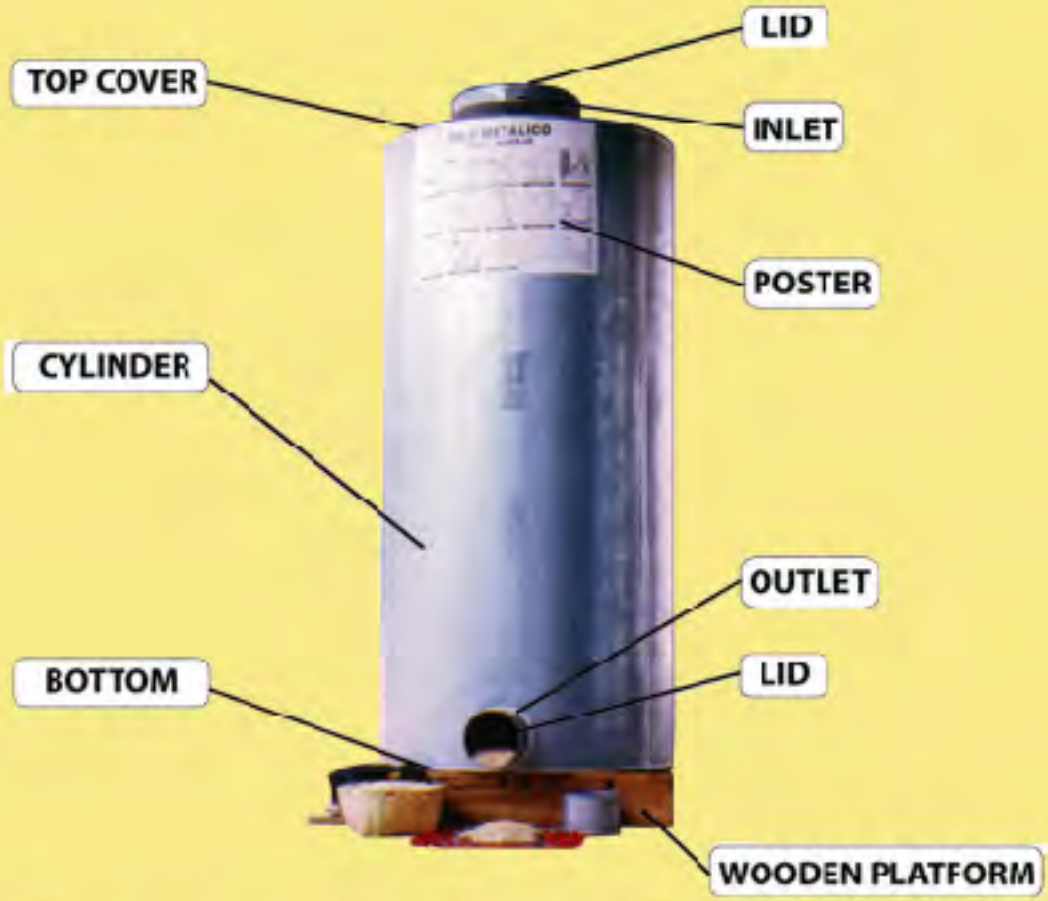
GET TO KNOW THE METAL SILO: AN EFFECTIVE TECHNOLOGY FOR POVERTY ALLEVIATION

Brief overview



Food security is a human right

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CONTENTS

1. GENERAL INFORMATION....1

2. EXPERIENCE IN CENTRAL AMERICA....2

3. WHY PURCHASE A SILO?....3

4. HOW ARE ARTISANS TRAINED?....4

4.1 Requirements for pre-selection of artisan trainees....4
4.2 Admission examination....5
4.3 Artisan training courses....7
4.4 Setting up and outfitting a workshop to make silos....8
4.5 Tools required....9
4.6 Materials to make silos....10

5. ATTACHMENTS:....11
5.1 Benefits of silos and grains....12
5.2 Measurements of silos with different capacities....12
5.3 Quality control, checking for the mistakes most often made....13
5.3.1 Checking for mistakes most often made, continued....14
5.4 Photographs of silos with different capacities....15
5.5 Poster on use and handling....16
5.6 Silos in the field....17
5.6.1 Using the silo in Guatemala....17
5.6.2 Using the silo in Honduras....17
5.6.3 Using the silo in El Salvador....18
5.6.4 Using the silo in Nicaragua....18
5.6.5 Using the silo in Cuba....19
5.6.6 Using the silo in Peru....19
5.6.7 Using the silo in Ecuador....20
5.6.8 Using the silo in Africa....20
5.7 Impact of metal silo....21
5.7.1 Grain stored in metal silos, Central America (MT)....21
5.7.2 Grain stored in metal silos (MT) and grain was not lost because it was stored in metal silos (MT/year)....22
5.7.3 Metal Silos delivered in Central America 1980 to 2008....23
5.7.4 People with food security in each country....24

1. GENERAL INFORMATION METAL SILOS.

1.1 Definition. A household silo is a cylindrical structure made of galvanized sheet steel, gauge 26 (0.5-0.7 mm thick), with its joints sealed by capillary-type soldering using tin and lead, applied by a soldering iron heated in a charcoal-burning furnace.

1.2 Storage capacity. 400 pounds (0.18 metric tons); 800 pounds (0.36 MT); 1200 pounds (0.55 MT); 1800 pounds (0.8 MT); 3000 pounds (1.36 MT).

1.3 Uses. For bulk storage of dry grains: corn, beans, sorghum, rice, barley, wheat and seeds.

1.4 Weight. Depending on the silo's capacity. For example, an empty 1800 lb. (0.8 MT) silo weighs about 62 lb. (28 kg) and a 3000 lb. silo weighs 85 lb. (38.6 kg).

1.5 Investment payback. The initial investment to purchase the silo is paid back by the price differential between harvest time and sale time (depending on the type of grain) and the savings by preventing 10-20% weight loss. Then, these savings continue for 20 years' useful life expectancy.

1.6 Post-harvest artisan. A man or woman trained to make good-quality silos of different capacities, who sets up his or her own strategically located workshop, equipped with the necessary tools and supplied with the materials to make silos and related products.

The artisan must have an entrepreneurial approach, competing with quality and prices, making this work a livelihood, investing, promoting his/her products and services, administering the workshop as a rural company, diversifying work and employing at least three other persons. One artisan must be trained per 2000 families who are potential silo users. Artisans also teach persons who purchase silos how to use and handle them.

With leftover sheet steel, artisans can make sheet metal products, to reduce environmental pollution, earn extra income, and work year-round.

Transfer Channel. Public or private development organizations that serve as liaisons between the family silos program and the target population.

Target population. Small and medium producers of basic grains, grain gathering centers, genetic improvement programs, poultry raisers, fish farmers, etc.

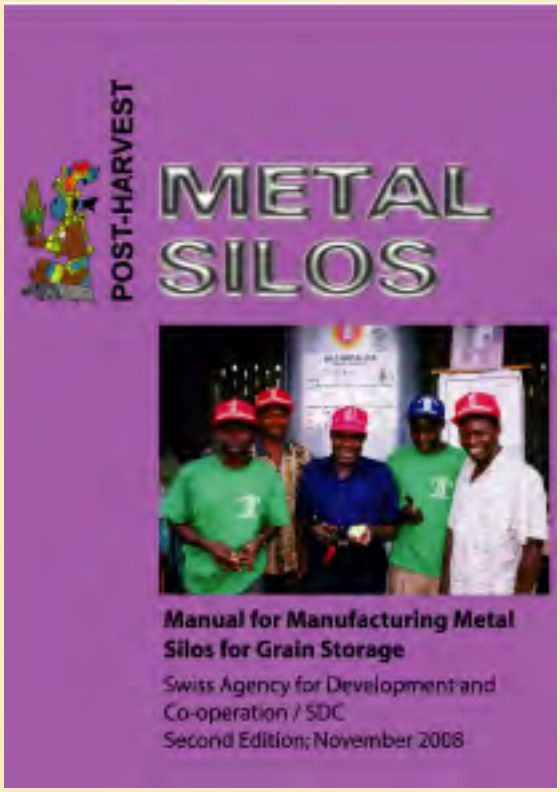
Transfer. Delivering silos from artisans' workshops to specific groups in the target population.

2. EXPERIENCE IN CENTRAL AMERICA.

These metal silos were developed in Central America, for warm, temperate and cold climates. They have also proven successful in Cuba, Peru and Africa.

The Swiss Agency for Development and Cooperation (SDC) supported four national post-harvest programs in El Salvador, Nicaragua, Honduras and Guatemala, delivering over 564,526 metal silos, mostly for 1800 and 3000 pounds in capacity. 500,00 MT stored in metal silo

To make these silos, the transfer scheme and supporting material designed included:



1. **Silo making manual.**
2. **Sheet metal manual.**
3. **Administration manual.**
4. **Artisan's notebook.**
5. **Flipcharts on post-production issues and silo use.**
6. **Videos on making silos.**
7. **Leaflets to train technicians.**

3. WHY BUY A SILO?

3.1 For a family. It is a savings bank. It gives farmers negotiating power, because they can store their harvest and later sell for a better price.

3.2 It is a physical barrier that. Keeps out insects (beetles and their grubs, moths), rodents, contamination by fungi and environmental moisture.

3.3 It can be used. In the Highlands, on the Coast, in the Amazon Jungle, without any problems.

3.4 Useful lifetime. Depending on handling, up to 20 years.

3.5 Materials used. Made of smooth sheet steel, galvanized, 0.55 mm thick.

3.6 Using the silo. For storing DRY GRAINS, such as corn, beans, rice, soy, sesame, feed and SEEDS.

3.7 Manufacture. Decentralized production by post-harvest artisans, who make silos and teach customers how to use and handle silos and grains. They also generate rural employment and income.

3.8 Amortization. The silo pays for itself because of the price differential between harvest time and when the grain is sold, and by preventing storage losses, which traditionally amount to some 20% of the harvest.

3.9 Storage time. Grains may be stored for over one year, with ZERO LOSSES.

3.10 Cost. Depending the size: 170 dollars for an 1800-pound silo, 300 dollars for a 3000-pound silo, and 70 dollars for a 400-pound silo.

3.11 Capacity. There are different sizes: 150, 400, 800, 1200, 1800, and 3000 pounds.

4. HOW ARE THE ARTISANS TRAINED?

4.1 REQUIREMENTS TO SELECT ARTISAN TRAINEES.

National Storage Unit (UNA)

Ministry of Agriculture and Livestock, Aquiculture and Fishing (MAGAP)
Avenida Eloy Alfaro No. 30-350
& Avenida Amazonas, 9th Floor.
Telephone: 02-2544147; 02-2566757
Quito, Ecuador.
Email: unidadnacionaldealmacenamiento@hotmail.es

1. Man or woman who knows how to read and write.
2. Good knowledge of basic mathematics.
3. Knowledge of the metric system.
4. Less than 40 years of age.
5. Living permanently in the community.
6. Responsible person with a good reputation.
7. Economic capacity to set up a sheet-metal workshop.
8. Well-defined demand for metal silos.

Commitments by artisans

1. Respect schedules and rules of the post-harvest workshop.
2. Attending training and other project activities.
3. Collaborating with the technician in their community.
4. Training customers in using and handling metal silos.
5. Reporting regularly to the Coordinating Unit on metal silos made, on the established form.

Silo No.	Made on (date)	Sold on (date)	Purchase mode				
			Cash	Credit	Inst.	Name	Address

4.2 National Storage Unit (UNA)

Ministry of Agriculture and Livestock, Aquiculture and Fishing (MAGAP)

4.2 ADMISSION EXAMINATION

Reserved for the Institution: Score: NO ( ) YES ( )
Training date (scheduled): _____
OBSERVATIONS:
_____
_____
_____
Evaluation (Name): _____ Reviewed by (Name): _____

PLACE AND DATE: 2009

OVERALL DATA

NAME_____AGE_____(Years)

HOW INVITED: _____
_____

APPLICANT, READ THIS TEST CAREFULLY BEFORE ANSWERING

PART ONE: ANSWER THE FOLLOWING QUESTIONS:

1. DO YOU KNOW WHAT POST-HARVEST MEANS? (EXPLAIN)
_____

2. BRIEFLY DESCRIBE A METAL SILO (GRAIN BIN)?
_____
_____

3. WHY WOULD YOU LIKE TO RECEIVE THIS TRAINING?
_____
_____

4. WHAT SHEET-METAL TOOLS HAVE YOU WORKED WITH?
_____ _____
_____ _____
_____ _____

PART TWO: ANSWER THE FOLLOWING QUESTIONS:

1. HOW DOES GRAIN SPOIL (CORN, BEANS, ETC.) WHEN STORED TRADITIONALLY (SACKS, *TABANCO*, ETC? (EXPLAIN).

_____

2. HOW MANY PERSONS IN YOUR COMMUNITY ARE INTERESTED IN BUYING METAL SILOS (GRAIN BINS)?

_____

_____

PART THREE: DO THE FOLLOWING EXERCISES:

1. WRITE THE FULL NAME FOR EACH ABBREVIATION:

Ml_____ Cm_____
Mm _____

2. NAME THE FOLLOWING MEASUREMENTS: (EXPLAIN)

D = _____
R= _____

PART FOUR: COMPLETE THE FOLLOWING:

1.	_____ CENTIMETERS	=	1 METER
2.	_____ MILLIMETERS	=	1 CENTIMETER
3.	1.5 CENTIMETER	=	____MILLIMETERS
4.	10 MILLIMETERS	=	____CENTIMETER

PART FIVE: DO THE FOLLOWING OPERATIONS:

1. ADD:

15.5
+ 0.5
_____
= _____

2. MULTIPLY:

3 SUBTRACT:

4. DIVIDE:

4.3 Artisan training courses

To teach trainees as artisans about the technical details of manufacturing quality silos in different capacities, according to specifications and norms established by the Regional Post-Harvest Program. By the end of the course, participants must have made two silos: for 1800 lb. (0.8 MT) and 3000 lb. (1.3 MT). They also learn to use and handle a silo properly and how to transport it. In this five-day course, the slogan is "the first silo I make must be the best". Details on this training course are given in Attachment 7.1.

4.4 Setting up and outfitting a workshop to make silos.

Physical space. To set up a post-harvest workshop, a new place need not be built. It is better to adapt an area in the artisan's house. The physical space should meet the following recommendations:

- Roomy, approximately 25 square meters.

- Strategically located, visible, to reach the highest possible volume of sales, such as along a roadway, at a market, etc.

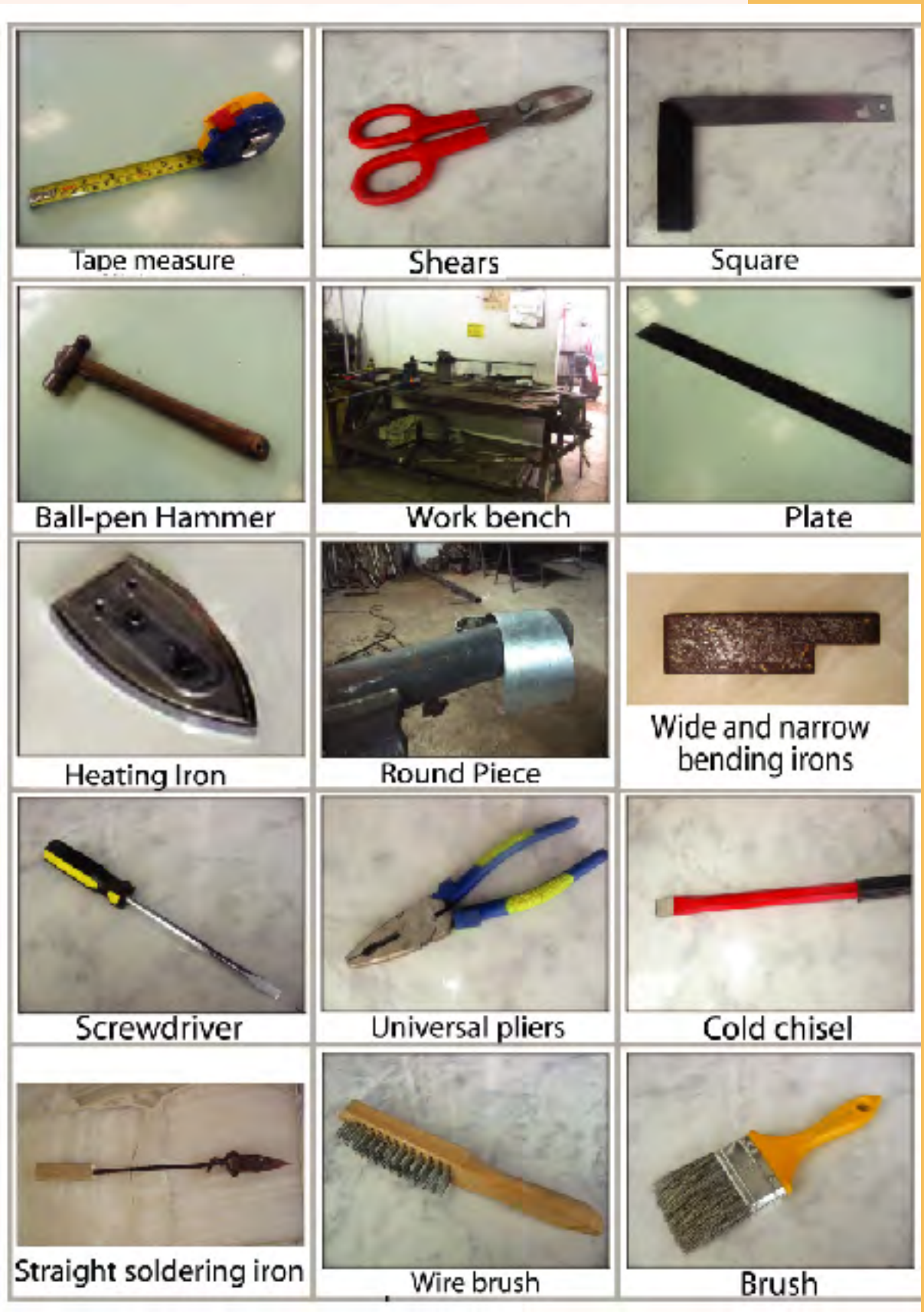
- A sign clearly identifying the workshop.

- Room to keep finished silos out of the rain.

- Orderly, with sheet steel up off the floor, tools kept in safe places, and the muriatic acid out of children's reach.

The artisans need to invest approximately 65 to 80 dollars, to purchase their own tools, in order to substantiate their genuine interest and motivation.

4.5 Tools required.



4.6 Materials to make silos.

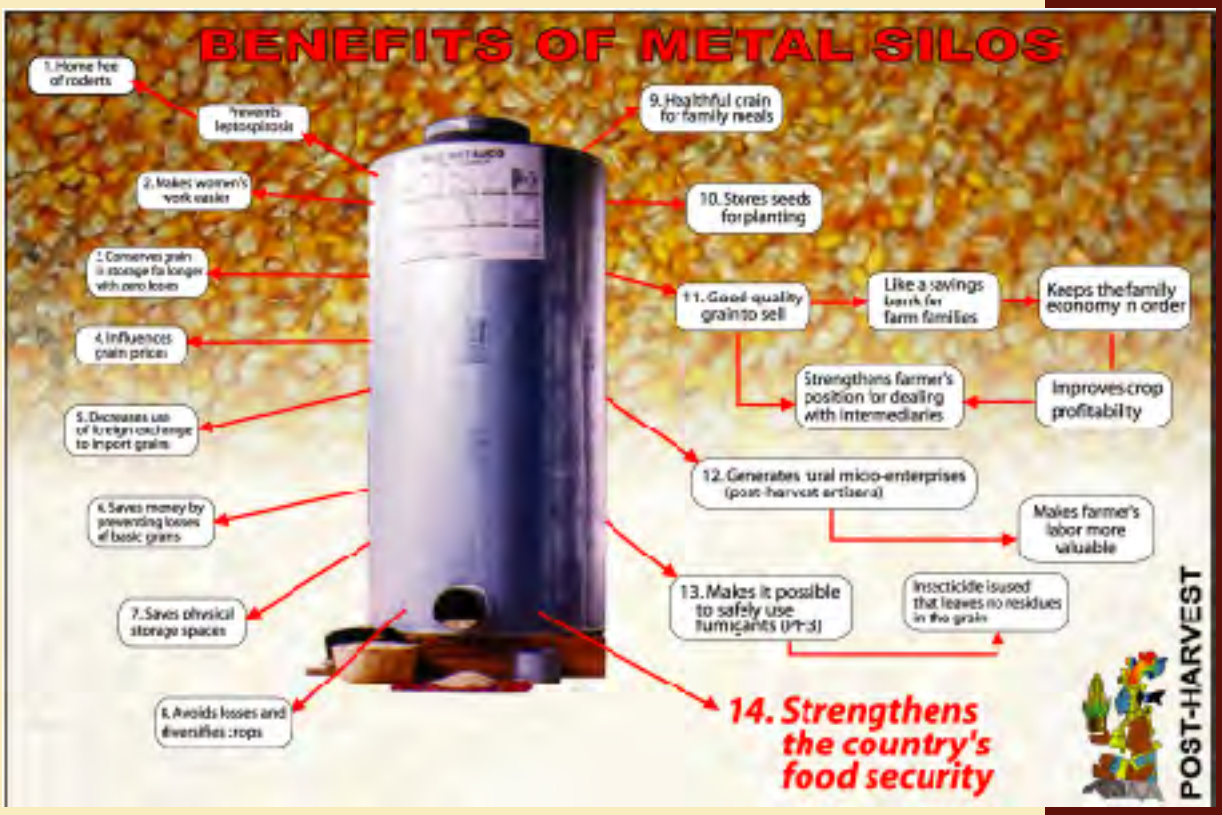
To begin an artisan's work the following materials are required:

1. A workshop equipped with a wooden workbench, with a straight angle iron at one end.
2. Galvanized sheet steel, 0.7mm thick, 120 cm wide by 240 cm long.
3. Bars of tin and lead molten together, in a 50/50 ratio.
4. Warehouse to keep the materials and silos that have been made.

5. ATTACHMENTS:

ATTACHMENTS

5.1 BENEFITS OF SILOS AND GRAINS.



5.2 MEASUREMENTS OF SILOS WITH DIFFERENT CAPACITIES.

Different Sizes of Silos

5.3 QUALITY CONTROL, CHECKING FOR THE MAIN MISTAKES THAT CAN BE MADE.

COMMON ERRORS	
ERRORS	**CAUSES**
Folds in sheet steel	Didn't apply pressure with hip.
Not uniform	Did not hit uniformly.
	Angle-iron on workbench is bent.
Flanges on the bottom	
Poorly seated	The sheet metal had some problem.
	The flange was not properly seated.
Not uniform	The artisan did not fold the flange bit by bit.
	The artisan pulled the flange too hard.
	The bottom is too big.
Cylinder seams	
Came apart	Flanges not uniform.
	Poor location of sheet joint.
Dents on the side	Did not hit uniformly.
	Did not hit straight down.
Soldering	
With holes	Not enough muriatic acid
	Dirty or greasy seams
	Moved the soldering iron too fast
Poor surface	Soldering iron cold
	Soldering iron dirty
	Soldering iron too upright (only the tip touching)
With balls of solder	Too much solder
	Didn't turn the soldering iron back up to melt all the solder
	Cold or dirty soldering iron
Acid stains	Careless use of the acid

5.3.1 QUALITY CONTROL, CHECKING FOR THE MAIN MISTAKES THAT CAN BE MADE, CONTINUED.

COMMON ERRORS	
ERRORS	**CAUSES**
Necks	
Overlapping outside	Did not follow instructions.
Incorrect measurements	Did not follow instructions.
	Poorly marked or cut openings.
Broken parts	Did not begin to round the bands at the tip.
Tabs poorly seated	Hit in the wrong place.
	Did not always hold onto the sheet.
	Poorly cut or folded tabs.
Twisted	Not soldered at a right angle.
	Didn't open properly with the screwdriver.
Edge of the neck doesn't match.	Didn't match before soldering.
Not aligned forward.	Bottom improperly assembled.
Covers	
Overlapped inside	Didn't follow instructions or didn't read the manual.
Too loose, too tight	Measurements not taken right.
Poorly overlapped.	Did not press properly with the screwdriver.
Twisted	Too much pressure from the bottom or did not hit properly.
Center point not soldered	Not enough solder applied.
Poster and platform	
Not there	The artisan didn't have the instructions poster.
	Negligence by institutions.
	Did not contact the Post-harvest Unit.
	Did not take it seriously enough.
Painting	
Acid stains	Not painted properly
	Forgot to paint over stains.

5.4 PHOTOGRAPHS OF SILOS WITH DIFFERENT CAPACITIES.

5.5 POSTER ON USE AND HANDLING.

5.6 Metal Silos in the field

5.6.1 Using the silo in Guatemala

5.6.2 Using the silo in Honduras

5.6.3 Using the silo in El Salvador

5.6.4 Using the silo in Nicaragua...

5.6.5 Using the silo in Cuba

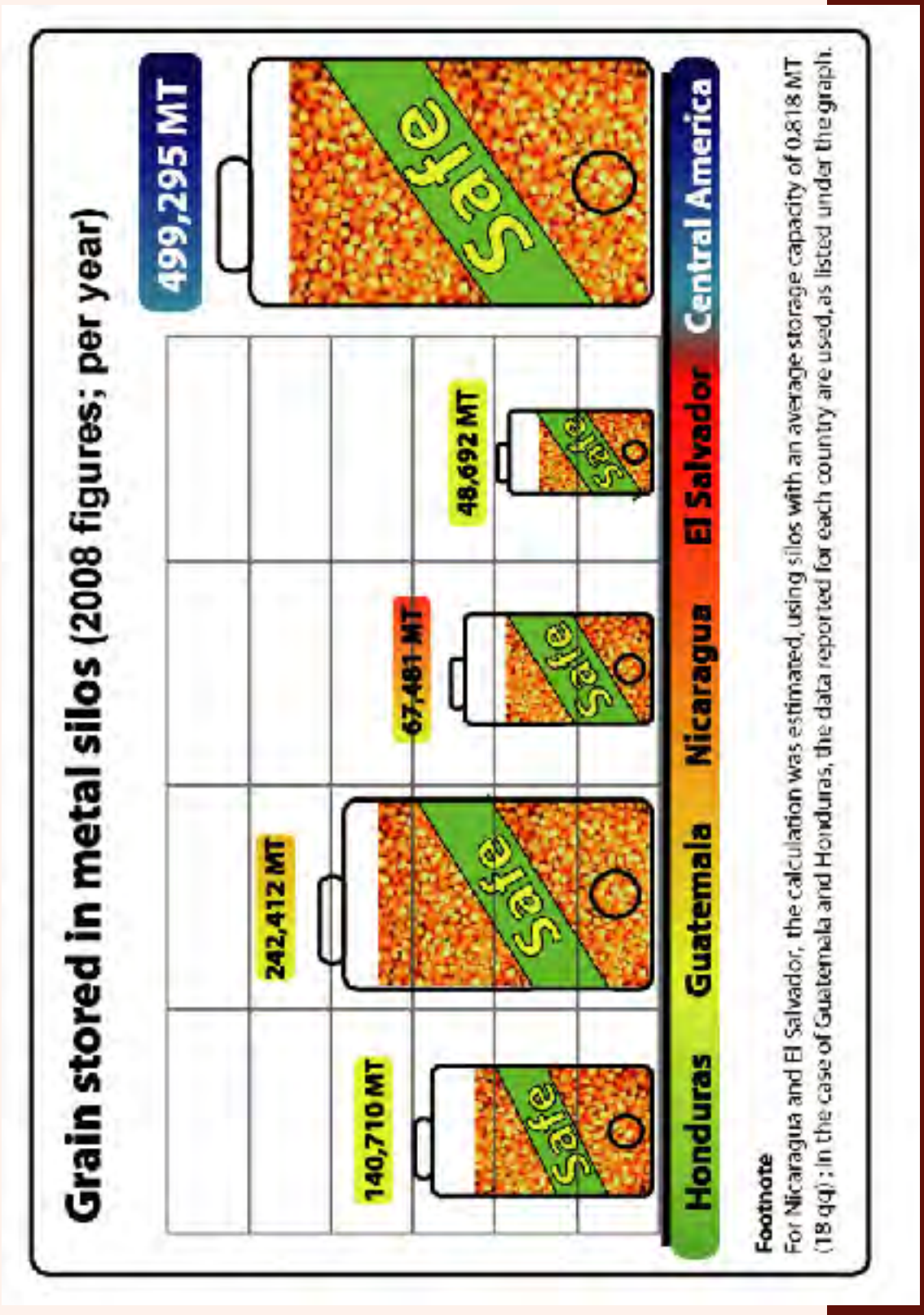
5.6.6 Using the silo in Peru

5.6.7 Using the silo in Ecuador

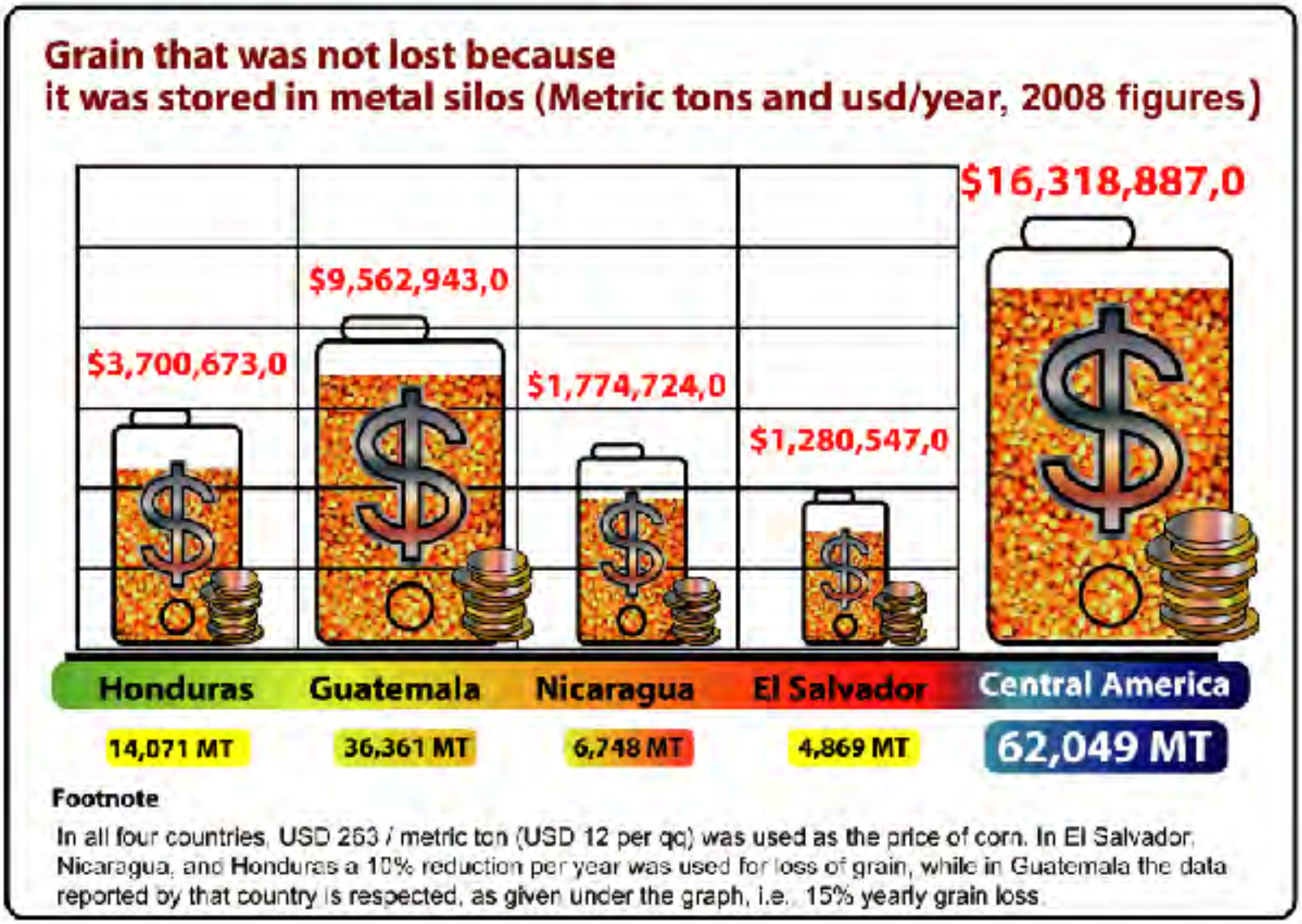
5.6.8 Using the silo in Africa

5.7 Impact of metal silo

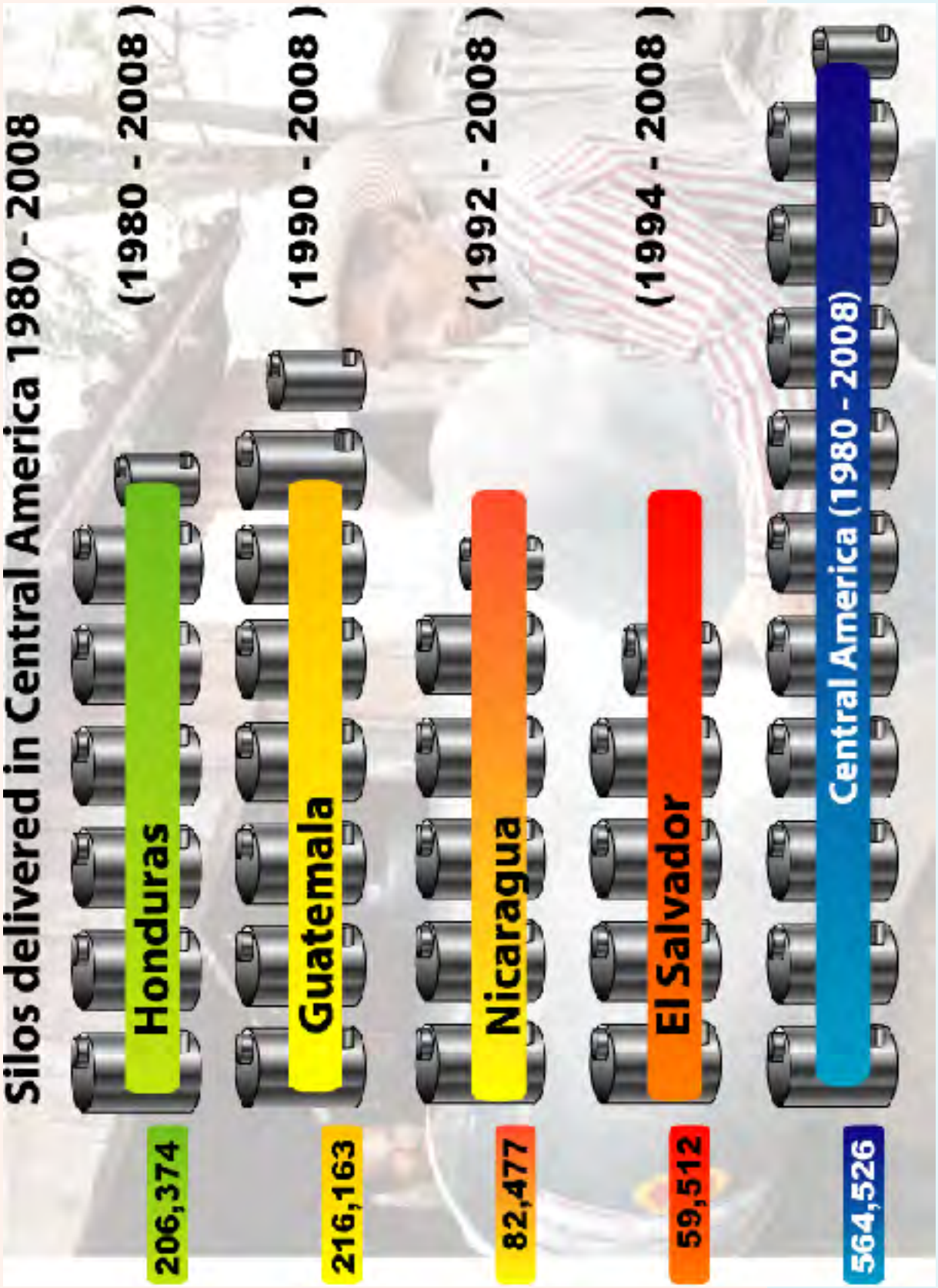
5.7.1 Grain stored in metal silos, Central America (MT).



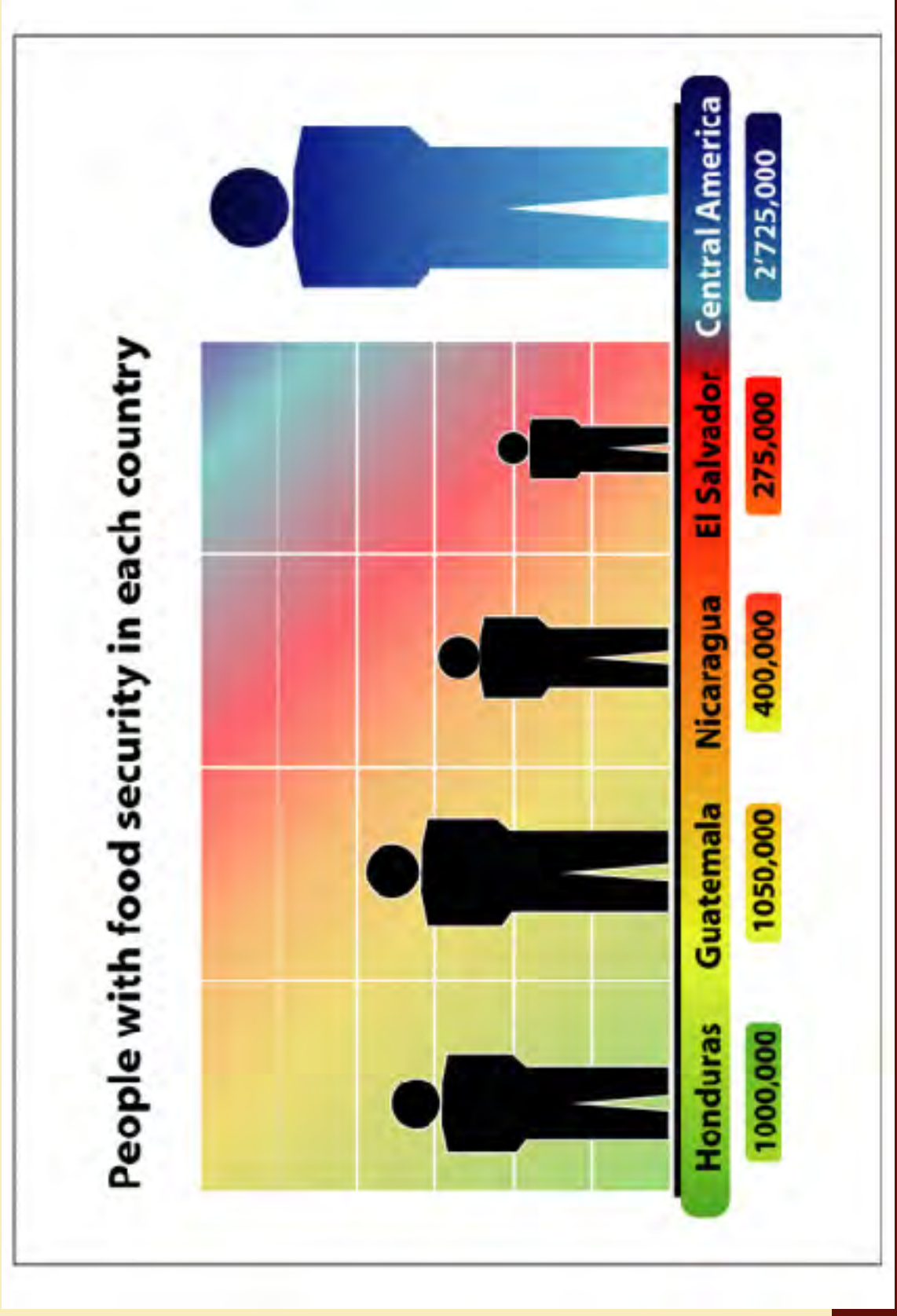
5.7.2 Grain that was not lost because it was stored in metal silos (Metric tons / year)



5.7.3 Silos delivered in Central America 1980 to 2008



5.7.4 People with food security in each country



METAL SILOS, A PROACTIVE TOOL

- 1. For rural development
- 2. Keeps crops safely stored in rural homes
- 3. Gives rural development institutions higher visibility
- 4. Enhances a country's food sovereignty
- 5. Generates employment and income and reduces poverty
- 6. Technology at a small-farmer scale
- 7. Gives producers negotiating power
- 8. A versatile technology for use in warm, cold, or temperate weather
- 9. Potential for use in countries with storage problems
- 10. Can store dried grains for over a year with zero losses
- 11. Manufactured by decentralized craftsmen-entrepreneurs
- 12. Boosts a region's economy
- 13. Generates rural enterprises
- 14. Capacity for decentralized rural technical storage
- 15. Useful for storing dry grains and seeds
- 16. More than 500 thousand silos sold in central America, Cuba, Paraguay and Peru.

A SILO IS LIFE, IT KEEPS YOUR HARVEST SAFE
¡BUY A SILO!

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