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

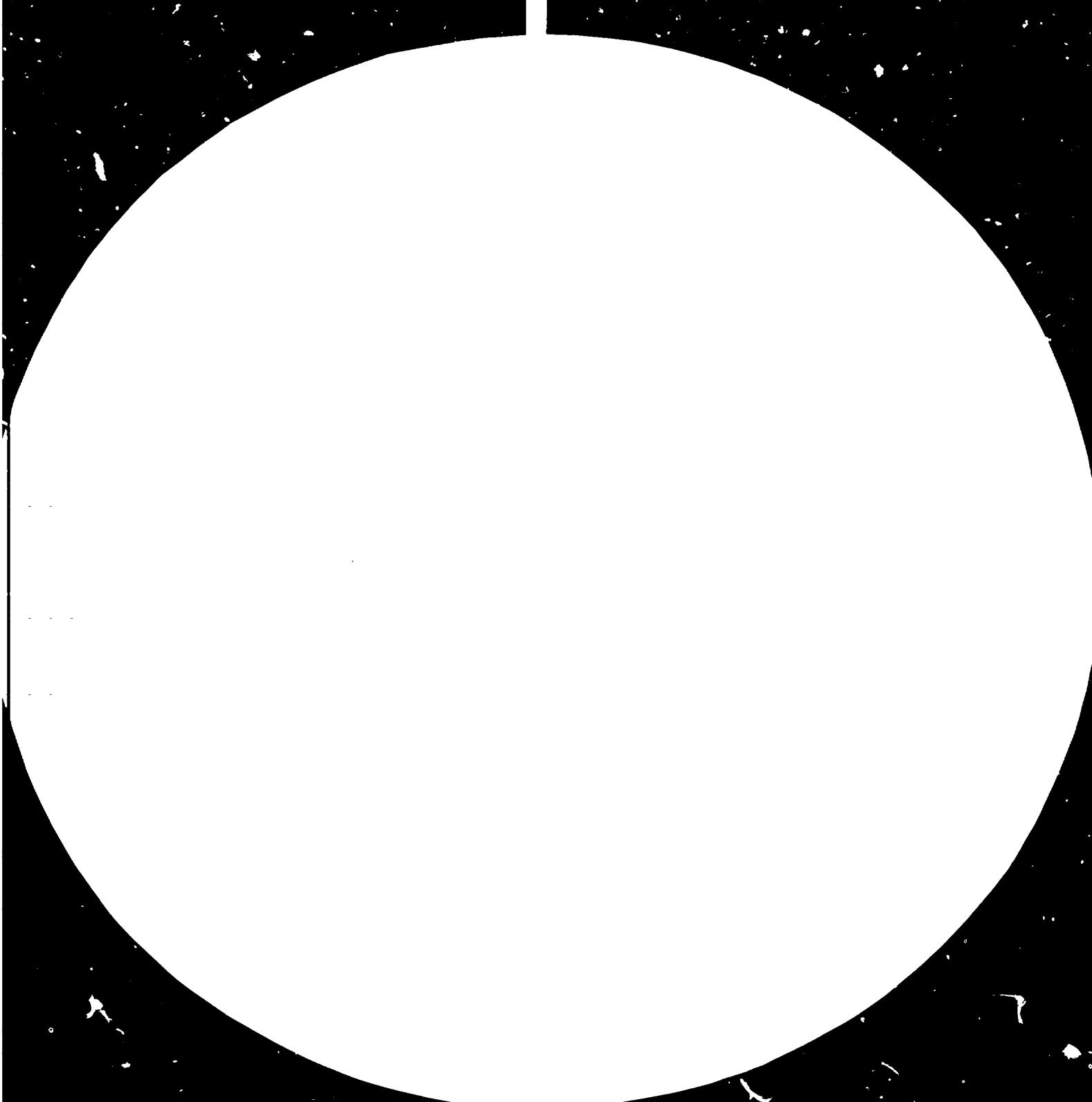
FAIR USE POLICY

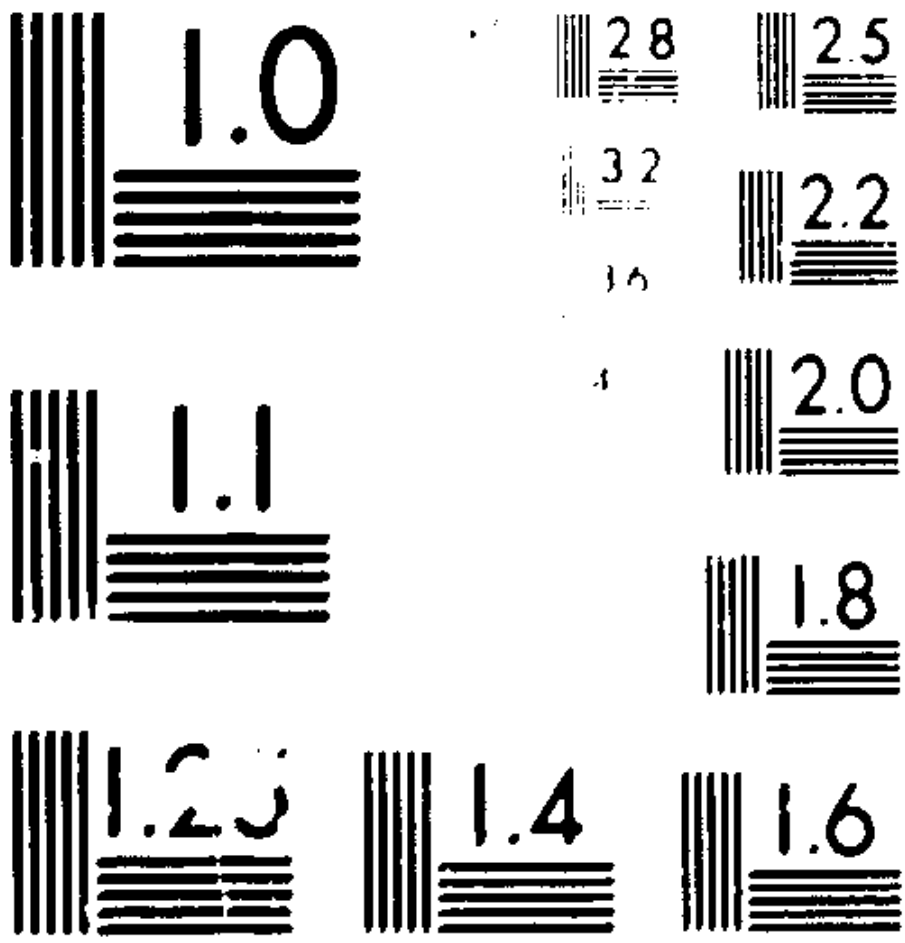
CONTACT

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




1.0
2.8
2.5
3.2
2.2
2.0
1.1
1.8
1.25
1.4
1.6

09553

Distr.
RESTRICTED

UNIDO/ITD.155
12 February 1973

ORIGINAL: ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

REPUBLIC OF MALAWI

AGRICULTURAL MACHINERY AND IMPLEMENTS MANUFACTURING FEASIBILITY STUDY MISSION[1/]

Final Report

by

G. Peterson
UNIDO Technical Assistance Expert

1/ The views and opinions expressed in this document are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

id. 73-907

INDEX

Introduction:

This report is being submitted on agricultural tools and implements market analysis and manufacture for Malawi with respect to agricultural hand tools, ox-drawn implements and hand-operated machines and the possibilities of their manufacture within the country.

In Malawi, there has been a rapid rise in agricultural productivity of both food and cash crops. Crop exports increased from 34 million Kwacha from 1969 to 47 million Kwacha by 1971 while agricultural produce accounted for over 78 % of the total exports, Malawi requires a greater corresponding effort in the promotion of agricultural inputs including among other inputs the use of improved tools and more power in order to maintain this pace particularily because of the limited amounts of new land for cultivation now available. To assist this effort the following is being proposed:

1. PROPOSAL FOR A MANUFACTURING PROGRAMME

It is suggested in order to assist the development of the local agricultural machinery industry, there is a need to strengthen existing manufacturing facilities by establishing a foundry and engineering workshop in Malawi. A foundry and engineering workshop could be used advantageously in utilizing metals existing in Malawi in the form of scrap and waste metals which are being exported abroad at the average rate of approximately 1,000 tons per year, including up to 30 tons of scrap metal per month produced by Agrimal (Malawi) Ltd. of a known content which they now export. In addition, there is estimated to be 10 years supply of various scrap metals within the country. Up to 45 % recovered metals, as a maximum, could be used in producing castings by converting scrap metal already in Malawi.

The foundry and engineering workshop would manufacture iron and non-ferrous castings for the agricultural implements industry for import substitution for castings now being brought in which are bulky with relatively high shipping costs. In addition, there are good possibilities of exports of agricultural implements from Malawi to Zambia, the future of this market while it should remain good for the immediate future is quite unpredictable because of the trend for other countries to implement their own manufacturing programmes.

The demand for castings for agricultural products is fairly widespread. The anticipated immediate demand for castings is listed as follows:

(a) Estimated Demand for Castings for Agricultural Products

(i) ox-cart hubs, wheel drums, bearings and stub axles - estimated demand 4,000 to 5,000 per year
(ii) ox-drawn plough wheels - 15,000 per year
(iii) ox-drawn ridging plough-frog, crevices - 1,000
(iv) cultivator -share arms for cultivator and control hook and wheels - 200
(v) hand water pumps - 500 to 1,000
(vi) maize mill parts - 100 to 200 (see later)
(vii) other ox-drawn implements - 750

(b) Estimated Demand for Non-agricultural Castings used in Agricultural Implements Manufacturing

(i) rolling mill safety blocks - 100 per year
(ii) rolling mill inserts - 50 to 80 per year (rough type casting only, the agricultural implement manufacturer will do any machine required).

NOTE: 1. The only foundry existing in Malawi is located at the Malawi Railway Workshop in Blantyre. Even though the Malawi Railway Workshop has not been used to its full capacity, it is felt that the best solution for the long run is for the industrial sector to have its own foundry and engineering workshop. The location of the proposed foundry and workshop should be decided by the Government of Malawi at either Blantyre, Liwonde or Lilongwe.

2. The size of cupola required for the foundry and engineering workshop would be the minimum size needed to handle solely the above range of products.

3. The cost of the small foundry is estimated to be approximately 67,000 Kwacha (US$ 80,000), with an estimated capacity of 2000 pounds per cupola charge.

4. Any agreement for establishing a new foundry and engineering workshop must include an agreement by the main agricultural implements manufacturing concerns to purchase their requirements for castings from the new foundry. Since most manufacturing is either for Government programmes or under existing governmental control, this part should not be difficult.

5. In the estimated demand for castings manhole type sewer covers have not been included because the Malawi Railway Workshop has the capability of producing manhole sewer covers although there still seems to be a preference in Malawi to use imported manhole sewer covers.

6. Referring to the exports of scrap metal from Malawi, the source of most scrap metals are from used tea estate machinery, metal turnings and waste metals from Malawy Railways, used heavy machinery and waste from the Ministry of Works, waste manufacturing metals from Brown and Clapperton and Agrimal (Malawi)Ltd. and waste metals from United (UTM). Old cars and other used automotive vehicles are included. Besides scrap iron and steel, aluminium, copper, lead, zinc and nickel are exported.

2. ADDITIONAL PROPOSAL FOR A MANUFACTURING PROGRAMME

It is suggested that the proposed future Small Industries Complex being put forward by the Import and Export Company of Malawi in Liwonde, under the aegis of the Malawi Development Corporation may consider the possibility of producing some of the agricultural hand tools and implements listed as follows:

(i) panga knife (matchet)
(ii) watering cans
(iii) African axes
(iv) water storage containers
(v) grain storage silos
(vi) dusters
(vii) ox-carts

While no one item listed above is probably an economically viable proposition at this time, with possible exception of the panga knife which is a borderline case, there are good possibilities that a combiantion of several on a small scale would contribute to a viable situation especially with outside assistance and Import and Export Company sponsorship as envisaged by the above proposal.

Panga knife sales for all of Malawi should be higher than imports indicate. According to the Farmer's Shopping Survey of August 1972*, 50% of the families in the survey actually purchased panga knives, another 29 % indicated they had intended to purchase panga knives, but

---

*/ Farmers' Shopping Survey Agro - Economic Survey. Ministry of Agriculture and Natural Resources, P.O. Box 303, ZOMBA, Malawi - August 1972.

did not succed in fact because panga knives were not available (21 %) or credit was not available (0 %). A second possibility concerning panga knife manufacturing would be to endeavour to interest Agrimal (Malawi) Ltd., an established manufacturer in Blantyre, in manufacturing panga knives. It is believed a viable number for them, ultimately would be higher, perhaps 250,000. The Government of Malawi should decide if panga knives should be manufactured by the private sector or by the governmental sponsored sector. A word of caution must be added here concerning product quality which contributes to a higher working efficiency in any tool. This especially applies to the panga knife which should be made from top quality high carbon tool steel properly tempered, which will then last longer and will hold a cutting edge for a considerabel time. There is a tendency in small industries to not be too concerned with product quality. With the above proposal of sponsorship it should be possible to set up and maintain standards of quality. It is urged that this be so organized in the programme. Of the above products, some parts may be imported with assembly and finishing taking place in Malawi. For example, the fine working parts of a sprayer such as valves and nozzles, may be imported with assembly and finishing of additional parts of the sprayer taking place within the country. On most items some of the manufacturing can be locally accomplished for instance, panga knife can be imported as a steel blank with forming, tempering and the addition of a wood handle taking place in plant in Malawi.

The sickle may also be a possibility for the above list, however, it was not included because of it's extremely low price as an imported item.

The proposed Small Industries Complex in Liwonde might also experiment with producing equipment for local manufacturing as recommended by the Intermediate Technology Development Group in London. Mr. Horspool, Farm Machinery Officer at the Agricultural Research Station in Chitedze has copies of sketches from I.T.D.G. showing this equipment which included low cost ox-carts, harrows, weeders, ground-nut threshers and irrigation equipment. Another source for designs of low cost village equipment in the V.I.T.A. Handbook is available from the American Embassy in Blantyre. The imported sickle in Malawi sells for approximately 40 Tambala (US$ 0.48). It would be difficult to compete with this source of supply in terms of price or quality or the combination of the two.

Other possible ventures for the Small Industries Complex which have been suggested, are manufacturing units for tin can forming and for producing bicycle spokes and nuts. Both are related to agriculture, the first to preserve agricultural produce and the second is used for farming purpose as part of the farmers' equipment to haul or transport their goods to market.

3. RECOMMENDATION FOR THE CHITEDZE AGRICULTURAL RESEARCH STATION, LILONGWE

Horspool, Farm Machinery Research Officer at the Chitedze Agricultural Research Station, working with minimum staff and assistance has developed an Ox-drawn toolbar. He has also carried out tests on the Unibar Ox-drawn toolbar, groundnut stripping and shelling equipment and has worked on groundnut lifting blades. This work has been quite well executed especially the work on the Chitedze multipurpose toolbar, with plough, ridger, cultivator and groundnut lifter. The construction is quite satisfactory utilizing R.H.S. (Rectangular Hollow Section) steel to good advantage. However, the expert believes it is good policy to offer first conventional individual tools and to make available only as an extra optional item agricultural implements such as toolbars or convertible tools because farmers may not be capable of changing convertible tools or properly setting them unless the toolbar or convertible tool can be made more simply than now by making it possible to attach only two complete units to each other, one a completely assemblied carrier unit in a section to a completely assembled working unit in another section, possibly even eliminating many of the loose bolts envolved in the process. The greatest foreseeable need at the Chitedze Agricultural Research Station in the Farm Machinery Investigation Section is making provision of more trained staff for the purpose of accelerating the research and development work being carried out there. In addition to the above, the following suggestions are being put forward for consideration for further work. Suggestions for expanding the staff at the Agricultural Research Station in the Farm Machinery Investigation Section in order to assist the development of the local farm machinery industry includes the addition of an engineer or technical officer and more junior staff such as a mechanic, welder, carpenter and recorders.

SUGGESTIONS FOR RESEARCH AND DEVELOPMENT AT THE AGRICULTURAL RESEARCH STATION

1. An investigation of maize grinding mills, in particular, the plate type maize grinding mill which would augment the proposal for a foundry.

2. It is suggested that the development of a single row ox-drawn weeder for use with a single oxen equipped with a single yoke harness could be useful.

3. Smaller and more efficient hand weeding hoes could be introduced and promoted if farmers are urged to use them earlier in their weeding programme.

4. Introduction of a small scythe is a distinct possibility and well worth investigating. The scythe is approximately three times faster than the sickle. It requires more skill to use and more frequent sharpening along with fairly flat fields and an uniform standing crop. In Malawi it perhaps is best suited for use with a livestock programme. A lighter type scythe such as may be available from Spain, Denmark or West Germany is suggested.

5. A satisfactory solution for a simple groundnut sheller for Malawi has not been found at the farmer level. The only one tested at Chitedze that had less than 10 % undamaged kernel was the Skylux Junior from U.K. but succeeded only on one variety, the Malimba. An efficient engine driven decorticator which is capable of producing an acceptable sample in one operation and shared by a group of farmers because of the cost is judged to be far better for the time being while the search for a simple groundnut sheller is being further investigated.

6. The introduction of existing tools and implements which have been used successfully elsewhere and may need some modification for conditions in Malawi should be promoted by the Ministry of Agriculture. One possibility, if not already known, is the French designed Ariana ox-drawn tool frame which is probably an intermediate step between individual ox-drawn implements and a full toolbar line. The Ariana is produced in Kenya by Hear Exchangers Ltd., P.O. Box 3070, Nairobi, Kenya. Other French designs available in West Africa could be investigated such as the multi-purpose single animal drawn cultivator as recommended by Agro-nomic Research in Senegal. Further information on French equipment could be obtained from the French Embassy in Blantyre.

4. STATUS OF MANUFACTURING

(a) PRODUCTION OF FARM MACHINERY AND OX-CARTS IN MALAWI - 1972

	QUANTITY	DOMESTIC CONTENT
hand digging hoes	810,000	90 %
ox-drawn mould board plough	1,275	40 %
ox-drawn ridging plough	750	40 %
ox-drawn harrows	700	60 %
ox-drawn cultivators	315	35 %
ox-carts	2,500 to 3,000	30 %

(b) EXPORTS TO ZAMBIA - 1972

hand digging hoes	31,500
mouldboard plough	500
harrows	700
ox-carts	1,000 (est.)

(c) IMPORTS OF FARM IMPLEMENTS TO MALAWI

(see attached annexes)

(d) LIST OF THE AMOUNT OF PRODUCTION IN EXISTING FACTORIES

1. Agrimal (Malawi) Limited, P.O. Box 143, Blantyre

	QUANTITY	DOMESTIC CONTENT
hand digging hoes	810,000	90 %
ox-drawn mouldboard plough	1,275	40 %
ox-drawn riging plough	750	40 %
ox-drawn harrows	700	60 %
ox-drawn cultivators	315	35 %

NOTE:

The above is the only company engaged in manufacturing agricultural implements in Malawi. Other companies are engaged in assembly and finishing. Under assembly and finishing domestic content is supposed to represent the amount added in Malawi. For instance, the domestic content of the digging hoe which is manufactured in Malawi is approximately 90 %. For most ox-carts the domestic content is only 30 %. In November 1972, Agrimal (Malawi) LImited produced 108,000 hoes of which 15,000 went to Zambia.

(e) LIST OF COMPANIES IN ASSEMBLY AND FINISHING IN MALAWI

1. R.B. Chilupira, P.O. Mathenje

	QUANTITY	DOMESTIC CONTENT
ox-carts	800	30 %

2. Bwaira Carpenter Owners Association, P.O. Box 509, Lilongwe

	QUANTITY	DOMESTIC CONTENT
ox-carts	50	30 - 40 %

3. Brown and Clapperton Ltd., P.O. Box 52, Lilongwe

	QUANTITY	DOMESTIC CONTENT
ox-carts	1,000	30 %

NOTE:

Have also produced the Chitedze ox-dran toolbar with groundnut lifter, plough, cultivator and a prototype maize mill. Ox-carts are produced mainly for export to Zambia.

4. Petroleum Services Ltd., P.O. Box 525, Blantyre

	QUANTITY	DOMESTIC CONTENT
ox-carts	1,000	30 %

5. Lilongwe Garage Ltd., P.O. Box 45, Lilongwe

	QUANTITY	DOMESTIC CONTENT
Maize Hammer Mills	120	bearings are imported

NOTE:

They use the Potassium Cyanide hardening process for blades. They also undertake welding, metal cutting, metal-gringing and turning.

6. Plumbing and Engineering Works, P.O. Box 30038 Chichiri, Blantyre 3, Malawi

They are assembling and finishing tractor drawn farm trailers (2 wheel and 4 wheel).

5. RECOMMENDATIONS CONCERNING THE EXISTING MANUFACTURING UNIT

(a) The first recommendation is that Agrimal (Malawi) Ltd. probably requires re-adjustment of their Government controlled price for the digging hoe which is 62 Tambala each to the consumer throughout Malawi on account of their rising material costs.

(b) It is further recommended that consideration be given to bringing to Malawi steps 1 and 2 in the manufacturing process for the digging hoe by Agrimal (Malawi) Ltd. which steps are now performed outside of Malawi before importation of the blanks for the digging hoes. Step 1 is cutting individual blanks from bar length stock in T-shaped sections. Step 2 is extending and forming the shaft portion of the blank (new length after forming is 4 1/4 inches long).

6. SUMMARY OF PROPOSALS AND RECOMMENDATIONS

(a) Proposal to establish within Malawi a foundry and engineering workshop to produce parts for farm implements utilizing some of the scrap metals and wastes now being exported from Malawi at the average rate of 1,000 tons per year.

(b) Recommendation for Small Industries Complex at Liwonde be used for assembly and finishing of some selected agricultural hand tools and implements. Requirement should be specified to maintain quality control over the products being produced. The panga knife comes nearest to being a viable product in the hand tool line.

(c) Some of the suggested areas needing further research and development at the Chitedze Research Station are maize grinding mill, single row ox-drawn weeder, ox-harness and yokes, groundnut strippers and shellers as well as the introduction and modification of tools used successfully elsewhere that have possibilities in Malawi.

(e) Suggestion that manufacturing steps and step 2 for the digging hoe at Agrimal (Malawi) Ltd. now accomplished outside Malawi be considered for domestic processing.

7. FINAL RECOMMENDATION TO THE GOVERNMENT OF REPUBLIC OF MALAWI AND UNIDO

Based on the findings of this study in order to assist the development of rural industries, local technical competence, training in all engineering aspects and assistance in import substitution and the development of engineering capabilities, the recommendation is for the establishment of a pilot demonstration engineering workshop and foundry for the manufacture of simple animal drawn implements, hand tools, hand operated machinery, castings, and allied engineering sheet metal and metal fabricated products by UNIDO in co-operation with the Malawi Development Corporation and the Import and Export Company of Malawi. For information on the complete project proposal, please refer to Annex - A, Appendix - I.

Also, based on the findings of the study , a further recommendation is for UNIDO in co-operation with the Ministry of Agriculture and Natural Resources, to provide sample machinery from other countries that have good possibilities for development and utilization in Malawi to the Farm Machinery Investigation Section at Chitedze, along with fellowhsips for training the staff members of the Farm Machinery Investigation Section to increase their competence, know-how and engineering capabilities. A project proposal to the above effect is enclosed in Annex - A.

ANNEX I

EXPORTS OF SCRAP METAL FROM MALAWI

73.01.01.00 Waste and Scrap, of Iron and Steel.

1968		1969		1970	
Qty.	K Value	Qty.	K Value	Qty.	K Value
700 tons	27,092	1315 tons	25,242	2569 tons	58,284

1971		1972 (3 Qtrs)	
Qty.	K Value	Qty.	K Value
1210 tons	57,357	877 tons	14,943

Note = 379 tons in Sept. 72
for one month alone.

Annex II

A SAMPLE OF SELECTED

IMPORTS FOR 1970

	1970	
	Quantity	K Value
Grass Slashers	4,800 No.	1,460
Sickles	14,700 No.	2.806
Matchets	57,400 No.	14,760
Axes	2,978 No.	2,796
Picks and Mattocks	6,088 No.	5,364
Agric. Hoes	136,376 No.	30.078
Agric. Hoe Blanks	505,000 No.	135,038
Hay Forks		
Shovels	7,556 No.	9,250
Rakes	378 No.	61
Wheel Barrows	44,672 lbs.	7,420
Stub Axles		
loose Scotch Cart Axles		
Farm Cart Wheels		
Steel Wheels for Carts	2,034 lbs.	400
Ploughs, single furrow	75 No.	840
Ploughs exc. 120 lbs.	92 No.	26,750
Cultivators	17,566 lbs.	5,242
Spraying Machines	232,689 lbs.	321,984
Tractors, Agric.	223. No.	737,348
Spare Parts for Tractors	320,868 lbs.	809,336
	Exports - 1970	
Agric. hoes	79,400	35,174

ANNEX III

A SAMPLE OF SELECTED

Imports for 1971 and

JAN. - JULY 1972

	1971		JAN - JULY 1972	
	QUANTITY	K VALUE	QUANTITY	K VALUE
GRASS SLASHERS	6,000 No.	3,155 K.	4,440 No.	1,622 K.
SICKLES	40,325 No.	8,855	38,000 No.	8,744 K.
MATCHETS	73,039 No.	26,530	18,720 No.	6,908 K.
AXES	4,845 No.	10,744	15,466 No.	12,233
PICKS & MATTOCKS	7,692 No.	8,221	4,800 No.	6,036
AGRIC. HOES	17,000 No.	7,522	10,800 No.	4,755
AGRIC. HOE BLANKS	613,000 No.	181,249	407,000 No.	133,528
HAY FORKS	24	123	12	34
SHOVELS	11,792 No.	17,254	4,075 No.	5,208 K
RAKES	1,042 No.	594	374 No.	266
WHEEL BARROWS	90,880 lbs.	16,595	67,906 lbs.	13,270 K
STUB AXLES & WHEELS	21,833 lbs.	15,159	93,390 lbs.	52,520 K
LOOSE SCOTCH CART AXLES			46,029 lbs.	17,892 K
FARM CART WHEELS	25,366 lbs.	5,970	12,523 lbs.	2,466 K.
STEEL WHEELS FOR CARTS N.E. 120 LBS.			32,975 lbs.	6,287 K
PLOUGHS, SINGLE FURROW	65 No.	876	50 No.	616
PLOUGHS, EXC. 120 LBS.	45 No.	11,744	9 No.	4,430
CULTIVATORS	11,524 lbs.	4.747	7,423 lbs.	1,606
SPRAYING MACHINES	138,329 lbs.	184,365	79,486 lbs.	117,864
TRACTOPS, AGRICULTURAL	380 No.	1,257,723	18 No.	88,255
SPARE PARTS FOR AGRIC. TRACTORS	684,090 lbs.	1,004,835	150,565 lbs.	162,380
	Total =	2,766,261	Total =	646,920
	EXPORTS	FOR 1971 & Jan. - JULY 1972		
AGRIC. HOES	30,700	14,386	9,200	4,106

NOTE FOR ANNEXES II AND III

1) Data on imports for the complete year for 1972 has been promised to be available later as this data is not included at this time.

2) The following unit weights and prices apply to the chart for imports:

wheel barrows	61 lbs. each
cultivators	87 to 93 lbs. each
B. & C. ox-cart axle and wheel assembly	155 lbs. each
spraying machines - Admarc Lehavet	25 lbs. each
approximate price of the B. & C. ox-cart axle and wheel assembly	K 88.00 each
Admarc sprayers	K 30.00 each
H. & C.D. Knapsack sprayers	K 48.50 each

ANNEX IV

LIST OF NAMES AND ADDRESSES

FOR MALAWI

Agrimal (Malawi) Limited
Makata Road, P. O. Box 143
Blantyre, Malawi

Mr. M.G. Walter - Managing Director

Malawi Development Corporation
Development House - Victoria Ave.
P. O. Box 566
Blantyre, Malawi

Mr. A.S. Brass - General Manager
Mr. T.O. Kanyuka - Project Manager
Mr. D.S. Timms - Adviser

Ministry of Trade, Industry & Tourism
P. O. Box 944
Blantyre, Malawi

Mr. T.B.A. Jere

National Statistical Office
P. O. Box 333
Zomba, Malawi

Mr C.C Greenfield - Director
Mr G.L. Chimwala

The Import & Export Co. of Malawi Ltd.
Tradeways House, Haile Selassie Rd.
P. O. Box 1106
Blantyre, Malawi

Mr. Kenneth M. Sheldon - Managing Dir.
Mr L.L. Mawena

The Agricultural Development and Marketing Corporation
P. O. Box 5052
Limbe, Blantyre, Malawi

Mr L. M. Masku
Mr. P.N. Scott
Mr. K.M. Hines
Mr. John Cotton

Ministry of Agriculture and Natural Resources
P. O. Box 303
Zomba, Malawi

Mr P. Bannister - Permanent Secretary
Mr. Peter Brown - Director of Agricultural Research

[redacted]