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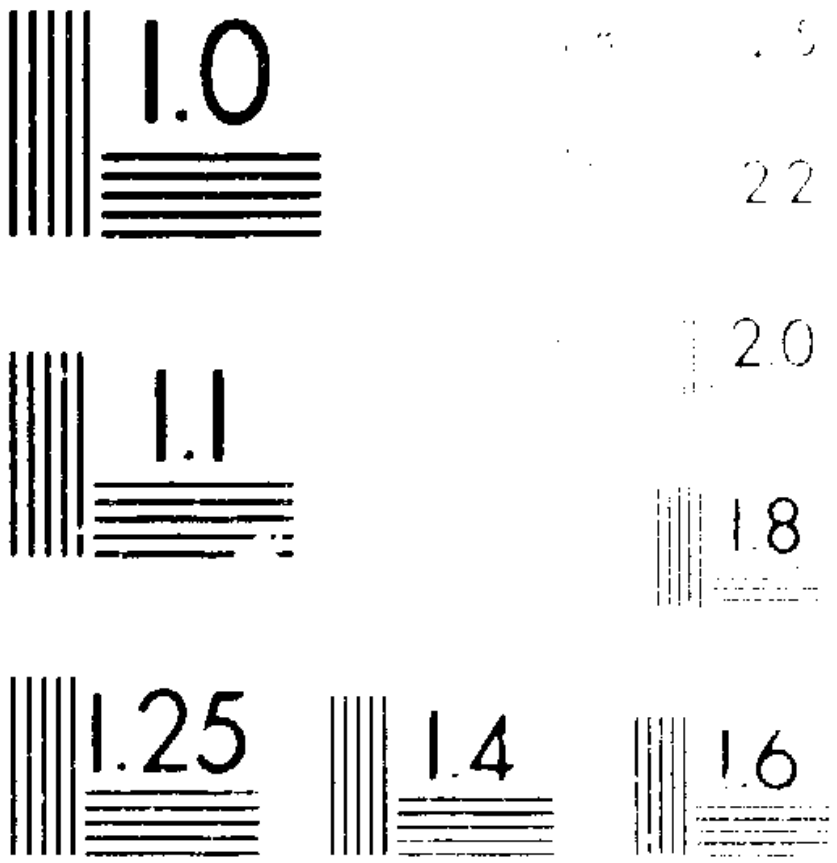
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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

(ASSISTANCE TO THE DEVELOPMENT OF SMALL INDUSTRIES)

DP/INS/78/078

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14284

Indonesia.

PROJECT OPPORTUNITIES.

For Consideration of

Preparing Feasibility studies.

Bjorn Eidsvig

Report No. 28.

May 1983.

PROJECT OPPORTUNITIES.

One of the aims of the UNIDO team is it to identify project possibilities and to assist in planning and implementation of industrial projects on that basis.

Enclosed is an initial list of 280 project opportunities which most of them will be possible to implement in Indonesia to day as small scale projects.

Weawre willing as far as we are able to, to make project profiles or feasibility studies for these projects. We do however not see any reason to do this until a client and a definite location possibility is identified and somebody is able to finance the project.

We atherefore send the list to you and request you to identify clients with potential interested in implementation of the projects.
We have for most of the projects specified; level of investment, possible no of employees and other important parameters, hoping that this will assist you in doing better selection.

It must be pointed out that many of the given data are specidied on very rough bais and some of them may change drastically during the required further investigations. Many can also very widely dependent on selection of technology, location, etc.

We will also be thankful if you can bring supplements and corrections to the list. Most important now, however, is it that you will assist us in finding potential promising clients so that the more detailed planning can start.

For some of the projects have been given some further information in the form of the appended briefs. Time has not allowed us to comment on all projects, but we will always be happy to discuss the matter further with you in connection with requirements and client's needs.

Jakarta 14th January 1983.

Industrial Engineering Expert,

BJØRN EIDSVIG.

PROJECT OPPORTUNITIES

Estimation of Implementation Potential.

Anticipated status and potential for the project (rough estimate).

COMMENTS AND AVAILABLE Information

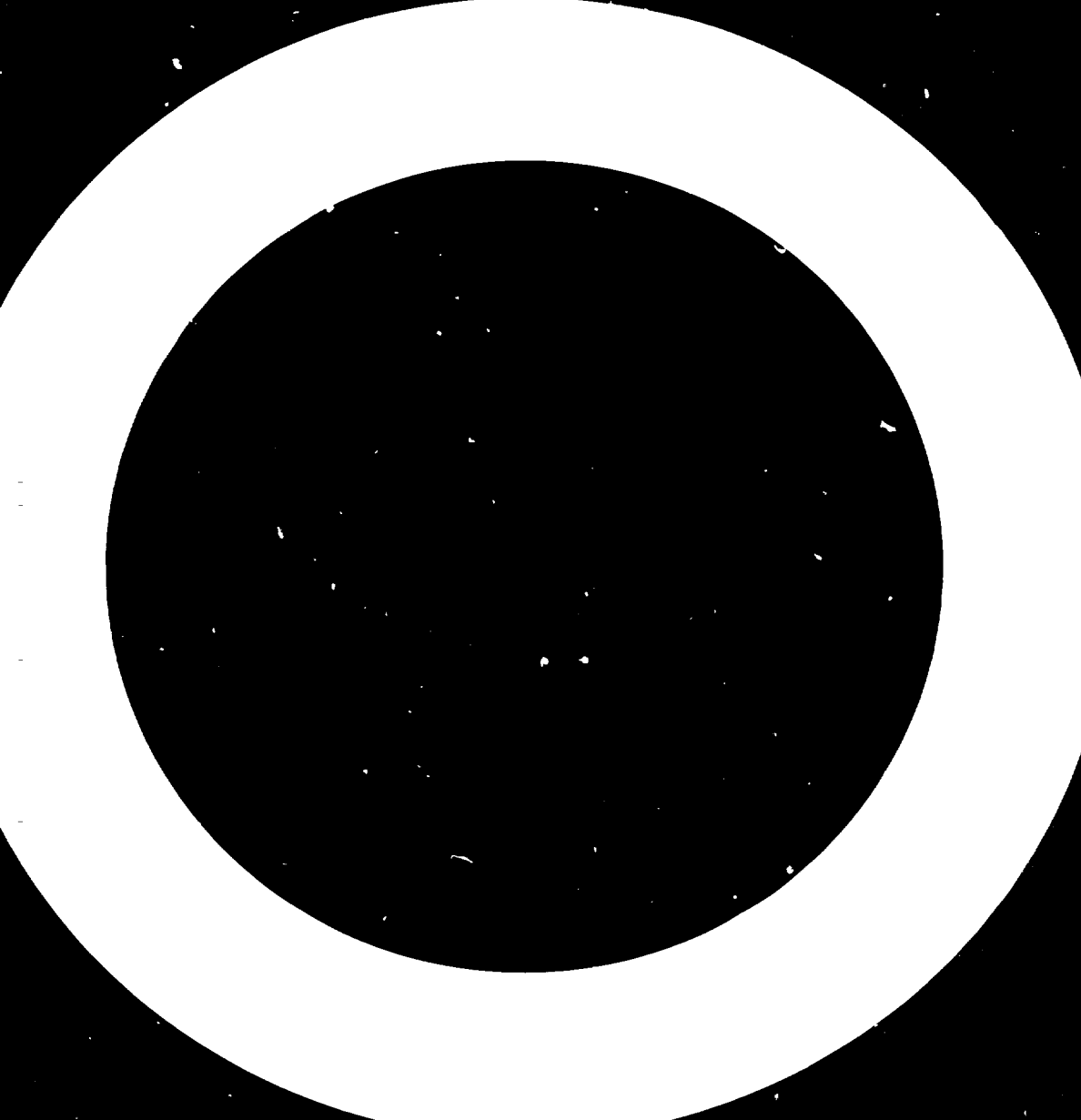
PROJECT	INVESTMENT (Mill Rs) (max. 100)	EMPLOYEES (NO)	NORMAL TURNOVER (Mill Rs/year)	PROFITABILITY (1= poor 5= very high)	PRESENT DEMAND SATISFACTION (% small scale/% local big scale)	EXPECTED FOREIGN SAVINGS (% of product cost)	PRODUCT IMPORTANCE (1= not important 5= very high)	DUPLICATING POTENTIAL (possible no of projects)	SKILL DEMAND (1=low 5= highest)	PRIORITY (1= low 5= highest	COMMENTS and available information
1. FOOD PRODUCTS.											
1.1 Fruit canning and glass packaging of jams, juice, fruitsalads	20	30	50	4	4000	70	3	4	3	1	BIPIK information on fruit juice production. Kenya studies.
2 Fruit and vegetable drying	20	20	30	2		20	3	4	2	3	BIPIK study no.6 outlines production of pinaple jam Indian profile I 467 Kenya studies.
3 Canning and cultivation of vegetables, asparagus, mushrooms.	50	20	100	4		30	3	4	4	2	BIPIK profile no.3 outlines the processing of dried cassava olyad roots.
4 Tomato sauce and ketchup, tauco from soya beans.	10	10	30	3	1450	20	3	3	3	3	BIPIK Profile 13 explain banana drying BIPIK profile no. 14 (tauco) Kenya study.

	PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
5	Canning/preparation of finished dishes with meat, rice, vegetables etc.	50	20	100	5			3	4	4	3	
6	Pickles and chutneys	40	20	60	3			3	2	4	3	
7	Honey refining and packaging	10	10	30	3			4	4	4	4	
8	Drinking water preparation and distribution	10	5	20	2			4	4	2	2	Import $ 130.000 (duty able)
9	Ice preparation and distribution, bars and cubes, rough and pure.	20	10	20	3			4	4	2	2	
10	Ice cream							2	3	3	4	Indian profile I 471.
11	Dairy products, Fresh milk sheese.	80	20	100	3			5	1	4	1	Cheese only where milk can not be consumed. Import dry milk $ 65.000.000.
12	Scusages, dried sauges preserved and dried meat	30	20	100	4			3	2	4	3	
13	Fish preservation and distribution, iceing, fille fillet freezing, smcking, dying.	20	30	50	3			5	4	3	1	
14	Bakeries - biscuits	20	40	80	2			4	4	3	3	Indian profiles I 461 - I 463 Kenya studies.
15	Spices, and other consume ables, grinding, preservation packaging.	15	20	40	4			3	2	2	3	Indian profile I 479. Import packed baking powder $ 1.100.000

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
16. Sweets, caramells confec-	30	20	50	4			1	2	3	4	Indian profile I 465 Import chewing gum $ 400.000
17. Spaghetti, noodles, maccaroni (bakmi)	10	20	20	2			3	2	2	3	
18. Tapioca flour and starch							3	4	2	3	From casava, potatoes, corn or arrow-roots, BIPIK profile and publication
19. Poshomilling of cereals for house-hold consume	5	5	10	2			4	5	2	2	Kenya studies Indian profile I 473.
20. Coconut oil and coconut mass							4	3	3		Small scale open process possible, but poor yield.
21. Sugar from cane	200	100	300	1			4	1	5	5	Economy doubtful on mechanical extraction
22. Edible oil expelling (cotton sun-flower, ground nuts, castor, mustard sesame)	100	50	300	2			3	3	5	4	Indian profile I 469 I 489 I 483 Kenya studies.
23. Peanut butter	30	15	40	3			2	2	5	3	BIPIK profile I gives proposal based on ground nuts Import $ 160.000
24. Animal feed from fish and slaughter offalls, bones and blod.	20	20	30	4			4	2	4	1	Indian profile I 477 BIPIK profile no. 19 and no. 35 Bone meal import $ 3.600.000
25. Animal feed based on straw treatment, urea and other additives, pelletizing.	100	50	300	4			5	4	4	1	Kenya study. Important products whereever sufficient strew is available.
26. Protein animal feed based on fungus cultivation of wood and straw wastes molasses etc.	100	30	300	?			5	2	5	1	Leaflets available for German plant and from Guatemala New technology.

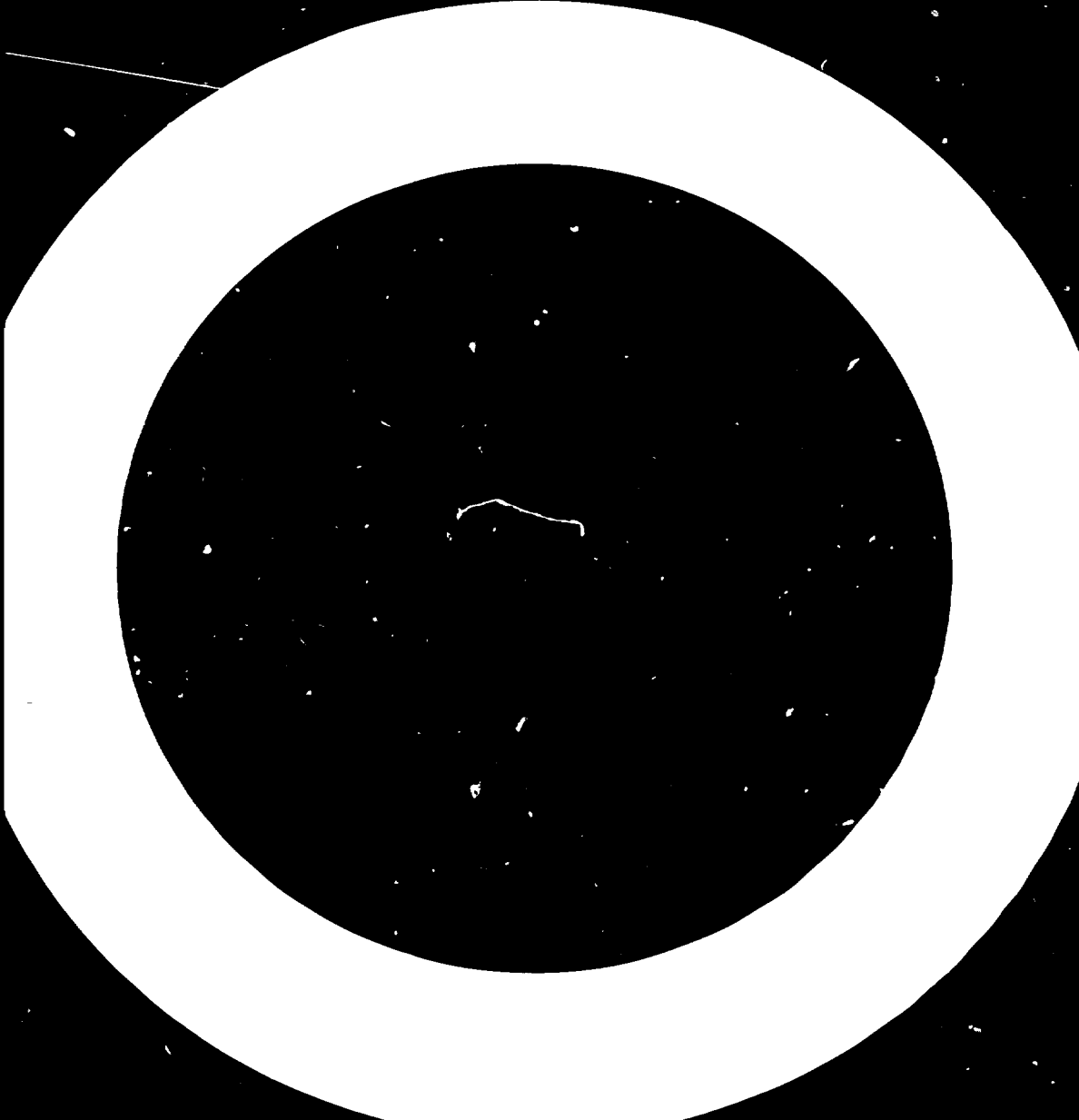
PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
27. Animal feed composition, grinding and packaging, based on cereals and other availabilities.	20	10	50	2			3		4	3	BIPIK profile No. 24.
28. Salt from sea water evaporation	50	50	80	2			4	2	5	2	Require large sea level areas and clean sea water
29. Aren palm flour	5	5	10	2			3	2	2	3	See BIPIK profile no. 2
30. Gelatine from sea weeds (agar-agar)	20	5	30	2			3	3	2	2	See BIPIK profile no. 10
31. Nutmeng in sugar syrup	5	3	20	3			2	3	2	4	BIPIK profile no. 7 explain dry processing and no. 12 syrup processing.
32. Papain enzym powder	20	10	50	3			3	4	2	3	BIPIK profile no. 22
33. Ketchup (kecap) from coconut water	25	10	100	2			2	2	3	4	BIPIK profile no.28.
34. Glukosis sugar syrup from tapioka starch	20	25	100	2			2	3	3	3	BIPIK profile no. 31
35. Milk substitute from soya beans, chokolate drink	15	10	40	2			3	3	3	2	BIPIK profile no. 32
36. Fruit essences from fruit peels	10	5	15	2			2	2	2	3	BIPIK profile no. 33 Fit for fruit canning industri
37. Ready made dry soups, in portion bags for instant cooking	20	10	50	4			2	2	3	4	With dry vegetables meat, fruit etc.
38. Bakers fresh yeast	100	25	200	3	1400		4	1	4	3	Import $ 1.400.

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
39. Potato chips in portion packaging french fried potatoes	20	20	80	4			2	2	3	4	
40. Corn flakes and other break fast cereals.	30	15	80	4			2	2	3	4	
2. TEXTILES, GARMENTS											
2.1 - PRODUCTS FROM WASTES AND FIBRE.											
1. Absorbent cotton, sanitary, facial or medical	150	50	600	4			3	2	4	4	Indian profile III 273.
2. Sanitary female napkins from cotton or cellulosis/non woven	20	50	200	3			3	3	3	2	Indian profile III 421
3. Sanitary female tampoons, cotton/rayon	50	50	300	2			2	2	4	2	
4. Pillows and cotton waste filled blankets.	2	5	20	2			2	2	2	4	
5. Blanket weft yarn, cotton/ acylic	150	50	600	4			2	2	4	4	Kenya study
2.2 FABRICS											
1. Handwoven upholstry material, towels, table cloth, curtain material, etc.	5	10	20	2			3	3	3	4	
2. Surgical bandages,	60	10	100	3			3	2	3	3	Import $ 120.000
3. Knitted fabrics for under-wear and shirts	40	6	100	3			3	3	3	3	Indian profile II 497 -499 - III 415.



PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGNSAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
2. Crome leather, wet blue and crust.	100	40	300	3			4	3	4	3***	Indian profile I 521 Kenya study
3. Tanning of gem skins, trophies snake skin.	30	15	40	4			3	2	4	2	Indian profile I 519 BIPIK Information on vegtable leather preparation.
4. Imitation PVC leather	200	20	400	4			4	3	4	3	
5. Suitcases, briefcases	30	20	100	4			2	3	4	3	Indian study III 463 Import travel goods $ 2.600.000
6. Handbags, belts, vallets, watch straps	10	15	40	3			2	3	3	3	Indian study II 531
7. Split leather working gloves	20	15	80	4			3	2	2	2	Indian profile III 449
8. Shoes, sandals, chappels	15	10	30	2			3	2	2	2	I 497 - 499 - 505 Indian profile
9. Foot balls	20	30	100	4			2	2	3	2	Importation $ 230.000
3. CHEMICAL AND FIBRE PRODUCTS.											
1. Glues and putties, paint, type correcting fluid. Printing inks.	40	10	100	4			3	2	2	3	Kenya study, Indian profile II 481 BIPIK study no. 30.
2. Lotions, tooth paste, hair oil, creams lipsticks, cosmetic powders, aerosol packaging.	30	30	200	4			2	3	3	3	Indian profile III 343 Import tooth paste $ 300.000 make up $ 650.000 nail polish 70.000
3. Petroleum jelly packaging	10	5	50	3			2	2	2	3	
4. Shoe polish, floor/wood polish	20	10	80	2			2	2	2	3	Indian profile III 333
5. Laundry soap	20	10	80	2			3	2	2	4	Indian profile III 351
6. Writing ink	20	10	80	3			3	2	2	2	Indian profile III 297 Import $ 70.000

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
7. Candles	2	5	20	3			2	2	2	3	Indian profile III 357
8. Animal glue							4	2	3	1	BIPIK profile skin glues
9. Essencial oils destillation/ pachouli oil (eucalyptus etc.)	6	5	20	2			3	3	3	2	Indian profile I 359 - II 407. BIPIK profile no. 4 and no. 7
10. Regeneration of used lubricat lubrication oil.	50	20	200	3			4	3	3	2	BIPIK report on distillation of channella oil and other essencial.
11. Silver regeneration from photographic films.	15	5	50	4			4	3	2	1	
12. Active carbon from coconut shell and briquetted charcoal	100	15	300	4			3	2	3	2	Import active carbon $ 8.100.000
13. Calsium carbonate powder and plaster of paris burning of $CaCO_3$ and $CaSO_4$	60	15	150	2			3	2	2	3	Import raw gypsum $ 12.300.000 calcunated $ 600.000.
14. Porsolan mini cement factory (clay)											
15. Bake fluids	10	5	20	3			2	1	2	4	
16. Industrial waste exchange central	10	5	100	3			4	2	4	2	
17. Dextrine (glue etc.) from tapioca starch	30	4	40	2	fair	80	2	4	3	1	BIPIK profile no. 18. Import $ 3.100.000
18. Acetylene and oxygene	60	10	100	2			3	1	4	4	Not for West Java. Import $ 500.000
19. Capsules for medical products, (gelatine)	100						4		4	1	Import electrical carbon 35.000.000
20. Carbon products											Carbon black $ 25.000.000.



PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
13. Bakelite electrical acessories lamholders, plugs, ceilling, roses, junction boxes	40	15	80	2			3	2	3	3	Indian profile II 95 - III 371, Kenya study lampholders $ 1.000.000 junction boxes $ 1.500.000 plugs and sockets $ 6.200.000
14. Linght reflection polystyrene pads for pedestrians.	20	5	100	4			3	2	2	4	
15. Fibre glass products, boats, tanks chair seats, helmets.	5	20	50	4			3	3	3	3	Indian profile III 275 Import helmets $ 1.100.000 other products $ 1.400.000
16. Gummed tape, cellotape, insulations tape	40	10	200	4			3	2	3	4	Indian profile III 373 Import $ 2.000.000
17. Collection and regeneration of plastic waste	20	40	100	3			5	3	4	1	
18. Sign boards, vacuum formed or engraved	30	5	60	4			2	3	3	4	
19. Vacuum formed bath tubs and wash stands from acrylis sheets	100	5	200	4			2	2	4	5	Kenya study
20. Plastic buttons, moulded in bakelite press, or cut from blanks	30	20	100	4			2	2	3	4	Indian profile II 433
21. Pressing of PVC floor tiles	80	15	200	4			3	2	3	4	
22. Educational mathematical sets, injection moulded	70	15	300	4			3	2	4	3	Kenya study
23. Injection moulded bottle caps, torches etc.	80	10	300	3			3	2	4	4	
24. Drinking straw	70	5	200	4			3	2	3	4	

PROJECT	INVEST	EMPLOY	SALE	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
25. Ball pens and fibre pens	100	20	200	4			3	2	3	4	Import $ 3.000.000
26. Polypropylene bags, woven from extruded monofilarment film.	50	20	200	4			3	2	3	2	Importation ready made jute bags $ 1.800.000
27. Blow moulded containers, bottles, toys, packaging	100	10	200	4			2	2	3	4	Indian profile I 347
28. Printed circuit manufacturing	60	15	100	3			3	2	4	3	Import $ 2.200.000
29. Cloth pegs, injection moulded with steel springs	70	20	20	3			3	2	2	4	
30. Wire mesh, net for mosquitoes and sceening etc.	30	10	60	3			3	2	3	4	Woven hard loom from nylon string.
3.3 RUBBER AND RUBBER PRODUCTS											
1. Shoe soles	50	10	100	3			3	2	3	4	Import $ 200.000
2. Bicycle tyres and compact tyres for transport equipment	100	20	300	3			3	2	4	3	
3. Tyre retreading, motorvehicle	40	10	50	3			3	3	3	4	Indian profile III 349
4. Rubber toys and balls	60	10	100	3			2	2	3	4	
5. Car components and other items on order basis.	70	30	200	3			3	2	3	4	Indian profile II 456
6. Engine mountings, vibriation absorbing	80	20	200	4			3	2	4	3	Indian profile II 459
7. Rubber patches for repair of automobile tubes.										4	
8. Erasers	40	15	100	4			3	2	3	4	Indian profile no. II 451
9. Rubber gloves, kitchen gloves industrial.	30	10	150	4			3	2	3	4	Indian profile II 477 Import rubber gloves $ 260.000.

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
10. Rubber balloons	20	10	60	3			2	2	2	5	Indian profile I 383
5A Valves for tyres and tubes metall/rubber										2	**Import** $ 3.200.000
11. Contraceptives, baby feeding nipples	80	15	150	3			4	3	4	3	Import condoms $ 1.700.000
12. V belts	60	20	150	4			3	5	4	3	
13. Bed botton Webbing rubber strips and low cost shoes, from old tyres	1	2	10	2			3	3	1	2	
14. Reclaiming and soles of rubber from Wastes	5	5	20	2			4	3	2	3	Import other then for diving $ 3.100.000
15. Vulvanized rubber clothing											
3.4 WOOD PRODUCTS.											
1. Wooden furniture, carved furniture	20	20	30	4			3	4	4	4	Indian profile II 339 Kenya studies.
2. Rattan furniture	10	40	40	3			3	4	4	4	BIPIK profile no. 23
3. Wooden doors	30	15	80	4			3	4	4	2	
4. Wooden cabinet doors	25	15	60	4			3	4	4	2	
5. Stairs	30	20	80	4			3	3	4	3	
6. Turned wood chairs, spindle back chairs	20	15	60	4			3	3	3	3	
7. Block board manufacture	100	30	300	4			4	2	4	2	Kenya profile Import $ 70.000
8. Beehives	10	5	30	3			4	3	2	2	

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
9. Wooden crates and boxes, plywood chests, cable drums.	4	5	20	2			3	3	2	4	Indian profile II 341 - 271 - 33. Import boxes $ 50.000
10. Kitchen cabinets and installations.	30	10	60	4			3	3	4	4	
11. Wooden toys	20	20	100	4			2	3	3	3	Import of toys $ 5.300.000
12. Wood boats	5	5	30	4			4	2	4	3	Indian profile III 237
13. Brooms and brushes, duster, kitchen utensils bottle wasters wisps.	20	20	100	4			3	3	3	4	Indian profile I 151 - II 137 - 323 - 137 - III 143. Import brooms/brushes $ 700.000.
14. Roof trusses with nail plates, standardized	40	15	100	3			4	4	4	2	
15. Finger joints	10	5	40	4			4	3	2	1	
16. Laminated wood beans for building construction.	80	20	200	4			4	2	5	4	
17. Wood seasoning	20	5	100	3			3	2	3	4	Indian profile III 177
18. Wood handles for tools and	10	10	30	4			3	2	2	4	Indian profile III 221
19. Cerment wood wool boards, straw boards.	30	10	100	3			3	2	2	4	Indian profile III 343
20. Floor pangquest from coconut trunk and other wood	40	15	150	3			3	2	3	3	
21. Matches, fire works	30	40	100	1			3	2	2	5	Indian profile II 461 - III 279. Kenya study.
22. Tooth Picks	20	5	40	2			3	2	2	4	
23. Pencils and eyebow pencils	100	20	200	3			3	2	3	4	Indian profile II 427 - III 151. Import pencils, lead $ 170.000 Eyebow $ 250.000 others $ 450.000.

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
3.5 PAPER PRODUCTS.											
1. Sand paper sheets	30	10	80	3			3	2	3	2	
2. Carbon paper and typing ribbons	100	20	200	4			3	2	3	3	Indian profile III 257 Import ribbons $ 700.000 Carbon paper $ 700.000.
3. Paper bags and envelopes	20	5	50	2			3	2	3	4	Indian profile I 395 - II 419.
4. Card board boxes	40	15	80	2			2	2	3	4	Indian profile II 415. BIPIK profile no. 25
5. File covers, box files	25	15	50	4			2	2	2	4	Indian profile II 383.
6. Paper drums, paper tubes, and cones for packaging	60	15	150	4			2	2	3	4	Indian profile II 417 - II 423.
7. Eggtrays and other formed pulp products	10	15	40	2			2	2	3	3	
8. Duplicating stencils	100	30	500	4			3	2	3	3	Indian profile II 375
9. Gurmed lables, stickers	30	10	100	4			2	2	2	4	Indian profile I 363
10. Transfere prints for ceramics	10	5	40	4			2	1	3	3	Import $ 1.700.000 Kenya study
11. Excersise books	25	5	40	2			3	2	3	4	Indian profile I 363
12. Paper napkins and toilet paper	30	15	60	3			2	2	2	4	Import toilet paper $ 160.000
13. Disposiable caudecologne moisted napkins	30	15	80	4			2	2	2	4	
14. Corrugated, asphalt dipped roofing sheets	15	15	40	3			3	3	2	2	Low cost product from low quality paper wastes.
15. Oil and filters for automobiles	40	20	150	3			3	2	4	3	Import oil and air filler $ 9.000.000 vegetable oil $ 2.000.000

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
16. Gummed paper glue tape in rolls	40	10					3	2	3	3	Import $ 1.850.000
3.6 OTHER FIBRE PRODUCTS.											
1. Fibre matresses	2	5	10	2			3	3	2	4	
2. Sisal/jute hyme, rope bags carpets, mats, dishes	2	5	15	3			3	2	3	4	
3. Binding of fishing flies	2	5	20	4			2	2	2	3	
4. Gaskets for automobile engines and others	30	10		4			3	3	3	2	Importation paper gas sheet $ 750.000, other engine and pipe gashets $ 11.200.000
3.7 MINERAL PRODUCTS.											
1. Glass table wore, handblown	60	60	300	4			3	3	5	3	Indian profile I 429
2. Glass table wore pressed	100	50	300	3			3	3	3	4	Indian profile I 432
3. Glass laboratory wore from pipes microscope slides	10	10	50	3			3	2	3	3	Imported $ 1.600.000 Import test tubes $ 120.000 microscope slides $ 130.000
4. Glass vials and ampuls	30	5	100	3			3	2	3	4	Import raw glass for this a $ 1.800.000
5. Ceramic table wore and sanitary wore insulators, tiles	100	40	300	4			3	3	4	2	Kenya study. Indian profile I 435 - I 457 - III 519. Import tiles $ 900.000 laboratory ware $ 1.000.000 porcellain table waro $ 1.000.000 Isulator $ 1.500.000.
6. Pottery	8	5	30	4			2	2	3	4	
7. School chalk	5	5	20	2			3	2	2	4	Indian profile I 419 Konya study
8. Plaster of paris	60	10	100	2			3	2	2	4	Kenya study.

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
9. Grinding wheels, ceramic and bakelite bound.	30	20	60	3			3	2	4	3	
10. Refractory Bricks	80						3	4	3	2	Import $ 25.000.000
11. Crushed and screened glass sand	30						3	1	2	3	Import $ 200.000, waste glass $ 1.600.000
12. Vacuum flasks							3	3		3	Import completed $ 2.300.000 glassinners $ 1.900.000
4. METALL WORKS ETC.											
4.1 MESS PRODUCTS.											
1. Detinning of tinplate scraps and second hand tincars	90	40	300	5			5	2	3	1	Kenya study
2. Un printed tin cars	20	35	300	3			4	2	3	3	Kenya study Indian profile II 233
3. Pins	30	5	80	3			3	2	2	3	Import $ 250.000.
4. Hair pins, safety pins	20	10	80	4			2	2	2	4	Indian profile II 91 safety pins $ 200.000 Import hair pins $ 175.000
5. Paper clips, shoe eyelets, snap fasteners powel pins	20	5	60	4			2	2	2	4	Indian profile I 127 - II 141
6. Pressed stainless steel cutlery	60	10	100	3			3	2	3	3	Indian profile II 267
7. Collapsible aluminium tubes	200	40	600	3			2	1	4	5	Import wire nails $ 200.000 Corrug, nails, drawing pin etc. $ 1.600.000
8. Wire nails, blue tacks and roofing nails	50	5	70	2			3	2	2	4	Indian profile II 329
9. Zip fasteners	40	10	80	2			3	2	2	4	Indian profile II 349

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
10. Steel wool	60	5	100	3			3	2	2	4	a 60kg/h plant offered from Hams & Markus.
11. Barbed wire	20	5	80	2			3	2	2	4	Indian profile I 29 Import $ 6.000
12. Bicycle spakes arid nipples	60	10	120	3			3	1	2	4	
13. Pad locks and tower bolts, hinges.	100	20	100	2			3	2	4	5	Indian profile 149 Import pad locks $ 1.000.000 hinges $ 1.200.000
14. Chain link bed bottoms	50	10	80	3			3	2	2	4	
15. Window louvres	80	10	150	3			3	2	4	4	
16. Aluminium cooking pans, utencils kettles pressure, cookers, milk churns	100	15	300	4			4	2	5	3	Indian profile I 113 - 117
17. Chisels and crowbars	2	5	20	3			3	2	2	4	Indian profile I 75 - 85 Negtible imports
18. Stainless steel dishes and tableware	100	30	200	4			3	2	4	4	Indian profile 227
19. Automobile radiator assembly and other vehicle parts on order basis.	30	10	80	2			3	1	3	4	Indian profile II 7 Import radiators $ 5.300.000.
20. Hoes, forkhoes, shovels	20	5	60	2			4	2	3	3	Indian profile I 157 - III 91 - 113. Import hoes $ 1.000.000
21. Wick stoves, pressure stoves	80	20	200	3			3	2	4	4	
22. Double corrugated roofing sheets aluminium.	100	15	200	4			3	2	4	3	

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
23. Matress production with helicoil springs and quilting.	80	30	200	4			3	2	3	3	Offer plant Hams & Markus 12 matress per hour. Import $ 200.000.
24. Woven metall mesh net for screening, cages mosquitoes etc.	30	5	100	3			3	2	2	3	Import $ 1.000.000
25. Hack saw blades and power saw	80	10	150	3			3	1	5	5	Nelectible Import
26. Spring washers	40	10	100	4			3	1	3	2	High import
27. Screws, bolts and nuts	40			2			3	4	3	3	Import $ 28.000.000
28. Wood hand saws	40			3			3	1	3	3	Import $ 900.000
29. Bicycle chains and other chains	100			4			3	1	4	3	Import bicycle ch. $ 2.200.000 other chains $ 4.300.000
30. Leaf springs	60			2			3	2	4	2	Import $ 8.500.000
31. Welding electrodes	50			3			3	2	4	2	Import electrodes $ 8.800.000
32. Assembly of motor cycle engines	10	20		2			3	2	4	2	Import of assembled engines for motor cycles $ 23.000.000
33. Part production and assembly of	50	20		3			2	2	3	3	Import load speakers $ 6.500.000
34. Assembly and part manufacture for electric smoothein irons	40	20		3			3	2	3	4	Import assembled $ 700.000
35. Electric instameous water heaters	50	30		4			2	2	4	4	Import $ 2.300.000
36. Assembly of car batteries	10	10		2			3	3	2	4	Import ready made $ 4.400.000
37. Shock absorbers for motor vehicles	100	40		4			3	2	4	4	Import ready made $ 6.900.000

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
38. Exhaust silencers	20	15		2			3	3	2	3	Import assembled $ 1.500.000
39. Chairs and seats of metall	40	20		3			3	2	4	3	Import $ 3.500.000
40. Assembly of water meters	10	15		2			3	1	2	3	Import $ 1.900.000
41. Detonators for blasting with explosives	100	20		4			3	1	5	4	Import $ 1.500.000
42. Pop rivets	80	15	150	3			3	1	3	4	
43. Tower bolts	20	5	50	3			2	2	2	4	
44. Reflective Rood signs	30	10	80	3			2	1	2	4	
45. Chicken wire and chain link	20	10	60	2			2	2	3	4	Import $ 1.000.000
46. LPG gas cylinders	60	20		3			3	2	4	1	Import $ 6.700.000
4.2 BUILT UP STEEL PRODUCTS.											
1. Solar Water heaters	20	20	60	4			4	3	3	2	
2. Electrical solar energy panels/ systems	15	15	50	4			4	2	3	3	
3. Wind mills and water pumps	40	20	80	4			4	3	3	2	
4. Hand carts, bicycle carts, wheel-barrows, oxcarts	20	15	80	3			3	3	3	3	Indian profile III 227
5. Wheel chairs, crutches, calippers	20	15	80	3			3	3	3	3	Indian profile II 313
6. Incubators for chickens	15	5	50	4			4	2	4	3	Import incubators and broders $ 1.200.000 other bee and pouty, Keeping machinery $ 1.700.000

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL/BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
7. Agricultural tools, for animals etc. plaws, harrows, harvesters, seeders cultivators, chaff cutters	30	15	80	3			4	2	2	3	Indian profile I 15 - 81 - II 155 - III 45 Import plows and harrows etc. $ 1.500.000
8. Bakery ovens	20	10	60	3			4	2	3	2	
9. Bicycle assembly	50	30	200	2			3	2	3	4	
9A Steam boilers	50	40	200	3			3	3	5	3	Import $ 20.000.000
9B Control panel building	20	15	100	4			3	3	5	3	Import $ 20.000.000 (panels and switch boards)
10. Buckets, trunks, dustbins, distribution boards.	20	10	60	2			3	3	3	4	
11. Stell door and window frames	15	5	40	2			3	3	3	4	
12. Aluminium door and window frames	25	10	80	4			2	3	3	4	
13. Vehicle body building	20	10	50	2			3	2	3	4	
14. Hospital beds and furniture	20	10	60	3			3	2	3	4	Indian profile I 3
15. Corrugated water tanks	5	10	20	3			4	4	2	1	For low cost farm water reservoans
16. Tool boxes, first aid boxes etc.	40	20	80	3			3	3	3	3	Import $ 5.300.000
17. Building structures	80	50	200	4			3	4	4	1	Import $ 130.000.000
4.3 FOUNDRY PRODUCTS											
1. Cost non soil pipes	60	30	150	3			3	2	3	3	Kenya study Import filling $ 2.000.000 tubes ofiron/steel $ 41.000.000 other cast iron products $ 1.700.000.

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
2. Cost iron cooking stoves	60	30	150	4			4	2	3	3	
3. Manhole covers, weights	60	30	150	3			3	2	3	3	Indian profile II 37 - III 475
4. Cast tin uniform buttons	15	5	50	4			2	2	2	4	Import $ 500.000
5. Belt fasteners ' buckles	20	5	50	3			2	2	3	4	Import $ 2.100.000
6. Diecasting and pressure die casting on order basis, sub su supplies.	100	10	200	4			3	2	4	4	Indian profile II 161
7. Imitation jewelry	80	20	200	4			2	2	4	5	
8. Centri fugas water pumps	100	30	200	4			3	2	4	4	Import centrifungul pumps $ 5.000.000
9. Shaft couplings	50	15	80	4			3	2	3	4	Import $ 900.000.
4.4 SERVICE INDUSTRIES.											
1. Offset printing press	60	5	150	3			3	2	4	4	Kenya study
2. Electro plating	50	10	100	4			3	2	3	3	
3. Scrap metall collection, recovery of motor vehicle bodies	3	10	10	2			4	3	2	3	
4. Laundry, dry cleaning	30	5	60	2			2	3	3	4	
5. Diesel pump maintenance &Repair	30	5	50	4			4	2	3	2	
6. Electrical motor Rewinding	5	5	50	4			4	2	4	2	
7. Auto Battery repair, assembly	3	5	50	2			2	2	2	3	
8. Composteing of Minicipality garbage together with cow dung	15	5	15	2			4	4	2	2	BIPIK profile no. 26

PROJECT	INVEST	EMPLOY	SALES	PROFIT	SMALL / BIG	FOREIGN SAVE	IMPORTANCE	DUPLIC	SKILL	PRIORITY	COMMENT
5. BUILDING MATERIALS											
1. Aggregate quarries	50	20	100	3			3	3	3	2	
2. Lime											
3. Natual building block stone	2	20	20	2			4	3	2	11	
4. Clay bricks, roofing tiles, went	50	20	100	3			4	3	3	2	
5. Concrete building products, Block stones hollow blocks, pipes, septic tank, culverts tiles, rood edging.	30	20	100	3			3	3	2	4	
6. Refractory bricks	30	15	80	3			3	2	3	4	
7. Glazed sewer pipes, clay	40	10	80	3			3	2	3	4	
8. Cement asbest products, ducts	20	10	50	3			3	2	2	3	
9. Glazed wall and floor tiles	80	20	300	4			3	3	3	2	
10. Woven banana fibre mats and wall papers	10	5	40	3			2	2	2	4	
11. Sisal reinfoced gypsum ceilling tiles	20	10	60	3			3	2	2	2	Indian profile I 441.
12. Terrazo tile cemented from marble or other stone chips.	80	20	150	2			2	2	2	4	

Brief Information on some of the above specified projects.

1.01 Fruit canning and glass packaging of fruit products

Jams, marmelades juices and fruit salads are relatively easy to prepare and do not require heavy investments.
Fruit products can be prepared and packed without the use of steam or any auto clave as long as the pH of the products never are allowed higher than 3,5. The acidity of the products will than be sufficient for the preservation. The mentioned products can be packed in short runs from available fruits as mangos, guavas, loquait, pashion fruit, plums, etc. It is important however that no rotten fruits is allowed. The project can start any-where these fruits are available at reasonable prices in sufficiently long seasca. One must expect to collect the fruit from the farmers. The process involves washing, peeling liszing, cooking with sugar, alginate, pectine (but no artificial additives or colouring), filling, exhausting, closing and sterilisation. The products should initially be intended for the local market. It is really a shame that Indonesia imports huge amounts of canned fruit when it is so easy to start projects like this ! The important of juice is US $ 1.200.000 p.a. Fruit in syrup the same and jams as well.

1.02 Fruit drying

Most fruit and vegetables can be preserved through drying.
As long as the market or the price for fresh or other-wise packed products are less satisfactory, drying projects should be established. The drying will involve washing, peeling slizing and drying on tray dryer with heated, far circulated air, the fruit placed in trays ever each others. Moisture should be down at 5 % before packaging.

1.03 Canning and cultivation of vegetables

Especially products as mushrooms and asparagus are highly perishable so that canning should be done in conjunetion with the cultivation.

Canning must also be done under the right hygienic conditions to prevent contamination and dangerous food poisoning. Sterilization under pressure will always be required. A boiler and an autoclave can not be emitted and the project investment hence always will be higher than for fruit canning. On the other side, these are well paid products, allowing a good economy of the project.

1.11 Dairy Fresh Milk pasteurization and Packaging.

The prices for fresh silk in Indonesia are very high. It can there-fore not be economical to make cheese or other concentrated dairy products as long as it ispossible to make use of fresh milk. Fresh milk is also very much a scarce resource very much needed by the population.

Where-ever one can get enough milk available on farm level, should therefore small milk distribution dairies be established.

The small dairy should contain;

- milk coolers on the farms.
- cooled transport to the dairy
- milk analyzing, pasteurization, packaging and cooling facilities within the dairy.
- cooled transport of packed milk to retailers with cooling facilities.
- alternative milk treatment possibilities at the diary for the case of uneven supplies (e.g. yogurt preparation).

1.24 Animal feed from fish and slaughter offalls

Fish meal manufacturing is generally a very demanding project involving high investments and requiring large quantities, separating oil and meal.

As long as the fish is relatively lean however, having limited fat content, it is possible to dry it either in multiple tray dryer, or in the sun on a finemesh tray under a finemesh cover (to prevent flies and birds). Thereafter the dried small pieces can be ground in a simple hammer mill, packed and sold. The product will be very rich in proteins. The possible storage time for such a product is mainly dependent on the fat content, but will in all cases be relatively short. Fat containing pieces should be sorted out and given to the animals directly.

1.25 Cattle feed from rice straw.

Indonesia has only 150.000 dairy cows, milk is to 86 % imported and is very expensive. * The straw from the wide spread rice cultivation is not properly utilized. Utilizing the rice straw for cattle feed, it can make it possible to increase the number of dairy cows and make it possible to establish cattle feed manufacturing units where ever rice straw or other straws are sufficiently available. Rice straw is originally not very nutritious or palletable for cattle. The process therefore involves caustic soda treatment of the straw, mixing with cotton seed cake or other protein containing feed, supplemented by Urea which caters for a part of the protein content, mixing also with molasses, vitamins, minerals and finally pelletizing. Different qualities can be made to ensure that the caw will get a balanced feed with the right protein content etc.

1.26 Animal feed based on fungus treatment of wastes.

Commercially available from Germany and Guatemala is now also equipment for treatment of molasses or of wood, straw and other wastes by fungus after grinding of the wastes. One will in this way be able to make animal feed rich in proteins, from wastes. A German process is offered from Hulls and a simpler process is available from centra American Research Institute for Industry in Guatemala.

* US $ 65 million is yearly spent on importation of dried milk.

1.29 Aren Palm flour

The aren palm is during its lifetime used for extracting juice and brown sugar. After 20 years lifetime the stem can be cut down and the marrow of the stem can be made into flour. That involves clearing out the marrow, rasping it into flour, washing in water, sieving and finally sun drying. It may be expected that a palm can contain with a yield of the marrow of 20 %, about 40 kg of flour. The flour can be used for cooking wet cakes and it contains mainly carbohydrates. Only where the Aren palm can be found in sufficient of 5 mill rupies may give a capacity of about 200 kg per day.

1.30 Gelatine from Sea weeds

Red sea weed gelichum carfilagenium give a yield of 30 % gelatine. A production in a small scale industry can process 500 - 1000 kg gelatine/year. The weed is mixed with 5 % CaO and dissolved for 6 hours under frequent stiring. It becomes pale, will be washed with water, dried and dissolved in acetic and 40 X water quantity, cooked, and the final product will be pressed in filter bags before final drying. The project can be duplicated where ever the right sea weed is available.

1.32 Papain Enzym Powder.

The product is made from the juice of the papaya fruit collected on the tree before ripening, and still allowing the fruit to be eaten when ripe.

The products is used for;

- tenderizing of meat
- clearing agent in the brewing industry
- in the textile and leather industry
- in the pharmaseutical and cosmetics industry.

With 1000 trees per Ha and 60 kg liquid per tree perday =+ 4 days of t rest, 25 Ha will be required to produce 100 kg/day which gives 25 kg of enzyme powder/day, coresponding to a total production of 7500 kg/year and a turnover of about 75 mill Rp./year.
The process involves . diluting with water, millving, filter pressing, drying, and finally grinding to a fine powder before packaging.

1.33 Ketchup from coconut water (Kecap).

Coconut water as normally wasted can be used as an ingredience in the manufacturing of Ketchup as an alternative to Soya beans, but the water does not constitute any mayor ingredience of the finished sauce (please see BIPIK profile no 28 for more information).

1.34 Glukosis sugar syrups from Tapioka starch.

BIPIK profile no 31 describes the manufacturing of 1500 kg/day of glucosis syrup from 1500 kg/day of tapioka flour added water, HCl, sodium carbonate etc. The process involves dissolving in water, boiling, Hydrolysis, neuhalisation with NaCO3, Clearing through heating with carbon, filter pressing, and finally concentrating the solution in an evaporator.

1.35 Soya bean milk.

Milk Substitute can be made from Soyabeans, but not having the same taste and probably not the same food values but composed drinks with e.g chokolate flavour may be made.
50 kg of beans + 45 kg of sugar, 1500 l water + calcium, salt, essence etc. will give 450 l of soyabean milk per day + 100 kg of soyabean cake.
The process involves mixing with water, boiling, grinding, boiling again, adding of calcium, sieving, adding of sugar and other ingrediences, and finally packing and pasteurisation.

1.36 Fruit essences from fruit peels

Fruit processing industries can use the fruit peel for manufacturing of natural fruit essences, contrary to most available essences which are made artificially. The process involves pell washing and cutting and thereafter ester extraction though heating in a alcohol quantity of 5 times the pell weight in enamelled apparaparatus. Sieving takes place after cooling and thereafter the excess alcohol quantity will be recovered for reuse through evaporation under vacuum and destillation. The BIPIK profile no 33 specifies a production of 20 kg/day expected to be sold at 2000 Rp per liter.

2.1.1 Absorbent cotton, sanitary facial and medical

The products are interesting and in great enough demand, but it appears inevitable that high investments will be involved in the project. With Fibre opener, wet cleaner, sterilization, sprindryer/ drying, carding machine, winding and cutting it is hard to expect an investment under 150 to 250 million Rp.

2.1.2 Sanitary female napkins

These, as disposable products were earlier made on a cotton basis, but are today mainly made on celluloses basis. It is usual to get the material in reels. The bulk fibre require some fluffing, but the rest of the process is pure assembly. Automatic machinery are available at costs over 100 - 150 mill rupias, but it will certainly be possible to construct very simple locally made equipment for semi manual assebly and packaging.

2.1.3 Sanitary female tampons.

A 50/50 % blend of cotton/rayon is normally used. The tampons are on the market in two executions, with and without a double paper tube applicator. The non applicator type is in many ways preferable, but require so heavy compression and complicated tooling that it can hardly be made by any small scale Industry.

For the applicator type are automatic machinery available, which are costly and too sophisticated. It will however be possible to construct locally, simpler tooling for semi manual production.

2.1.4 Blanket Weft yarn

To the extent that cotton and acrylic textile cuttings and wastes are available, blanket weft yarn can be made.
The process is based on coloured rags to be colour separated and thereafter run through a tearer, an opener, blender, carding machine and a spinning machine. The investments are therefore bound to be relatively high.

2.2.3 Knitted Fabrics for underwear, and shirts etc.

A few round knitting machins, preferably of a few different diameters and gauges are used to satisfy the demands for cloth widths and fineness, are used. 4 - 6 machines can forman economical project. Knitting machines for plain cloth are simpler, and they will normally be satisfactory for the required patterns.
No further machinery is normally required. The project will buy dyed cotton or cotton blend yarm in rolls and will either sell the knitted fabric to garment manufacturers or be equipped with sewing facilities to make ready made garments, which normally is a more flexible solution. The knitting should normally operate on 3 shift.

2.2.4 Shoe laces, ribbons, elastic tapes, belts, stove wicks etc.

These products will be braided, woven or crotchetted on special automatic machines for the purpose, and in different widths.
The weaving machines being equipped for coloured patterns or not, and being able to weave also elastics. The project can always start with a small number of machines of either of the types and expand continiously. 3 shift production should be intended.

2.2.5 Fusible interlings.

Automatic or semiautomatic machines are available for dotting fusing coumpound, rosin or others, on both sides of the material. The interling will be sawn into collars and other garment items which will be stiffened by the interlining after releasing the fusing compound during pressing of the garments.

2.2.6 Medical plaster.

A glue compound will be applied in bath on a woven or kintted fabric passing a drying chamber also sterilizing the product. The tape passes over slitting rolls before being would on small reels. Parts of the tape will be added impregnated strips of gaze and protection plastic before being packed in small units as quick-plaster. Investments can be quite moderate and the economy good.

2.2.7 Cotton Measuring tapes.

Tapes of 1,5 m lenght can be made from cotton ribbons passing through a machine for syntetic coating of the tape, with thereafter following printing, cutting, and end fixing. This is a small and simple project for tailors measuring tapes, requiring only limited space.

2.3.1 Tailoring Projects.

This is one of the easiest projects to start, requiring only a small number of ordinary straight stitch machines, a zig-zag machine and some simple cutting and ironing facilities, with very little space requirements. Button holing, button fixing, heming machines and other more complicated machines should normally be avoided. They are too complicated to use and to maintain, and will normally be very poorly utilized. The easiest products to start with are school unforms, car seat covers, and ladies dresses. More demanding are projects for gents trousers and shirts and too complicated for most projects are mens suits.

The differences however, are only on skill demand.

2.3.2 Garments from Knitted fabrics.

Knitted fabrics can be bought in reels, but it may often pay better to combine the project with the knitting operations. Underwear, wests, shirts and T-shirts, blouses and childrens wear are the normal products. The required equipment, excluding the round knitting machines, include; A simple cutting machine, a few overlock and glatlock stitching machines and pressing equipment.
The project is fearly simple to operate.

2.3.4 Bolls and other stuffed toys.

Having one or two simple straight stitch sewing machines, and preferably some slight sence of shape and sesign, this is a very simple and low cost project to start. Cotton cloth pieces can be cut after templets with ordinary shissors the products sown together, tuned inside out and stuffed with torn up cotton wastes. Finall Embrodery application of hair, eyes, etc. is important. Dolls are presently imported for over $ 3.000.000 p.a.

2.3.6 Knitted Socks.

Socks are knitted on small round knitting machines. Ready dyed yarn in wool, cotton or with syntetic blend will be used. The project can start with a small number of machines with different number of needles. After knitting, only hand sewing of the toe portion is required, iroring, and fixing of a label.
Even if mainly locally made import ammosts to about $ 3.000.000 p.a.

2.3.8 Assembly of fishing nets.

Fishing nets are bound on large machines as an endless material. The nets require assembly with edging and straps for floats and sinks before it is ready for sales. This is normally done manually and can be done in very small projects, either on a subcontracting basis or buying net in bales, selling erected ready made fishing nets. The importation of fishing nets is very high, ammounting to

over $ 5.000.000 p.a.

2.4.1 Vegetable tanning of leather.

Vegetable tanning of all types of hides and skins is a fairly simple process requiring limited equipment only, but big space and much water with possibility of draining the effluent. The product will be the local brown leather as much used in belts, ladies hand bags, locally made sandals etc.

The process normally involves;

- Soaking in water in basin for one day
- Liming with lime in water in rotating drum for one day
- Fleshing, i.e. cleaning of the leather, normally done with hand tools only.
- Deliming (soaking for 2 days).
- Drum pickling in a drum for one day
- Tanning with wattle extract in a rotating drum for 2 days.
- Thereafter fatting in drum, hanging drying and finally softening and smoothing through staking with hand tools.

Vegetable tanning can start in a fairly small scale, and very profitable can it be combined with assembly of game animals and reptiles.

2.4.2 Chrome leather.

The most high value use of the hides are for manufacturing of shoe leather and other high quality developed leathers. That involves further machinery and processes, a more extensive used of chemicals, large water quantities, and water pollution problems. It is also possible to tan semifinished products named as wet blue or "crust" for export and finishing overseas. That involves less processing and less sophisticated equipment, while the dirty part of the job remains the same. These products are very popular overseas, but it should normally be discouraged to export raw materials and semifinished products.

2.4.5 Leather products.

As long as one is able to make popular designs, the manufacture of leather products from vegetable or crome leather or even imitation PVC leather is fairly simple process involving very limited investments, mainly sewing machines, a clicking machine (for cutting when many uniform pieces of complicated shape, are required) may be a small leather splitting machine, a skiving machine for edge trimming, a buffing machine and some hand tools. The easiest products to start with are belts, vallets, purses, hand bags watch straps, etc. Slightly more complicated are briefcases, suitcases, working gloves, ladies gloves, footballs etc. and most demanding is the production of high quality shoes, also requiring some more machinery.

3.1.1 Glues, putties, paint, printing inks etc.

A project can be tailored to make a wide variety, or may be rather few selected of these products. The process and the equipment will vary a bit on selection of the products range. Most of them require a mixer, some with a heated jacket others with a close lid, A tripple mill is required for most products. For rubber based glues is required a heavy rubber kneading will.

3.1.3 Petroleum jelly Packaging.

Petroleum jelly comes as a by product from the oil refineries. This can be packed into small jars and tubes as it ocurs, as a skin cream, or if needed, after some further simple filtering and adding of perfumes etc.

3.1.4 Shoe, floor and furniture polish, car polish.

These products are woxes dissolved in solvents and possibly added dyestuffs, silicones etc. A hot jacketed agitated vessel is the main requirement. In this the waxes will be melted and the additives mixed in, where after packaging takes place.

Waxes as carnauba wax, montainwax shellac wax ozokenite and bees wax may be used, dissolved in paraffin wax, turpentine oil, white spirit and or nitrobenzena.

3.1.5 Laundry Soap.

Saponification of fats as tallow, palm oil, palm kernel oil and others is done in heated stirred vessel with caustic soda. Filters and builders etc. may be added before the mass is transfered to moulds for cooling/stamping.
Manufacturing of laundry soap is considered a simple process possible to start on local basis.

3.1.7 Candles.

Candles are made by moulding melted stearine/wax possibly added dyes around a wick. This can be done either by repeated dipping of a frame with hanging wicks down into a wax bath, or more normal in a candle moulding machine, normally hand operated. The simple machine has a number of wick rolls under, the wicks leading through a moulding chamber with many cylindrical candle moulds and fastened to a set of already moulded candles held in a frame on top. Candle sets are alternately moulded, cooled drawn up and cut off. Candles can also be moulded in individual moulds of more fancy shapes. Candle making is an easy process with very low cost equipment.

3.1.8 Animal glue

Animal glue is made from animals skin, bone, and hows. The cost of animal glue have increased heavily on the world market as this more and more has become a scarcely available product. Animal glue is used both in carpentry, paper making and sundry chemical industries. This is a good project to start as long as rawmaterials are sufficiently available.

3.1.9 Essencial oils destillation

Essencial oils for use in the manufacturing of cosmetics soaps and in the pharmaseutical industry etc. are distilled from leaves or seeds of sundry plants and trees. BIPIK profile no 27 specifies for a small project a requirement of 250 kg leaves of the Minyak Nilam bush per day to get 8 kg of pachouli oil for a very small scale project with an investment of 6 million Rps. The process will normally mainly involve raw material cleaning and chapping and semi dry destillation. The equipment will include destillation apparatus chaff cutter, and sundry auxiliary installations. Products that can be extracted from Indonesia plants will mainly include:

	Export 1981 from Indonesia:
citronella oil cananga oil	750 tons at 2.03 US $/ton
cinamon oil	54 tons at 12.50 US $/ton
clores oil	635 tons at 1.78 US $/ton
pepper oil	4 tons at 16,50 US $/ton
nutmeg oil patchouli oil cardamon oil	530 tons at 16,-- US $/ton
vetivert oil lemon grass oil	46 tons at 12,-- US $/ton

The products are exported to many countries and the exportation can easily be increased.

3.1.10 Regeneration of used lubrication oils

Some used engine oil in Jakarta is recollected for refining, but most of the used engine oil in Indonesia is just wasted. It is important to start further projects within this sector. The refining is under governmental control, but the processing is left for private industry. Refined oil becomes equal in quality to oil refined from new crude oils. The rerefining includes first of all clay treatment, filtration, possibly acid treatment, de..tillation and the incorporation of additives.

Most of the equipment is pumps and tanks which can be locally made. A plant as small as 200 - 500 tons p.a. may become a vilable venture and can be implemented also in smaller towns in Java. Investments may be limited to under 50 million Rp.
For even smaller quantities is it possible to utilize the used oil for manufacturing of wood preservatives etc.
Not Research development corp. in New Delhi and others offer technology and equipment.

3.1.11 Silver Regeneration from photographic film material.

Photographic film contain silver bromide during development, 80 % goes into the development liquid and 20 % is converted into metallic silver. The film contains 5 - 10 kg silver perton of film. Indonesia's input is 5000 tons of photographic material per year which contain about 40 tons of silver. It being able to recover 20 % of this at a price of 300.000 Rp/kg a sales value of about 500 mill Rp can be gained and give life to many small scale projects. The recovery is simple. From the used developer liquid, it can be separated by electrolysis or by a metal exchange method, and from the film by melting after burning the film or through enzyme destruction of the gelatine holding the silver grains. Collection, first of all of X - ray materital and development liqual from hospitals, and used or spoilt film from processing laboratories etc. are the easiest raw material saurces.

3.1.12 Active carbon from coconut shell.

Active carbons are mainly used for clearing of liquids and gases through absorbing of the pollutions. Active carbon of gas absorbent grade can be made from coconut shell. A project of this nature can make Indonesia an exported rather than an imported as at present of this product. The proces involves crushing, treating with zink cloride and activation in a rotary kiln, washing and drying. A plat for 500 kg/24 h may requence an investment of about 100 mill Rp.
The importation of active carbon anmounts to over 8 mill US $.

Indonesia presently exports ordinary coconut shell charcoal of 300 tons/tons year at $ 0,15 per kg. Mangrove charcoal is exported with 36.000 tons at $ 0.09 per kg.
Activated carbon fetches very much higher prices and will easily find export markets.

3.1.13 Calsium Carbonate and Plaster of Paris (gypsin) mining and manufacturing.

Calsium carbonate is abundantly available allmost every where in Java and Calium sulphate in many places.
Gypsin is imported to Indonesia with 8.500 tons per annum at cost of 45 Rp/kg or 550.000 $ p.a. Ready processed anhydrate powdered plaster of paris is imported with 300.000 tons p.a. at a price of 280 Rp/kg = 12 million US $ p.a.
At such a price, it should for a local miner and manufacture be easy to compete for an import substitution.
The processing of raw gypsum into plaster of paris involves, clearing of the gypsin from pollutions, either by rough screening or by water washing fallowed by drying.
These after first rough crushing and later fine powder milling will be clone with stone crushing equipment and a micronizing will. Dehydration will be done in a stried vessel, heated to about 140 °C. The investment may, dependent on the capacity, limited to 20 million Rp or more. Within the some project will it also be possible to make ready made gypsum ceiling tiles as explained later. Calsium carbonate is demanded in still much bigger quantities fetches much lower prices but are also less demanding in the production, requiring less fine grinding.

3.1.15 Brake fluid.

Brake fluids are imported to Indonesia 2000 tons p.a. at a value of 2,8 mill US $ or Rp 10 per kg. This may indicate that manufacture or at least local packaging may become available small scale venture.

3.1.17 Acetylen and Oxygen.

These welding gases are already manufactured at several central places in Indonesia. It is however expected that the manufacturing should be further decentralized, especially for acetylen which is fairly easy to manufacture and involves high transport cost after filling of the cylinders.
Acetylen production involves calcium carbide reaction with water, filtration compression and filling of culinders. The investment may be on the higher side because of the high cost of cylinders as long as one can not do pirate filling of cylinders belonging to others.

3.1.18 Industrial waste exchange central.

A range of wastes, chemical, metals, minerals, plastics etc. is through away, especially by medium and large industry in large quantities.
These wastes can by other industries be used either as they are or after some refining or simple treatment.
Will some coordinating effort is it will possible to match suppliers and users, and also the some times required between treatment. The refining in between can if not done by the supplier or the consumer can in most cases be organized through other existing industry.
Hence this project does not need to involve any physical processing or handling only breaking of availabilities and demands is required, and the project require a high portion of skill. The project can be established as an government office as an industrial organization venture, but still may be most efficiently as a private enterprise. The suppliers/consumers can best be changed a commission for the established trade, but the organization of a member-ship fee is also possible.

3 2. Plastic Products.

3 2.1 Foam Polystyrene.

Foam polystyrene is white, is extremely light in weight (20 kg/m^3), is easy to shape and is used for insulation or as a floating madium. Moulded in big blocks and thereafter cut with an electrically heated wire it will be used as insulation board ceiling boards, pipe insulation or window decorations. It saves load on the AC and is cheap in use. Beads are firstly blown up from imported expandable polystyrene with steam, blocks are thereafter moulded in simple box moulds with steam and finally cut with electrically heated stretched hot wine arrangements. Moulds are simple and can be locally made. Instead of moulding in blocks and cutting with wire, direct moulding of small complicated shaped products is possible. That method will apply for cooling containers, packaging material pieces, fishing floats etc.
Foam polystyrene is easy to handle and investments are moderate, but steam is required.

3 2.3 Foam PVC.

Foam PVC os a very strong and rigid plastic mainly used for life bouys and for heavy duty fishing floats of different shape. They are moulded ready to shape, or shaped from moulded bars. Firstly PVC powder is mixed with blowing agent and other ingrediences, thereafter cured in compressed from in moulds in an water, expanding 10 - 15 times in volume. The process is quite demanding.

3 2.4 Foam Polyurethane.

Foam Polyurethane as a rigid or semirigid foam is made by mixing two liquid components (polyol and isocyanat) together. 2 different methods are used :

1). Insulation material of very low weight is made by quickly pouring premeasured quantities of the liquids together into an ordinary electric mixing machine. Mixing is done for about minute.

The total content will quickly be filled over in a simple wooden mould with paper on the inside walls. The lid is closed, the foam develops, and after an hour the block can be taken out and cut on a band saw. The product becomes a bit heavier than foam polystyrene, it insulates even better but becomes also more expensive. The investment for this process will be very low !

2). Heavier products porous inside and with a tough skin (integral foam) is made in a different way. The 2 liquids are continiously mixed in a nozzle machine down into a mould which thereafter is immediatly closed until the curring is completed. In that way is made shoe soles (possibly also moulded directly onto the shoe upper), car interior body parts, (including dash board, and steering wheel cover, armrests, seats, etc.) cooling containers etc. A number of moulds may be used to allow for a curing time of about 15 minutes. The moulds can be of very simple construction. No real pressure develops !

3 2.5 Foam Matresses and other soft plastic foam.

Mattresses, sponges, pillows, upholstry foam etc. are in the prinsimple made in the same way as ridfid polyurethane, only the chemical composition is slightly different.
Firstly a block or a continous block will be moulded, thereafter matresses or other products will be cut with a band knife machine. Finally a textile cover may be applied.
The moulding can be done either in a closed box mould as described above (of size as a matress but much higher) or it can be done with a continious mixing head applying a mixed string of material and moving zig-zag over a transport belt with side covers. With the box mould the investment becomes very low, but the liquid consumption may turn out to be slightly higher.

All foam plastic products are voliminous after foaming. Normally they are consumed in big quantities and the investments are reasonable. One will therefore often find them well fit for local manufacturing and consumption.

3 2.7 Life Saving vests and swimming aids.

These floating aids are made with foam plastics as polystyrene, PVC or poly ethylene which can be moulded for the purpose or cut to shape for the purpose. Welded plastic foil products for air-filling can also be used. Investments are moderate, but be aware of that for life saving equipment, shape, materials and construction are subject to government approvals.

3 2.8 Moulded soft dolls and toys.

These products are very simple to make with low cost equipment. PVC powder is mixed with dyes and other ingrediences, or the moulding compound can be bought ready made. Product moulds will be cast from aluminium. They will be filled with compound through a botton opening and placed short time in the oven. Plastification takes place around the surfaces. Excess material is pured back into the container and the moulds are taken back into the oven again and now placed upright to complete the curing. Thereafter moulds will be taken apart and the products decorated and equipped with a whistle.

3 2.9 Rotation Moulding.

This is a nother low cost plastic manufacturing process fit for moderate products quantities. No pressure is involved, only simple moulds rotate in the oven. Simple thin sheet aluminium moulds can be used. The process is well fit for fishing bouys, mouring boys, fenders, other floating products, but also containers and even small double shell roing boats.

PVC powder or paste is poured into the moulds, the moulds are closed and put on a rack which provide slow ratation around 2 axis during the heating in the oven. The rotation continues also during the later cooling. During the rotation the plastic will deposit on the inner walls of the moulds. The products are ready from the moulds. The rotation in the oven can be provided manually or with a simple motor driven rack system with alimited number of moulds.

3 2.10 PVC dipped stell products.

Kitchen utensil drying racks, towel hangers, cabinet shelves, and other household items can be made from steel wire, sportwelded together and thereafter dipped in PVC powder or PVC compound. After dipping, the products will be placed into a simple oven for curing. If the steel products are bought from others, only a dipping container and a curing oven is required. To make the steel products within the project, generally a small hand lever shear, a spot welder, and some forming jigs are required.

3 2.11 Welded plastic products.

Many simple or complex plastic products can be made by welding together pieces of thiner or thicker textile reinforced or not reinforced plastic foil. That can involve rain coats, rain hats, book and file covers, bags, and covers for different purposes, napkin holders, shopping bags, diaries, purses, wallets, folders, advertisement items, etc.

Welding of the foil pieces is done either by heated rulers pressed together over the foil pieces in a hot sealing machine, or better in a high frequency sealing machine where the sealing rulers are shaped according to the sape of the joint. Also the high frequency welding machine is not very costly. The pieces to be joinded together can either be precut manually, or in clicking machine, or the cutting will as in most cases be done simultaniously with the hot sealing in the high frequency machine.

Aome printing os the products is normally required. A simple screen printing frame can be used for the purpose.

3 2.13 Bakelite electrical accessoines.

Products as lampholders, ceiling roses junction boxes and plugs can easily be made by a small scale project. Other products as switches and sockets etc. are often difficult to make due to the very tough quality regulations. Metal components will either be made within the project or purchased. A simple hydraulically operated bakelite press with 1 - 6 cavity heated moulds will normally be used. The mould normally consist of a stationery and a movable part. Metal incerts are fixed to the lower part, bakelite or urea formaldehyde powder is portioned in (if not a tabelet is prepressed) and the press is closed for curing for 15 - 60 seconds. Thereafter the product is taken out warmpressed, and the products will be assembled. The process is not very complicated and the press and tool investment is reasonable. One will however often find that these bakelite products are imported at very reasonable costs.

3 2.14 Pedestrians light reflection Pads.

Many pedestrians are hit by cars on the road and killed, simply because they can not be seen by the drivers in the darkness. Light reflection pads are carried byt the pedestrians in many countries. Most of the accidents can hence be eliminated. The small pads can best be injection moulded from polystyrene.
A small mould with a number of cavities together with a small injection moulding machine is what is required for the production The pads may be sold at about 50 Rp each.

3 2.15 Fibreglass Products-Boats.

Glassfibre reinforced polyester plastic is today the conventional method of building and fabrication of smaller and medium large boats.

Rowing boats, motor boots, seiling boats, canoes, kayaks, surfing boards, etc. But also other products can be made, tanks and vessels which require strenght, leight weight without corrosion, fishing rods, translucent roofing sheets, chair seats, table tops etc. * The major requirement for the production is the mould, or a number of moulds for products to be erected from different parts. The mould can even be made from an old wooden boat. The major production steps includes hand laying on the mould of layers of glassfibre mats to be soaked with polyester resin and allowing that to harden.

A more sophisticated production will be achieved using a spray gun with a glassfibre cutter, applying fibre cut reinforcement from a roll. Also other more advanced methods exist, but it is always possible to start this production in a very small scale.

3 2.17 Collection and regeneration of plastic wastes.

All thermo plastics can be used and reused again and again. The plastic prices are now so high that it pays well to recollect all used plastics and bring it back into production again. Collection should be organized from industry, for homes and from garbage collections.

The project will normally involve:

- Collection of scrap with hand carts
- Washing with water and detergent
- Sorting of plastics in qualities and in colours
- Grinding in a knife mill
- Packaging and sales to industry.

To fetch better prices is it also possible to include remeting and repellitizing in an extruder, but that is not required for a start. This project can be organized allmost everywhere.

3 2.18 Plastic sign boards.

Sign boards for commercial or domestic use can be made in may different ways.

* A product which could have been better developed an introduce than what the cases was few years back is the helmets for the motor cyclist. Exstensive importation of helmets for other purpose still exist.

Here is mentioned two t for the start of low cost small scale projects.

1) Cutting of laminated sheets
   This is mainly used for small size door signs etc. A laminated plastic sheet (light and dark colour aminated together) is first cut to required size. The letters etc. is thereafter cut into the sheet with a simple phantograph with a cutting spindle.

2) Vacuum formed illuminated boards.
   Mainly used in bigger size outside, sign boards. A vacuum pump and a heating cabinet for the vacuum forming is required. For one or very few signs very simple forming moulds will beused, made from card board, wood, foam polystyrene, plaster of paris etc. Acrylic sheets will normally be used. Colouring, fitting and inside illumination is normally required.

3 2.19 Vacuum formed bath tubs etc.

These bath tubs will not be cheap, but get an elegant appearance when well maintained. A simple vacuum forming machine is required to from the relatively thin acrylic sheet. Thereafter glassfibre reinforced polyester plastic will be applied on the back side to give the product sufficient strenght.

3 2.20 Plastic buttons.

Two different methods may apply:

1) Moulding of thermosetting plastic in abakelite press.
   A press with exchangable mould plates for a large number of buttons will be used. Urea formaldelyde tablets will first be pressed and thereafter placed one into each cavity. The hot press will be closed to sure the products which thereafter will be tumbled clean in a drum.

2) Milling/turning of acylic or polyester blanks.
Blanks will punched from sheets or purchased in bags.
Small turning automats for shaping and 4 - hole drilling automats will be used for completing the shape before the buttons will be polished in rotating drums.

3 2.22 Educational mathematical sets.

A set consist of angelsquares,ruler, protractor, compass, divider and possibly other items in a small box. The products, including the box, will be injection moulded. The injection moulding machine makes the investment relatively high, but the project is quite profilable and saves lots of foreign exchange. A complete manual is available from Kenya.

3 2.26 Polypropylene Bags.

Bags for sugar and other bulk consumables are today prefered from woven polypropylene monofilament. The bags become light weight and are strong, hygienic and durable.
The project will when including extruder facilities become relatively costly. But since extruded monofilament is available in Indonesia, may it be possible to start with the weaving and tailoring sections only.

3 3.1-6 Moulded rubber products.

A range rubber products from compact material can be moulded,

on a regular sales basis or an order from the car industry or others. The composition of the rubber mass will very extensively dependant on the material requirements. Metallic in cents and textile or metallic reinforcement may be required.
The mass is first kneaded together with additives in a rubber roller kneader. The mass may thereafter be extruded to a suitable profile ocut to lenght and placed into a heated mould in a press for the final curring of the product.

In spile of Indonesia being a rubber cultivation country, finished rubber products which to a high extent should have been substituted by local small scale production are to a large extent still imported. The annul importation include 130 tons of shoe heats and sales, 400 tons of rings, discs and washers, 750 tons of V. belts, 350 tons of flat belts and 1000 tons of other pressed rubber products.

3 3.8 Erasers.

Rubber Erasers are cut from pressed rubber sheets. The sheets are pressed after kneading together of rubber and a range of additives. The required equipment include a roller kneading will, a hydraulic press, a steam generator, a guillotine cutter and a thumbling polishing drum.

3 3.9-11 Dipped Rubber Products.

A range of products are made through dipping a mould into a latex solution. These products include Kitchen gloves, working gloves (especially for chemical and wet treating industry), surgical gloves, baby feeding nipples for milk bottles etc. Some products are reinforced with a knitted fabric to be put on the mould before dipping. The local market for these products are sufficient enough, only condoms are imported with 140 tons and other hygienic rubber products with 160 tons p.a.

Before dipping the latex will be aired and worked together with sundry additives. A coagulant solution will also be prepared. The moulds will first be dipped in coagulant thereafter in the lates mass at controlled speed and conditions before possible any preliminary finishing and curring in hot air. Before removal on the product from the dipping mould. The process may be done discontinuously in stages, but may be rather in a continuously operating machine with the moulds fit onto a continuously moving chain, moving from station to station.

3 3.12 Tyre Retreading.

Tyre retreading means exchange of the wearing surface of worn out tyres for motor vehicles of all kinds from scooters to tractors. It is economical to do retreading of the tyre surfaces and a project can be economical based on as little as 10.000 tyres per year. That means that this project can be implemented also within small towns and large villages to settle the local demand. The most expensive part of the factory installation is the vulcanizing moulds/machines, of which there must be one for each tyre dimension. All machines must be fully loaded with work, about 1 tyre/hour. Moulds most therefore be selected to match the distribution of the market demand on the different sizes, 3 - shift operation should be anticipated. Retreading can be done both on basis of locally worn out tyres and on imported casing. The smallest damage of the cord of the casing qualify for rejection. The rate of rejection of locally worn casing will therefore allways be high.

The process involves buffing (grinding down of the surface), profileforming and curing and fixing of raw rubber stab with vulcanizing compound, pressing of the gip patten into the tyre in the moulds using steam, and possibly replacing on the rim and balancing of the wheel.

3 3.14 Reclaiming and reconditioning of Rubber wastes.

There are in general 4 ways to reuse old rubber, first of all motorvehicles tyres. Reclaiming of rubber can be a very profitable business, especially in Indonesia and the utilization should be sought in the following sequence:

a) Tyre retrading (as explained above)
b) Reuse of the formed rubber prieces including cutting and reforming
c) Remoulding and rubber crup
d) Devulcanization

b) Reuse of the formed Rubber.

Especially motorvehicle tyres and tubes can be utilized for manufacturing of along range of important products. The manufacturing is generally very simple and require very limited investment. A range of small scale industries can be established on this basis. Some products can be mentioned:

- Rubber shoes cut split and assembled from the sides and wearing surface of the tyres.
- Furniture webbing, especially bed bottons, through splitting around the circumference of the tyre a 2 X 30 mm ship containing 1 - 3 largers of textile cord
- Door mats, car mats and other tough mats trough wearing coiling and otherwise forming of rubber strips
- Shoe sales and heels for repair and for rurally made leather shoes.
- Dock and boat fenders, childred swings and toys, cords for lethering animals, buffers hinges etc.
- Shaps and membranes from tubes.

c) Remoulding of Rubber crump.

Tyre retrading involves buffing off large amounts of small rubber granules (crump) screened to contain crump only under 0,8 mm, this crump can be used together with new unvulcanized rubber in the compression moulding of a range of products. Even if the crump is already vulcanized it has been found that 50 - 80 % of the rubber may consist of reused crump. This saves up to 50 % of the product cost and can be used for the moulding of products as among other;

- shoe sales and heels
- sycle pedals and handle grips, motorcycle foot rests
- solid wheels for hollys, wheel barrows, kids tricycles
- motor car fenders
- moulded rubber mats

- car Battery cases
- tips endstops and buffers for furniture, doors, etc.

d) Devulcanization.

Rubber is vulcanized, which means that during the original shaping of the product the latex reacts with sulphur and the rubber becomes shape stabil. The percentage of sulphur also determines the product handness. Remoulding and reshaping of rubber is not possible without opening of this chemical building. That involves a quite economical process, and some of the rubber qualities will also be improved, but the investment is definetely on the higher side. The reclamation process is generally as follows;

- sorting out rubber insuitable for the process (old tyres are generally accepted unless having steel cord)
- cracking (rough cutting)
- separation of textile and other unwanted elements
- grinding to crump of max 0,8 mm
- mixing with certain oils and extruding at about 200 °C during which the long chain molecules breaks down and the sulphur binding is released chipping the product into suitable prieceses (before remixing and reuse)

3 4.3-4 Wooden doors and cabinet doors.

Door baldes and cabinet doors in Indonesia are mainly made individually by the carpenters an order.
There are prospects of making them both better and cheaper through simple standardisation and prefabrication. Supplying from stock. Such doors will be made by simpler and cheaper materials and will generally be both better and cheaper.

The normal use of paper honey comb brings the weight and cost down of the core, at the same time as the covering flakes will get more close support to enable the use also of more low cost covers.

The production however must be standardized and the factory should not engage in any other production but his particular type of door blades possibly with frame.
The production mainly require seasoned wood and involves a multiple rip sow, squaring and sanding equipment and some painting/varnishing equipment.

3 4.7 Black board.

Plywoods are entensively used for building and furniture production in Indonesia. Black board is manufactured to a lesser extent and of a lower range. A project for manufacturing proper black board will not glue together 2 thin sheets of plywood over a layer of wooden list as traditionally done. That becomes more expensive and gives a lower quality:

The project should preferably contain a multiple rip saw, a core stock joining machine, a wide thicknessing machine, a plate press, sanding equipment, and a squaring saw.
Hence the project will first make a continuous flate of the core and plane this before gluing on 1 layers of simple veneer on each side. The product will utilize waste wood and when doing proper seasoning be able to make products cheaper than and superior to plywood.

3 4.8 Bee-hives.

Honey is imported with over 150 tons/year. It is possible to increase the local honey collection in Java. Most important is it than to offer the frames efficient and low cost bee-hives easy to operate. A new type of hives is available easy to make at low cost and having these benefits. A few small scale carpentry projects can be initiated on that basis.

3 4.10 Kitchen cabinets and working benches.

There is a need to improve the small Indonesian kitchen offering prefabricated standardized wood overhead cabinets and working benches with respatex cover. The are woom for several small scale carpenty workshops to spezialize within this field.

3 4.11 Wooden toys

All over the world wooden toys of a wide range are considered superior to the plastic products on the market. Selecting the good models, there must be a good scope for Indonesian being able to compete also in price also to export such products. Small workshops specializing on very few models to be made in larger series can be established.

3 4.12 Wooden boats

The small rowing and fishing boat can still be best and cheapest built from wood. Improved skills and models are however required. A range of small scale projects can be established may be better located collectively, arranging for advice from a trained boat builder.

3 4.14 Roof trusses.

Wooden roof trusses can often be built cheaper with lower material consumption when prefabricated according to the available tables of dimension/load/span specifications, using the mail plate system. A range of small simple projects, car be arranged where space is sufficient to handle the trusses.

3 4.15 Finger joints

Finger joints is the simplest and most material saving method of coaxial joining wood. The joint is almost invisible and as strong as the rest of the board.

The process required a moulding spindle machine with 2 fine toothed cutters, a axial gluing press with ultra heating system and a cutting saw. Independant projects can be started, e.g. within a carpentry estate, giving services to the carpenters or it can be started in conjuction with sow mills, truss building projects, or other carpentry projects.

3 4.16 Laimated wooden beans.

Wooden beans, laimated from e.g. 1" x 3" fingers joint and planed wood, straight or curved, are in many ways superior to beams from steel or prestrassed concrete, e.g. roof carrying beams of spans up to 50 m can be made. The quality requirements and consequently the skill requirements are however relatively high.

3 4.20 Floor Panguet from coconut trunk.

Coconut trunk is hard, has a beautiful structure when being polished but is also tough to the tools. It has been found especially suitable for the manufacture of parguet flooring, possibly arranged with small sticks glued in a mosaik pattern on apaper backing. Coconut trunks are to a too high extent wasted. A range of small scale projects equipped with hard metall typped saw blades etc. can be established, and it is not unreasonable to expect extensive exportation of the product.

3 4.21 Matches

Mostly matches are made by bigger scale industry. Several small scale technologies are available with higher or lower extent of labour intencivity. It has however been seen in other situations and other countries that these technologies with a very high extent of labour cost have difficulties in be coming competetive.

It is also quite likely if more detailed investigations will be done in Indonesia that the profitability will be found to be too poor.

3 4.22 Tooth picks

The use of tooth picks in the daily hygiene is on increase in the world. Small automatic machines for chopping of tooth pickes are available. Still the processing becomes relatively labour intensive and is fit for small scale production in Indonesia.
One will expect that reasonable export possibilities exist.

3 5.1 Sand paper.

Most sand paper consumed in Indonesia is imported.
The manufacture of sand paper is still a relatively easy process which very well can be done locally by small scale industries.
Printed craft paper passes through applicator rollers for animal glue. Screened crushed glass is thereafter applied with a vibrator feeder and the paper passes through a drying channel before final splitting and chopping.