and it has not been formally edited.

BACKGROUND

The need of agricultural mechanization in Mexico impelled, first to satisfy part of the demand with imports from the United States and the United Kingdom meanly, and latter with a political economy to promote national assemble and manufacture.

National manufacture started in 1966 with a production of 647 units, and in 1977, it ascended to 11 574 tractors.

As it is seen, the production is still poor for a country with an area of two million square kilometers.

MEXICAN SOIL CHARACTERISTICS

National Territory is, in general, very arid. Only the 23% of the area could be considered humid.

Classification	Area in Ha (millions)	%	Pluvial Precipitation mm.
Total	196	100	
Very arid	45	23	Less than 300
Arid	39	20	300 to 500
Semi-arid	67	34	500 to 1000
Semi-humid	31	16	1000 to 1500
Humid	9	4	1500 to 2000
Very humid	5	3	More than 2000

Additionally, solely the 36% of the territory is flat (less than 10 degrees of slope).

Kind	Slope degree	Area in Has. (millions)	%
Total		196	100
Very Irregular	More than 25°	58	30
Irregular	From 10° to 25°	67	34
Flat	Less than 10°	71	36

Derivated from these characteristics, only the 15% of the territory is opened to cultivation.

Use	Area in Has. (millions)	%
Total	196	100
Good for Livestock	86	44
Forest	66	34
Opened for cultivation	30	15
Not useful	14	7

From this area the 60% depends of rain for its humidity. The total area opened to cultivation is not entirely exploted, only the 53% in 1973 as the better year.

TYPE OF IRRIGATION

Total area opened for cultivation	30	100
Depends of raining	18	60
Gravity Irigation	6	20
Bombing Irigation	3	10
Tropical-humid	3	10

USE OF CULTIVATION AREA

Year	Area in Has. (millions)	%
	30 000	100
Reported Use		
1970	14 975	50
1971	15 487	52
1972	15 243	51
1973	15 868	53
1974	14 905	50
1975	15 495	52
1976	14 815	49
1977	15 312	51

With these considerations, it comes out that even when exists a great extension of land in Mexico, the area with enough quality for cultiva tion is really very small, and besides, is holded by few people. This situation originates that most of the farmers would not have economic capacity to acquire mechanical aid for their parcels of land, creating a diminished real demand of tractors.

As it could be observed, it is required government technical and financial support to impel agricultural mechanization. This aid should look national autosufficiency in food production and a just economic system.

NATIONAL APPARENT CONSUMPTION 1960-1977

National apparent consumption of wheel tractors grew with a rate of 4.6% between 1960 to 1977, showing an irregular behaviour. This period of time contains seven stages: from 1960 to 1963 decreased 18%; from 1964 to 1965 grew 48%; from 1966 to 1967 diminished 17%; from 1967 to 1968 it was increased 54%; from 1969 to 1971 decreased 36%, from 1972 to 1975 grew 119% and, from 1976 to 1977 diminished 13%. (Table A).

DEMAND PROJECTION 1978-1982

The projection does not consider price demand-elasticity, because price has official control. It also do not consider growth of cultivable surfrace, since this does not keep relation with apparent consumption growth.

(TABLE A) NATIONAL APPARENT CONSUMPTION 1960 - 1977

Year	U N I T S			
	Production	Imports	Exports	Apparent Consumption
1960	-	7 056	-	7 056
1961	-	5 094	-	5 094
1962	-	5 143	-	5 143
1963	-	6 156	-	6 156
1964	-	9 088	-	9 088
1965	-	7 776	-	7 776
1966	467	6 018	-	6 485
1967	2 798	5 010	-	7 808
1968	5 367	6 624	-	11 991
1969	5 059	6 458	-	11 517
1970	3 954	4 978	-	8 932
1971	5 076	2 277	-	7 353
1972	6 677	2 885	-	9 562
1973	6 646	4 080	-	10 726
1974	7 951	7 411	-	15 362
1975	10 507	10 525	111	20 921
1976	9 664	7 863	20	17 507
1977	11 574	3 600	n.d.	15 174

There was used two different methods to calculate the behaviour of futuro demand: one linear regression, and the other with a parabolic curve. We used the first one since the second seems very optimistic.(See Graph 1 and Table B)

There is a National Agricultural Plan that pretend to add 60 000 tractor to the demand from 1978 to 1982. This additional demand should be added to the linear trend. Next Table shows the projection of demand divided in four different classes of tractor, depending the power in H. P.

APPARENT CONSUMPTION 1960 - 1977
AND PROJECTION 1978 - 1982

(units)

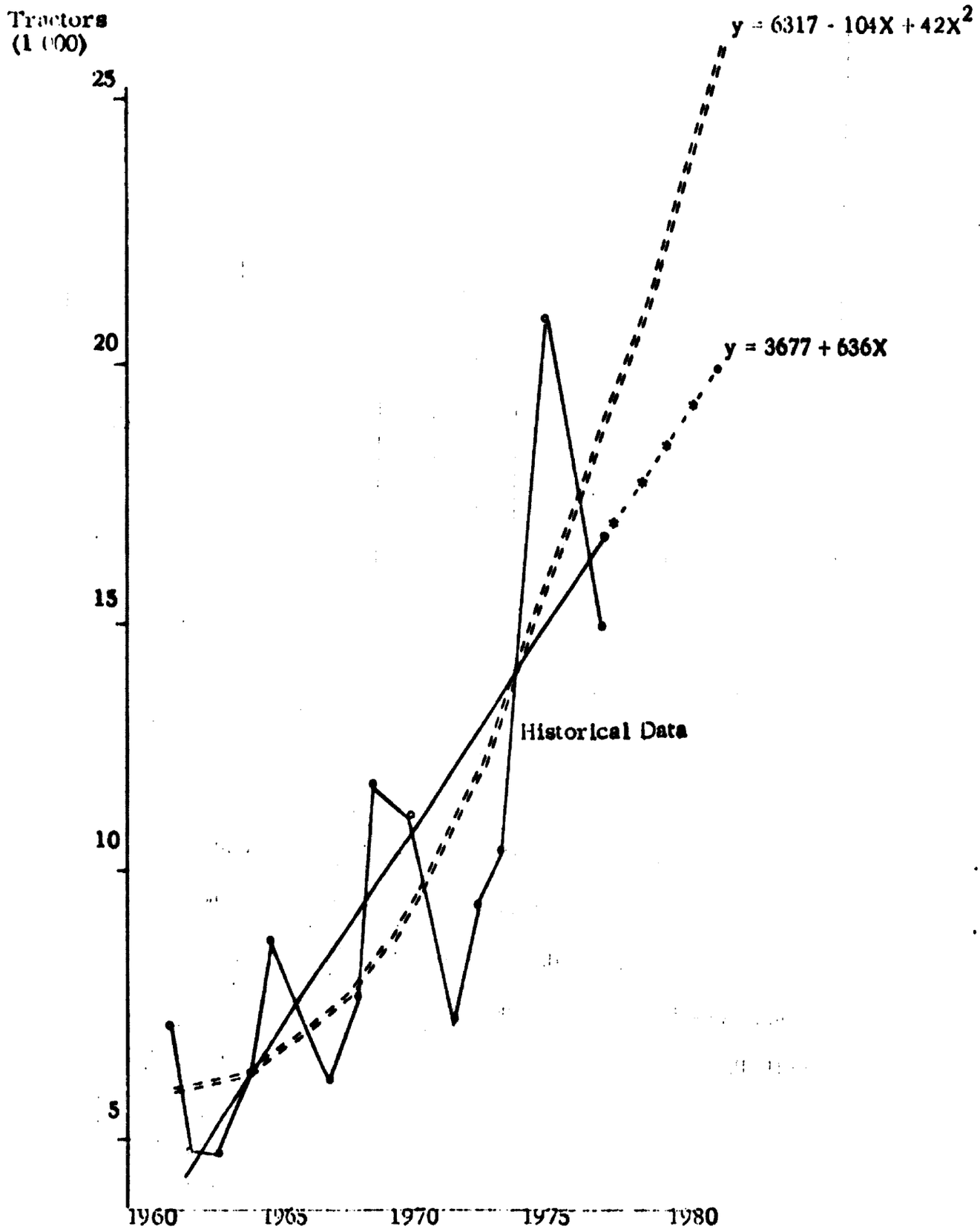


TABLE B DEMAND PROJECTION 1978 1982
(TRACTORS DIVIDED BY H. P. RANKS)

Year	Total	Until 40	41 - 59	60 - 79	80 or more
1978	28 711	1 389	2 534	11 145	13 643
1979	29 397	1 498	2 314	11 822	13 763
1980	30 083	1 607	2 263	12 429	13 784
1981	30 769	1 716	2 057	13 021	13 975
1982	31 455	1 824	1 876	13 594	14 161

This distribution is based in an historical behaviour of different ranks demand from 1969 to 1977, and the opinion from authorities in this matter.

PRODUCTION CAPACITY

As it was shown, tractor production started in 1966, and in 1977 reached a national manufacture of 11 574 units.

Year	Production	H. P. 25 - 40	H. P. 41-55	H. P. 60-79	H. P. 80 - 125
1966	467	n. d.	n. d.	n. d.	n. d.
1967	2 798	n. d.	n. d.	n. d.	n. d.
1968	5 367	n. d.	n. d.	n. d.	n. d.
1969	5 059	425	2 898	1 595	141
1970	3 954	302	1 811	1 809	32
1971	5 076	474	2 441	2 065	96
1972	6 677	482	2 542	3 087	566
1973	6 646	163	2 317	3 175	691
1974	7 951	315	2 331	4 209	1 096
1975	10 507	914	2 833	5 152	1 608
1976	9 664	1 027	1 686	5 883	1 068
1977	11 574	1 036	1 372	7 610	1 556

Comparing these production with the installed capacity is observed that the use of it is only 59%. It is not considered the T-25 production since this is only assembled.

Company	Tractor Production in 1977	Production Capacity	Use %
Massey Ferguson	4 269	5 000	85.4
Siderúrgica Nacional (Ford)	3 708	5 000	74.2
John Deere	1 850	3 000	61.7
International Harvester	981	2 500	39.2
Total	11 574	15 500	59.4

Making a comparison between capacity of production and future demand, there is a deficit, even if it is considered hereafter extension.

Company	Future Production Capacity
Massey Ferguson	8 500
Ford-Sidena	5 000
International Harvester	5 000
John Deere	3 000
Total	21 500

PARTS AVAILABILITY

One of the meanly problems that automotive industry faces is the supply of foundry parts. It has already been studied by Mexican state investors the possible solution to time, price and quality problems of the meanly supplies to this industry.

PRICES

Tractor prices to farmers were almost constant from 1968 to 1973, but the increase from 1975 to July 1978 is superior to the 100%.

Some Prices in International Market are lightly higher than in Mexico, with the exception of the Ford-6600 Tractor.

COMPARISON BETWEEN TRACTOR PRICES IN MEXICO AND THE U. K.

			(Sterlig pounds)	
		H. P.	In the U. K.	In Mexico
John Deere	4430	138	16 361	10 686
International	1046	93	12 902	9 547
Ford	[illegible]	67	5 786	6 117

TECHNOLOGY

Tractor manufacture technology used in Mexico comes from the U. S. A. and from the United Kingdom, except the one to assemble the soviet T-25 that comes from the U. R. S. S. which had a small unique payment -

for total transfer and consents the user freedom for manufacture and international trade, while the others can not be considered a transfer of technology only like a rent, in virtue that the cost is a percentage per saled unit and have restrictions for international trade.

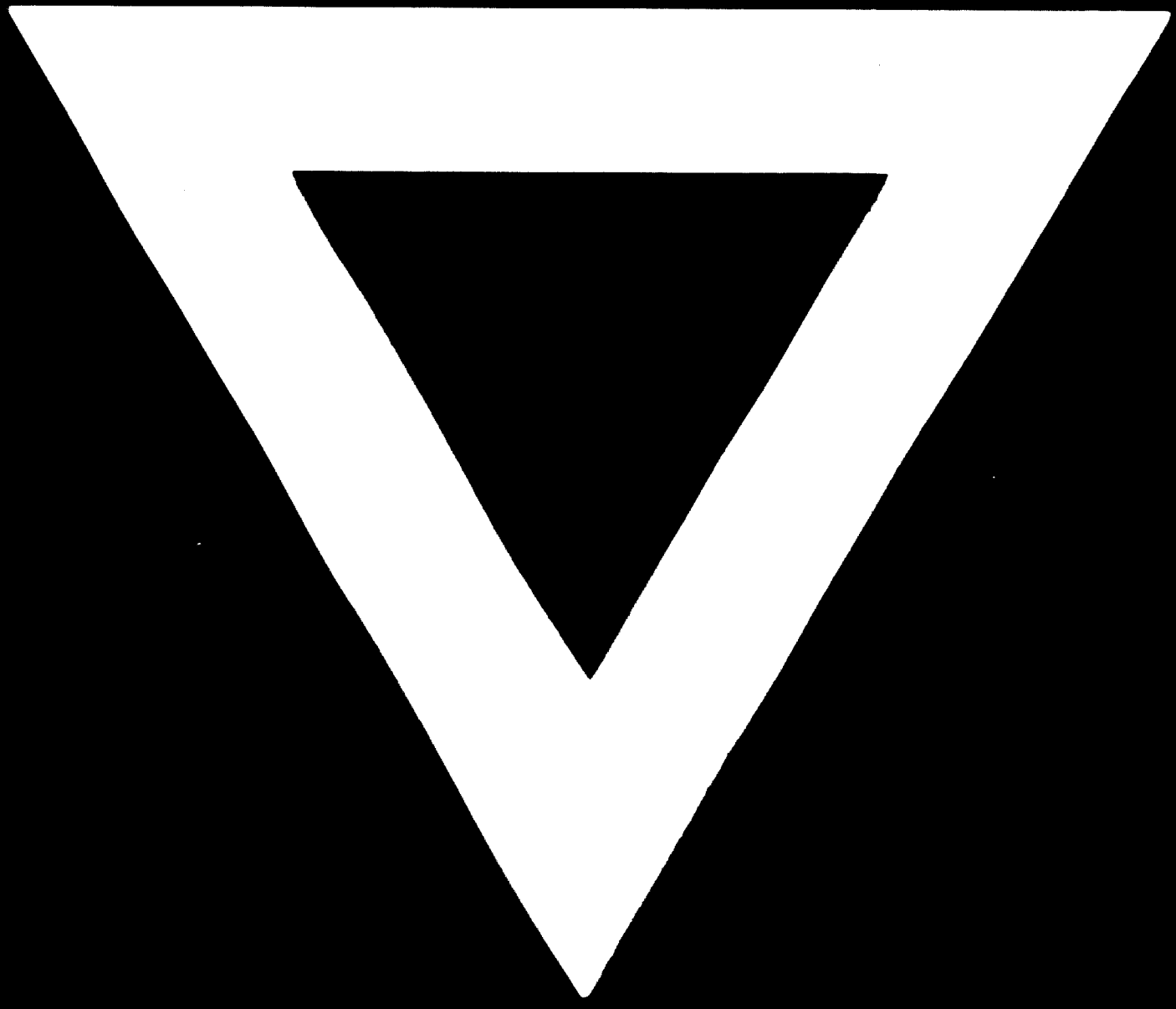
CONCLUSIONS

Mexican Government should do special efforts to solve simultaneously: the autosufficiency in food production; the acquisition of an adequate technology; and, the promotion to manufacture enough and cheap tractors to satisfy the increasing demand.

These three problems are involved and most be solve having in mind the independence and freedom to choose the type of tractors that could satisfy needs of mechanization at a lowest cost as possible, cost related with investments, technology, trade and prices.

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche

C-11



79.11.14