No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
SUPPLY FOR SCHOOL TEXTBOOK PRINTING EQUIPMENT
IN
THE REPUBLIC OF YEMEN

SEPTEMBER 2003

JAPAN INTERNATIONAL COOPERATION AGENCY
SYSTEM SCIENCE CONSULTANTS INC.

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PREFACE

In response to a request from the Government of the Republic of Yemen, the Government of Japan decided to conduct a basic design study on the Project for Supply for School Textbook Printing Equipment and entrusted the study to the Japan International Cooperation Agency (JICA).

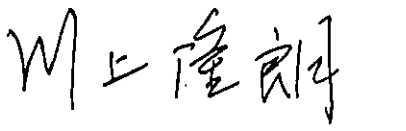
JICA sent to Yemen a study team from May 3rd to 28th, 2003.

The team held discussions with the officials concerned of the Government of Yemen, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Yemen, in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Yemen for their close cooperation extended to the team.

September 2003



Takao Kawakami
President
Japan International Cooperation Agency

September, 2003

Letter of Transmittal

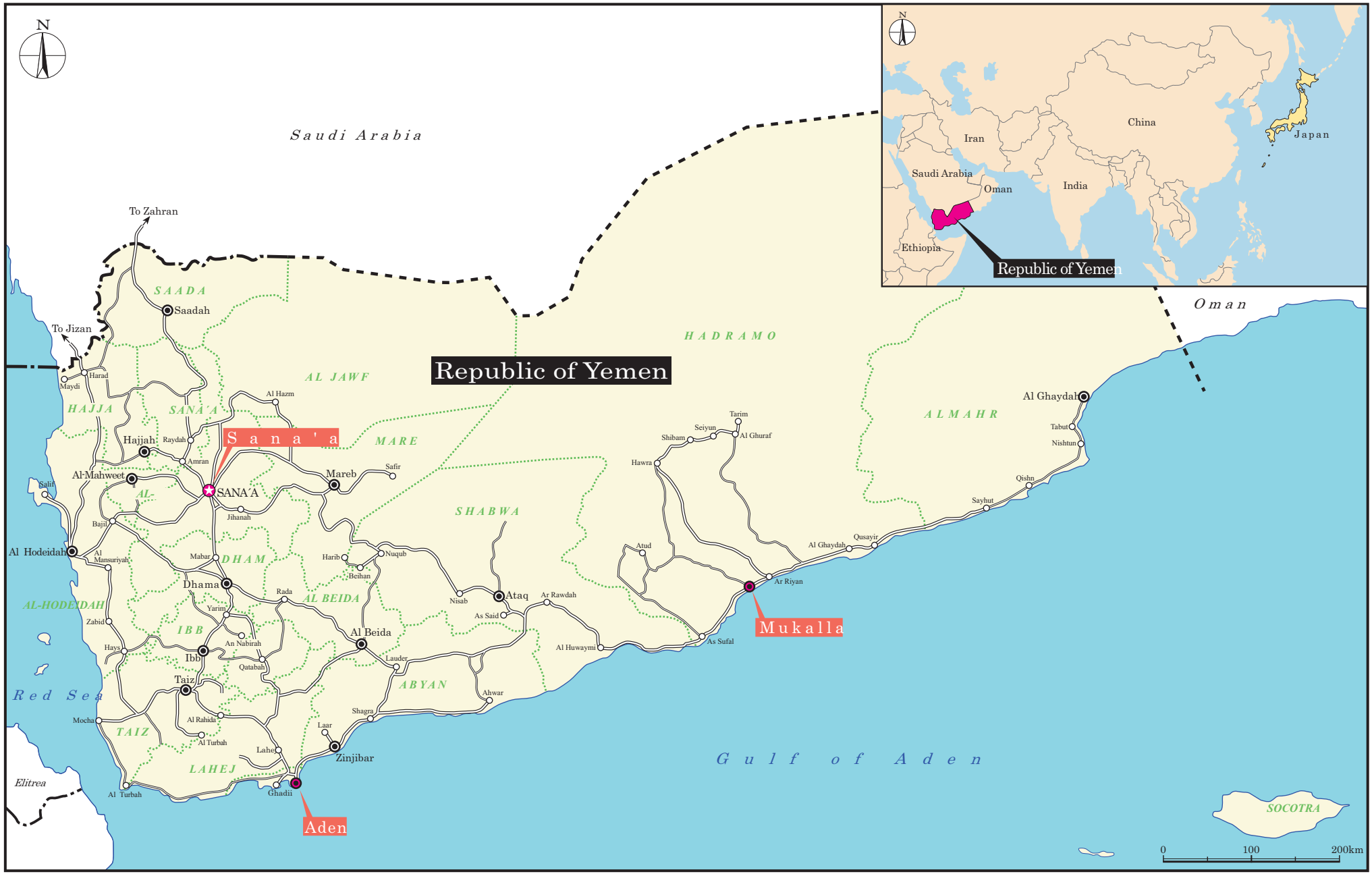
We are pleased to submit to you the basic design study report on the Project for Supply for School Textbook Printing Equipment in the Republic of Yemen.

This study was conducted by System Science Consultants Inc., under a contract to JICA, during the period from April to September, 2003. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Yemen and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Masami SUDA
Project Manager,
Basic design study team on
the Project for Supply for
School Textbook Printing Equipment
in the Republic of Yemen
System Science Consultants Inc.



LOCATION MAP

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Abbreviations

CD	Compact Disk
CDP	Child Development Project
CIP	Carriage and Insurance Paid To
CMYK	Cyan, Magenta, Yellow, Black
CPU	Central Processing Unit
DTP	Desktop Publishing
E/N	Exchange of Note
EFARP	Economic, Financial, and Administrative Reform Program
ERDC	Education Research and Development Center
G-1～G-12	Grade 1～Grade 12
GB	Giga Byte
GCSPP	General Cooperation for School Book Printing Press
GDP	Gross Domestic Product
GNP	Gross National Product
GSM	Gram per Square meter
GTZ	Deutsche Gesellschatt fur Technische Zusammenarbeit
GW	Giga Watt
HD	Hard Disk
JICA	Japan International Cooperation Agency
MB	Mega Byte
MHz	Mega Hertz
NVQ	National Vocational Qualification
OS	Operating System
PDCA	Plan, Do, Check, Action
PS	Pre-sensitized Aluminum Plate
QA	Cost Analysis
QC	Quality Control
RIP	Raster Image Processor
UAE	United Arab Emirates
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UPS	Uninterrupted Power Supply
US$	United States of American Dollar
WTO	World Trading Organization

SUMMARY

The Republic of Yemen (hereinafter referred to as "Yemen") is located on the southwest tip of the Arabian peninsula. It is situated at the gateway to the Red Sea on the west and faces the Aden Gulf and Arabian Sea on the south. Although a portion of the border area between Yemen and Saudi Arabia is still undefined, the size of Yemen is approximately 528,000 km^2, or about 1.5 times the size of Japan. Yemen is roughly divided into two areas based on its geographical features: "Upper Yemen" consisting of mountains and highlands, and "Lower Yemen," consisting of lowlands and the costal areas. The climate of Yemen is diversified and temperatures range from temperate to tropical. Sanaa, the capital of Yemen, is located virtually in the center of the country at 2,300 meters above sea level, with a temperate climate, low humidity and a rather low annual rainfall of 63mm. The target area, Mukalla, on the other hand, is situated in the costal lowland region and has a high-temperate climate with high humidity. The average annual temperature is 27°C and average annual humidity is 71.8%. The average annual rainfall in Mukalla, however, is approximately 12mm, which is extremely low. The overall population of Yemen was 18.86 million (as of fiscal 2001).

Following the unification of South Yemen and North Yemen in May of 1990, the country has been moving forward with development based on a policy of promoting a market economy and establishing democracy. Yemen has a multi-party political system and elects its president based on a national referendum. Under the "1st Five-Year Plan" which was drawn up in 1995, the country began a series of economical, financial and administrative reforms. In addition, with the support of the World Bank and IMF, structural reforms and economic retrenchment were implemented from 1998 to 2000. Through such measures, the deficit percentage of the GDP has been greatly reduced and inflation has been lowered.

Prior to laying down the "Second 5-year Economic and Social Development Plan for 2003 to 2005" (hereinafter referred to as "Second 5-year Plan"), the country drafted "Yemen's Strategic Vision 2025" a long-term strategic policy with the goals of developing human resources, raising the living standard and enacting other improvements. In relation to the education sector, the Vision has the goal of lowering the rate of illiteracy to below 10% by 2025 and stresses the necessity of improving education in the fields of science and technology.

The "Second 5-year Plan," on the other hand, sets goals for the education sector based on increasing school enrollment ratios with the aim of reducing the illiteracy rate. This is to be accomplished by 2005 by: ① increasing the number of students enrolled in the first grade by 12% ② increasing the percentage of students enrolled in primary education to 69% (82.4% boys; 55% girls), and 3) increasing the number of students enrolled in secondary education to 41.3%.

The Ministry of Education of Yemen drew up the "National Strategy for Basic Education for 2003 to 2015" to introduce various programs based on annual indices for the school enrollment ratio, the number of schools, the number of teachers, the number of textbooks and other related factors. This strategy puts forth a goal of increasing the school enrollment ratio for basic education to 95% by 2015. The following table outlines projected developments in the education sector up to 2015.

Table : Indices for the educational sector from 2000 to 2015

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Population (unit: 1000)	18,261	18,834	19,469	20,125	20,803	21,504	22,229	22,978	23,752	24,552	24,944	26,785	26,664	27,562	28,480	29,440
Age 6 to 14 (1000)	5,457	5,647	5,845	6,050	6,261	6,475	6,650	6,829	7,014	7,203	7,398	7,597	7,802	8,013	8,229	8,451
No. of children not enrolled in school (unit: 1000)	2,055	2,047	2,056	2,080	2,116	2,072	1,929	1,776	1,613	1,441	1,258	1,109	952	785	609	423
School enrollment ratio（%）	62.34	63.75	64.82	65.62	66.20	68.00	70.99	73.99	77.00	79.99	83.00	85.40	87.80	90.20	92.60	95.00
No. of children enrolled in school (unit: 1000)	3,402	3,600	3,789	3,970	4,145	4,403	4,721	5,053	5,401	5,762	6,140	6,488	6,850	7,228	7,620	8,028
No. of schools	12,388	13,847	14,571	15,268	15,944	16,935	18,160	19,436	20,772	22,163	23,617	24,953	26,347	27,799	29,308	30,879
No. of students per teacher	23.36	22.40	22.80	23.20	23.60	24.00	24.80	25.60	26.40	27.20	28.00	28.80	29.60	30.40	31.20	32.00
No. of teachers	145,624	160,729	166,166	171,103	175,652	183,458	190,383	197,401	204,575	211,863	219,298	225,272	231,424	237,754	244,233	250,889
No. of textbooks (unit: 1000)	23,814	25,202	26,520	27,787	29,018	30,821	33,051	35,374	37,805	40,337	42,982	45,415	47,951	50,594	53,340	56,199
No. of textbooks for teachers (unit: 1000)	562	643	665	684	703	734	762	790	818	947	877	901	926	951	977	1,004

Source: National Strategy for Basic Education for 2003 to 2015

The “National Strategy for Basic Education for 2003 to 2015” projects that the 3.4 million children enrolled in primary school as of 2000 will increase to 8 million by 2015 (or more than 2 times the level it was in the year 2000), accompanying the improvement in school enrollment ratios. In order to cope with the increase of the number of students enrolled in school, the “National Strategy for Basic Education for 2003 to 2015” places emphasis on increasing the number of schools from 12,388 to 30,879, increase the number of teachers from 145,624 to 250,889 and the number of textbooks from 27,800,000 to 56,200,000.

The Project is intended to procure page makeup equipment, printing equipment, binding machines and related equipment, as well as packaging and transport equipment and materials for the textbook printing house to be newly constructed in Mukalla by Yemen with the ultimate goal of offsetting the textbook shortage and meeting the increased demand for new textbooks. In August 2000, the government of Yemen requested the assistance of the Japanese government in implementing its “Textbook Printing Plant Equipment Supply Project.”

In response to this request, the Japanese government decided to undertake a Basic Design Study in relation to the Project and dispatched a Basic Design Study Team consisting of JICA members to the pertinent site from May 3 to May 26, 2003. The Basic Design Study was undertaken to assess the details and background of the items contained in the plan that relate to the educational sector in Yemen and the textbook situation, including the types and contents of textbooks, the number of textbooks distributed, the distribution chain, the activities of the organizations involved with procuring and distributing textbooks, existing machines and equipment for printing textbooks, as well as the situation surrounding existing facilities, maintenance and management systems, the topography for the pertinent site, the level of infrastructure development, plus items such as power supply capabilities and so forth.

After the Team returned to Japan, it confirmed the necessity and validity of undertaking the Project and proposed the machines and equipment best suited to the scale and details of the Project, then drew up a basic design summary. Based on the contents of this basic design summary, JICA dispatched a Basic Design Briefing Team to the pertinent site from August 8 to August 15, 2003 to explain and go over the details of the Project with the government of Yemen.

In selecting machines and equipment in relation to the Project, a basic plan was drawn up which takes into account the development plan by Yemen, the role of the textbook organizations, how existing facilities and equipment are being used and the level of technical expertise. The plan covers the following items.

- Machines and equipment that will be required for printing textbooks.
- Machines and equipment that will be required to supplement the textbook shortage.
- The use of machines and equipment equivalent to those installed in the existing printing plants (which do not require a high-level technical know-how or entail extra maintenance and management costs).
- The machines and equipment that will be required to remedy the current situation wherein textbook deliveries are often late.
- The minimum number of machines and equipment required for operation of the new printing house.

In order to study and analyze the need for textbooks and the textbook shortage problem in relation to the Project, the number of text books necessary and the textbook shortage was calculated on a yearly basis, while taking into account the population statistics for Yemen from 2003 – 2015 and the projected educational indices. Based on this, it was determined that the following policies would be necessary.

- Reducing the number of textbooks and the number of pages per textbook based on the textbook contents.
- Thoroughly promoting the reuse of textbooks
- Streamlining the operation of the existing printing plants and improving operation and production ratios.

The results of the calculations are listed in the table below. Regardless of whether or not school enrollment increases, the number of textbooks required will decrease continuously until 2008 as a result of the policy for “reducing the number of textbooks and number of pages per textbook.” In the “National Strategy for Basic Education for 2003 to 2015,” the number of textbooks required per student for basic education was roughly estimated at “seven.” However, because the Strategy calculates the number of required textbooks simply by multiplying the number of children enrolled in school by seven, there is a discrepancy between the estimate of the number of textbooks required under the “National Strategy” and the estimate of the number of textbooks required under the Project.

Table: Projection of the shortage of textbooks from 2005 to 2015

	No. of textbooks required	No. of textbooks for reuse		No. of textbooks printed	No of textbooks printed by existing facilities	Shortage of textbooks
	(No. of copies)	(No. of copies)	(%)	(No. of copies)	(No. of copies)	(No. of copies)
2005	70,843,250	13,294,246	18.8	57,549,004	46,630,730	10,918,274
2006	68,027,226	16,315,993	24.0	51,711,232	39,947,779	11,763,453
2007	64,104,779	18,671,221	29.1	45,433,558	35,005,054	10,428,504
2008	59,312,037	20,816,412	35.1	38,495,625	31,298,462	7,197,162
2009	63,888,538	30,462,287	47.7	33,426,251	28,144,463	5,281,789
2010	68,442,641	29,868,914	43.6	38,573,726	32,841,573	5,732,153
2011	73,281,757	32,406,734	44.2	40,875,024	35,030,980	5,844,043
2012	77,849,742	38,889,175	50.0	38,960,567	32,273,315	6,687,252
2013	82,649,184	41,093,957	49.7	41,555,228	33,985,581	7,569,647
2014	87,970,040	49,252,873	56.0	38,717,167	33,655,728	5,061,439
2015	94,430,535	47,781,734	50.6	46,648,801	39,048,671	7,600,130

Source : Prepared based on "The Contract between the Ministry of Education and the Textbook Printing Corporation"

Based on the results of the above study, the machines and equipment listed below have been slated for use with the Project.

No.	Machine/equipment name	Quantiy	
1. Page makeup equipment			
1-1	Computer for data input and editing		
1-1-1	Computer for database	1	Set
1-1-2	Computer for editing	1	Set
1-1-3	Computer for layout	1	Set
1-1-4	Computer for image setter	1	Set
1-2	Image setter	1	Set
1-3	Automatic development unit for PS plate	1	Unit
1-4	Sink/vat	1	Set
1-5	Light table	1	Unit
1-6	PS plate printing equpment	1	Unit
1-7	Densitometer	1 (each)	Unit
2. Printing equipment			
2-1	Four-color offset printer	2	Unit
3. Paper process equpment			
3-1	Cutter	1	Unit
3-2	Folding machine	2	Unit
4. Binding equipment			
4-1	Automatic binding machine	1	Set
5. Cutting blade grinding equipment			
5-1	Cutting blade grinder	1	Unit
6. Packaging equpment			
6-1	Paper jogger	1	Unit
6-2	Air table	1	Unit
6-3	Banding machine	1	Unit
7. Maintenance tools			
7-1	Tools	1	Set
8. Shipment/transportation equipment			
8-1	Forklift	1	Unit
8-2	Hand-pallet truck	4	Unit
8-3	8-ton truck	3	Unit
8-4	2-ton truck	1	Unit

The following issues related to the current situation surrounding textbook editing, printing and binding work need to be resolved.

Textbook editing

- Reduce the number of pages per textbook and the number of textbooks (urgently required).
- Editing of textbooks is time consuming and often results in printing delays as well as delays in the delivery of textbooks. To solve this problem, a database of illustrations, photos and page layouts for textbooks and related materials needs to be created to improve work efficiency for revising textbooks.

Printing/binding work

- Technicians working for the Textbook Printing Corporation have sufficient technical capabilities for the levels described in the manuals. On the other hand, however, they seem to have a low awareness toward losses which occur during the printing and binding processes. This results in huge amounts of wasted and unused paper, as well as losses due to excessive ink consumption and through improper binding.

In order to resolve the above issues and promote the efficient utilization of machines and equipment that are slated to be procured, the following “soft component” activities are planned.

Item	Detailed activities
Support for textbook editing	Provide guidance for editing each textbook aimed at reducing the number of pages per textbook and building a database. At the same time, check the results of editing.
Guidance for improving the post page makeup process	Initiate activities for improving work by organizing small groups using QC methods.

In the case Japan decides to implement this program under a Japanese-government funded assistance program, it is expected to take four months to complete detailed design, tendering and procurement. Once the procurement contract is concluded, it will take eight months for manufacturing/procurement of machines and related equipment, and implementation of soft components under the Project. The rough estimate of the cost for implementing the Project is ¥740 million (of this amount, ¥610 million will be borne by Japan and ¥130 million will be borne by Yemen).

The implementation of the Project is expected to provide the following benefits to Yemen.

1) Direct benefits
   - The text shortage without the Project is anticipated as maximum 11.7 million copies for each year from 2005 to 2015. Enough textbooks will be printed and supplied to cover this shortage.
   - Approximately 2,000 tons of paper per year will be saved by 2015 through reducing the number of pages per textbook.

2) Indirect benefits

- By providing textbooks without delay for classes in all primary schools and secondary schools throughout the country, the quality of education will be improved.
- As the educational environment is consolidated through the spread of textbooks, the literacy ratio (which was 46.2% as of the year 2000) will be improved.
- Employment opportunities will be increased in the Mukalla area, which is an intensive development region in Yemen.

In that the benefits outlined above can be expected from the Project, it has been deemed reasonable for implementation under the Japanese-government Grant Aid Program. Note, however, to ensure that implementation of the Project proceeds smoothly and efficiently, the Ministry of Education in Yemen, which is responsible for implementing the reduction in the number of textbooks as well as reducing the number of pages per text book and actively promoting the textbook reuse system, must carry out its responsibilities in relation to the Project in an efficient manner. Also, the Textbook Printing Corporation, the organization in Yemen responsible for promoting efficient utilization of the existing machines and equipment must do its part as well. In addition, it is essential that construction of the printing facility to be newly established in Mukalla be completed on schedule to ensure that the overall Project is implemented on schedule.

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Chapter 1 Background of the Project

1-1 Background of the Request

In Yemen, improvement of the literacy rate and increasing the school enrollment ratio are items with the highest priority in the educational sector, in line with the goal of reducing illiteracy. Under the "National Strategy for Basic Education for 2003 to 2015," a long-term project for the educational sector, a goal has been set for improving the school enrollment rate in basic education to over 95% by 2015.

Under the plan, the goals of building schools, training teachers and spreading education among girls are being actively pursued with the support of international organizations. However, issues have arisen which interfere with the achievement of these goals such as a growing demand for textbooks in relation to the population increase and improvement in the school enrollment ratio. If improvement of school enrollment ratio can be achieved as planned, the number of textbooks required for the basic education is estimated as increasing from the 39 million required as of 2000, to 93 million by 2015 (this figure rises to 120 million if the number of textbooks required for secondary school education is included).

The Textbook Printing Corporation, which falls under the umbrella of the Yemen's Ministry of Education, oversees all orders for the printing of textbooks. The Textbook Printing Corporation operates two printing plants in Sanaa and Aden and the textbook printing capacity of these two facilities is limited to approximately 45 million copies per year. In order to meet the demand for textbooks, a portion of the orders for printing textbooks are sub-commissioned to private printing corporations. However, it is difficult to increase the number of textbook orders sub-commissioned to private printing corporations due to their limited printing capacities, increased costs and other factors. Accordingly, it will be more difficult to cope with the increased demand for textbooks in the future.

Under these circumstances, the Textbook Printing Corporation drafted a plan to build a new textbook printing plant in the city of Mukalla, an intensive development area, in order to improve its textbook printing capabilities. The tendering phase for construction of the new printing plant has been completed and actual construction has just started. Under the Project, machines, equipment and materials required for page makeup, printing and binding will be installed and consolidated in the newly built Mukalla printing plant with the goal of meeting the increasing demand for textbooks in the future.

1-2 Summary of the Request

The machines, equipment and materials requested under this project are as follows;

1) Computer, image setter and other equipment for the school textbook editing.
2) Printing press such as sheet offset press 4-color
3) Book making equipment such as guillotine cutter
4) Perfect binding line
5) Knife grinder
6) Packing equipment such as paper jogging machine
7) Maintenance tool

8) AVR
9) Handling and delivery equipment such as folk lift and truck
10) Training of the equipment

The equipment list requested is shown in table 1-1.

Table 1-1 Equipment List Requested

Item No.	Equipment name	Q'ty	Priority
1. Pre-press Section			
1-1	Publishing set	10 set	A
1-2a	High quality scanner	1 unit	A
1-2b	Scanner	1 unit	C
1-3	Image setter	2 sets	A
1-4	RIP (Raster Image Processor)	2 sets	A
1-5	Plate Processor	2 units	A
1-6	Sink and vat	2 sets	A
1-7	Light table	3 units	A
1-8	PS plate vacuum printer	2 units	A
1-9	Densitometry	3 units	B
2. Printing Section			
2-1	Sheet offset press 4-color	1 unit	A
2-2a	Sheet offset press 2-color, both side	1 unit	A
2-2b	Sheet offset press 2-color, small size	1 unit	B
2-3	Sheet press 1-color	1 unit	C
2-4	Plate puncher	4 units	A
2-5	Color viewer	3 units	A
3. Book Making Section			
3-1	Guillotine cutter	2 units	A
3-2	Paper folding machine	4 units	A
4. Binding Section			
4-1	Perfect binding line	1 unit	A
5. Knife Grinder Section			
5-1	Knife grinder	1 unit	A
6. Packing Section			
6-1	Paper jogging machine	2 units	A
6-2	Air table	2 units	A
6-3	Tying machine	2 units	A
7. Maintenace tools			
	Maintenace tools	1 unit	A
8. Automatic Voltage Regulator			
	Automatic Voltage Regulator	1 set	A
9. Handling and Delivery Section			
9-1	Folk lift 2 tons	1 unit	A
9-2	Manual lifter	4 units	A
9-3	Air conditioner	1 set	C
9-4	Office equipment	1 set	C
9-5a	Truck 8 tons	6 units	A
9-5b	Truck 2 tons	2 units	A
10. Trainings			
10-1	Training for maintenance work of Pre-press section	1 set	A
10-2	Training for maintenance work of Printing section	1 set	A
10-3	Training for maintenance work of Binding section	1 set	A

Chapter 2. Contents of the Project

2-1 Basic Concept of the Project

2-1-1 National and regional planning, and Project goals

The Republic of Yemen (hereinafter referred to as “Yemen”) has drawn up a long-term national plan, put forth as “Yemen’s Strategic Vision 2025,” and a medium-term implementation plan, put forth as the “The Second Five-year Plan for Economic and Social Development 2001-2005.” In addition, Yemen has also put forth a “National Strategy for Development of Basic Education in the Republic of Yemen 2003-2015,” which was drawn up as a plan to take concrete action in the educational sector up to the year 2015.

(1) Yemen’s Strategic Vision 2025

This is a long-term national strategy undertaken for the purpose of human resource development and improving the living standard for the people of Yemen. The program lays down several targets geared toward improving the living standard in Yemen, including economical growth, coastal area development, accelerated industrialization, agriculture promotion, utilization of fisheries, tourism promotion, decentralization of government authority and so forth. The education sector assigns an important position in line with human resources development, and stresses the necessity of improving education in the fields of science and technology, as well as lowering the illiteracy rate to below 10% by the year 2025. It also emphasizes regional development as a means for improving the living standard. Al Mukalla, the site for this Project, is a location, which figures to be important in relation to regional development, with a “free economic zone” slated to be established there.

(2) “The Second Five-year Plan for Economic and Social Development 2001-2005”

This public works action plan succeeds and carries forward the content of the "The First Five-year Plan" for 1996 to 2000. The following is an outline for development of the educational sector under the plan.

1) Improving the literacy rate

"Yemen’s Strategic Vision 2025" sets the goal of reducing illiteracy in the country to below 10% by 2025. However, for the period covered by "The Second Five-Year Plan", the goal is set at teaching 345,000 people how to read and write, due to limited management resources and a shortage of funds.

2) General education

One of the goals of "The Second Five-Year Plan" is to increase the number of students in the first grade by 12% during the period of the plan. It also aims to increase the percentage of students in primary education to 69% (82.4% boys; 55% girls), and the number of students in secondary school to 41.3%. Table 2-1 is an index of primary and secondary education statistics in relation to the goals set by "The Second Five-Year Plan".

Table2-1: Index of primary and secondary education goals in Second 5-year Plan

Unit: persons

	1995			2000			2005		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
No. of students newly enrolling in primary school	254,927	171,994	426,921	295,838	217,900	513,738	372,764	318,432	691,196
No. of students newly enrolling in secondary school	91,732	22,943	114,675	123,299	51,679	174,978	168,824	86,271	255,095
No. of primary school students	1,762,668	837,516	2,600,184	2,202,996	1,144,513	3,347,509	2,787,529	1,701,724	4,489,253
No. of secondary school students	231,108	56,949	288,057	314,613	128,608	443,221	436,360	226,849	663,209
No. of students graduating from primary school	81,181	32,441	113,622	144,072	51,869	195,941	191,874	73,112	264,986
No. of students graduating from secondary school	27,793	18,416	46,209	80,177	29,654	109,831	88,521	37,521	126,042
No. of primary school teachers	95,499	20,585	116,084	100,079	42,587	142,666	114,020	65,664	179,684
No. of secondary school teachers	12,307	3,091	15,398	20,301	5,228	25,529	30,049	7,759	37,808
Ratio of government expenditure for general education cost (%)	–	–	17.2	–	–	18.8	–	–	–

Source: Second Five-year Plan for Economic & Social Development 2001-2005

(3) "National Strategy for Development of Basic Education 2003 - 2015"

This project is a more detailed version of the “Education for All by 2015 Plan” which set a goal of attaining a 100% school enrollment ratio by the year 2015. It is a national plan for the educational sector that sets progressive educational goals on an annual basis and projects a school enrollment ratio of a 95% by 2015. Table2-2 below shows an index of the items in the educational sector covered under this plan.

Table 2-2: Index of the educational sector projecting 95% enrollment by 2015

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Population [unit: 1000]	18,261	18,834	19,469	20,125	20,803	21,504	22,229	22,978	23,752	24,552	24,944	26,785	26,664	27,562	28,480	29,440
Age 6 to 14	5,457	5,647	5,845	6,050	6,261	6,475	6,650	6,829	7,014	7,203	7,398	7,597	7,802	8,013	8,229	8,451
No. of children not enrolled in school [1000]	2,055	2,047	2,056	2,080	2,116	2,072	1,929	1,776	1,613	1,441	1,258	1,109	952	785	609	423
School enrollment ratio (%)	62.34	63.75	64.82	65.62	66.20	68.00	70.99	73.99	77.00	79.99	83.00	85.40	87.80	90.20	92.60	95.00
No. of children attending school [1000]	3,402	3,600	3,789	3,970	4,145	4,403	4,721	5,053	5,401	5,762	6,140	6,488	6,850	7,228	7,620	8,028
No. of schools	12,388	13,847	14,571	15,268	15,944	16,935	18,160	19,436	20,772	22,163	23,617	24,953	26,347	27,799	29,308	30,879
No. of students per teacher	23.36	22.40	22.80	23.20	23.60	24.00	24.80	25.60	26.40	27.20	28.00	28.80	29.60	30.40	31.20	32.00
No. of teachers	145,624	160,729	166,166	171,103	175,652	183,458	190,383	197,401	204,575	211,863	219,298	225,272	231,424	237,754	244,233	250,889
No. of textbooks [1000]	23,814	25,202	26,520	27,787	29,018	30,821	33,051	35,374	37,805	40,337	42,982	45,415	47,951	50,594	53,340	56,199
No. of textbooks for teachers [1000]	562	643	665	684	703	734	762	790	818	947	877	901	926	951	977	1,004

Source: National Strategy for Basic Education for 2003 to 2015

(4) Position of the project in relation to the overall goal of the sector

One of the overall goals of this sector is to greatly increase the school enrollment ratio in order to improve literacy rate. Yemen has been promoting projects such as constructing school facilities, training teachers etc., in order to create an environment for improving school enrollment ratios.

On the other hand, the number of children enrolled in school is expected to increase greatly in conjunction with efforts to improve the school enrollment ratios and also due to the continuing increase in the population rate. The figures in Table 1-2, compiled by under the "National Strategy for Development of Basic Education 2003-2015", project that the 3.4 million children enrolled in primary school as of 2000 will increase to 8 million by 2015, or more than 2.3 times the level for the year 2000. Accompanying this increase, the number of textbooks required for basic education, which was approximately 39 million[1] in 2000, is also expected to increase to approximately 93 million by 2015.

[1] In the "National Strategy for Development of Basic Education 2003 - 2015", the number of textbooks allotted per student is calculated at seven; however, in this section it was calculated on the basis of 11.6 as the standard for the average number of textbooks required for primary education for the five years from 2000 to 2004.

(5) The goals of the Project

In order to cope with shortages of textbooks, with the cooperation of UNICEF, Yemen is striving to reduce the number of required textbooks, the number of pages per textbook, and to increase the number of textbook distribution centers. However, in actuality, the government cannot keep up with the increasing demand for textbooks. In light of this situation, the goal of this project is to solve the textbook shortage problem by 2015, parallel with maintaining a policy of promoting the re-use of textbooks, reducing the total number of required textbooks and reducing the number of pages per textbook, by consolidating printing equipment and facilities at a printing plant scheduled to be newly built at Mukalla, which is also an important development region from the standpoint of the national economy.

2-1-2 Outline of the Project

In line with achieving the overall goals, the Project calls for installing Pre-press equipment, Printing presses equipment, Binding equipment and other items required for the Mukalla Printing Plant with the aim of printing textbooks with fewer pages and of producing re-usable textbooks. It is anticipated that such efforts will meet with the rapidly increasing demand for textbooks in Yemen, keeping the percentage of re-usable textbooks high, and the number of text books fewer. In addition, the construction of the new printing plant in Mukalla is expected to promote industrial development for the Mukalla city, which has been designated as an important development region.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic policy

The "National Strategy for Development of Basic Education 2003-2015", which was put forth as a national project for the educational sector in Yemen, aims at increasing the school enrollment ratio for basic education to 95% by 2015. This will require procurement of printing equipment to print textbooks that are in short supply. The policy for estimating and selecting the number of textbooks that are in short supply and for selecting applicable textbooks, etc., by the final target date of 2015 is determined as follows.

1) The demand for textbooks

a. Projected population by age group

Based on the projected population by age group provided in the population statistics for 2001, future population growth has been estimated using polynomial approximation in relation to population distribution. Figure 2-1 below projects changes in the population by age groups until 2017.

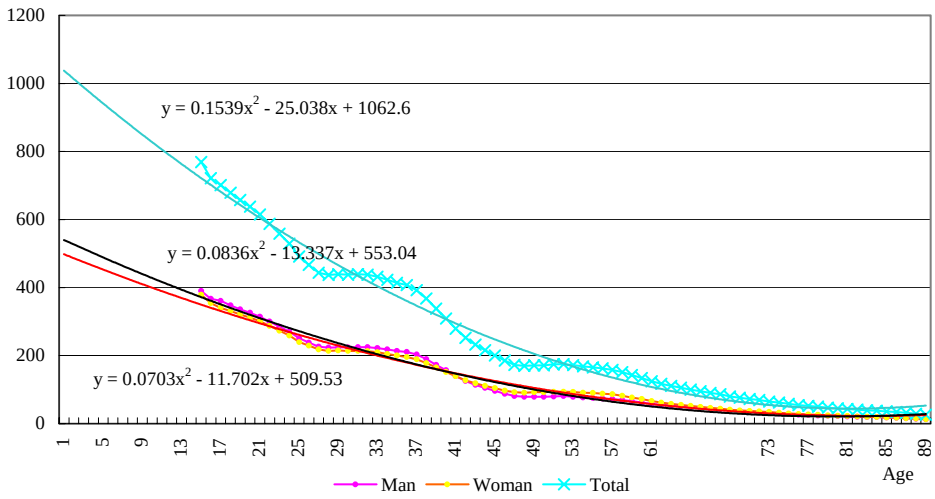


Figure 2-1 Projected population based on age group by 2017

The "National Strategy for Development of Basic Education 2003-2015", calculates the total population for the age group from 6 to 14 years old, which corresponds to the 1st through 9th grades. Table 2-3 is the comparison of the total population for these nine grades, i.e. the calculated values in Figure 2-1, with the target values computed under the "National Strategy for Development of Basic Education 2003-2015".

Table 2-3 Comparison of the target values from the "National Strategy for Basic Education for 2003 to 2015" and the calculated values in Figure 2-1

Unit : thousand people

Year	Male	Female	Total	Computed 9 grades	Plan
2015	540	498	1,038	8,480	8,451
2014	527	486	1,013	8,270	8,229
2013	514	475	989	8,063	8,013
2012	501	464	965	7,858	7,802
2011	488	453	941	7,656	7,597
2010	476	442	918	7,484	7,398
2009	464	431	895	7,287	7,203
2008	452	420	872	7,093	7,014
2007	440	410	850	6,900	6,829
2006	428	400	828	6,708	6,650
2005	416	389	806	6,518	6,475
2004	405	379	784	6,327	6,261
2003	394	369	763	6,130	6,050
2002	390	379	769	5,925	5,845
2001	367	354	721	5,685	5,647
2000	361	340	701	5,455	5,457
1999	348	331	679	5,221	
1998	336	321	657	4,986	
1997	326	312	638	4,766	
1996	314	301	615	4,567	
1995	300	287	587	4,390	
1994	285	273	558	4,242	
1993	270	259	529	4,122	
1992	251	240	491	4,025	
1991	238	229	467	3,957	
1990	226	218	444	3,904	
1989	223	214	437	3,867	

Source : Prepared based on "National Strategy for Development of Basic Education 2003-2015"

A multiple correlation between the calculated values and target values in the above table is shown in Figure 2-2.

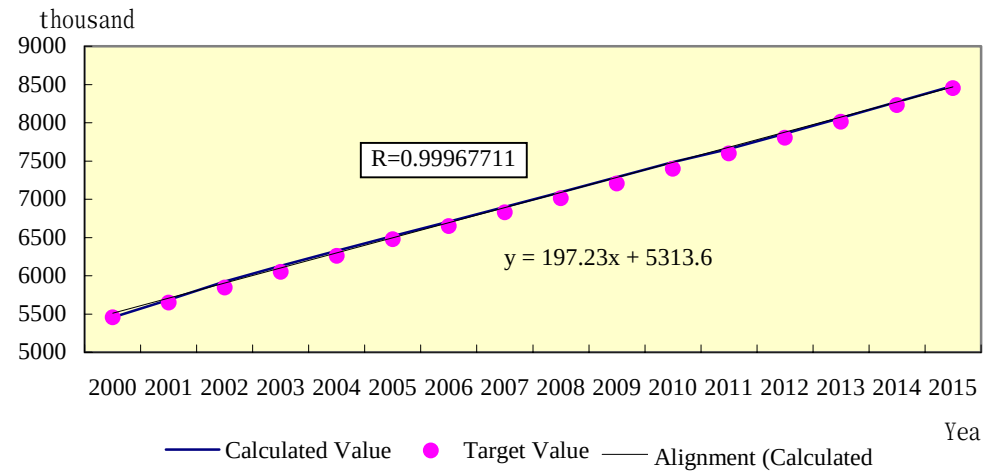


Figure 2-2 Correlation between calculated values and target values

Figure 2-2 shows that the multiple correlation between the calculated values and the target values is 0.9996. Because this figure is extremely high, it is determined appropriate that the calculated values should be adopted.

In regard to the population by specific grade levels, the primary-school population for the age group from 6 through 14 and the secondary-school population for the age group from 15 to 17 during the period from 2000 to 2015 is shown in Table 2-3 (this is assumed based on the grade-specific population exclusive of the death rate). Table 2-4. indicates the grade-specific population from 2000 to 2015 calculated based on the results of the above study.

Table 2-4 Grade-specific population levels for 2000 to 2015 (for grades 1 through 12)

Unit : thousand of people

	Grade/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Primary Education	G-1	701	721	769	763	784	806	828	850	872	895	918	941	965	989	1,013	1,038
	G-2	679	701	721	769	763	784	806	828	850	872	895	918	941	965	989	1,013
	G-3	657	679	701	721	769	763	784	806	828	850	872	895	918	941	965	989
	G-4	638	657	679	701	721	769	763	784	806	828	850	872	895	918	941	965
	G-5	615	638	657	679	701	721	769	763	784	806	828	850	872	895	918	941
	G-6	587	615	638	657	679	701	721	769	763	784	806	828	850	872	895	918
	G-7	558	587	615	638	657	679	701	721	769	763	784	806	828	850	872	895
	G-8	529	558	587	615	638	657	679	701	721	769	763	784	806	828	850	872
	G-9	491	529	558	587	615	638	657	679	701	721	769	763	784	806	828	850
	Sub-total	5,455	5,685	5,925	6,130	6,327	6,518	6,708	6,900	7,093	7,287	7,484	7,656	7,858	8,063	8,270	8,480
Secondary	G-10	467	491	529	558	587	615	638	657	679	701	721	769	763	784	806	828
	G-11	444	467	491	529	558	587	615	638	657	679	701	721	769	763	784	806
	G-12	437	444	467	491	529	558	587	615	638	657	679	701	721	769	763	784
	Sub-total	1,348	1,402	1,487	1,578	1,674	1,760	1,840	1,910	1,974	2,037	2,101	2,191	2,253	2,316	2,353	2,418
Total		6,803	7,087	7,412	7,708	8,001	8,278	8,548	8,810	9,067	9,324	9,585	9,847	10,111	10,379	10,623	10,898

Source: National Strategy for Development of Basic Education 2003-2015

b. Forecasting the number of children enrolled in school by grade

The "National Strategy for Development of Basic Education 2003-2015", estimates the enrollment ratio for the primary school level from 2000 to 2015. For example, it lists the school enrollment ratio as 62.34% for 2000, and 63.75% for 2001.

Also, the 2001 population statistics provide a grade-specific breakdown of the number of children enrolled in school. During the year 2000, the grade-specific enrollment ratio for the 1st grade of primary school was at 83.1%, the highest among all the grades, while that for the 12th grade of secondary school was the lowest at 35.8%.

In this project, the grade-specific enrollment ratio is calculated for each grade, assuming that it is increasing in proportion to the values set forth in the "National Strategy for Development of Basic Education 2003-2015". Using the school enrollment ratios for 2000 and 2001 as examples, the difference in the overall school enrollment ratio for primary school education is calculated as below:

63.75%－62.34%＝1.41%

Then, the grade-specific enrollment ratio is predicted as uniformly increasing at 1.41%, in the calculation of the enrollment ratio for each grade. Hence, the respective grade-specific enrollment ratio for the 1st grade of primary school and for the 12th grade of secondary school in 2001 are calculated as follows:

Grade-specific enrollment ratio for the 1st grade of primary school

83.1%＋1.41%＝84.51%

Grade-specific enrollment ratio for the 12th grade of secondary school

35.8%＋1.41%＝37.21%

Also, when the calculation of grade-specific enrollment ratios for any grade exceeds 100%, the upper limit shall be set at 100%.

Table 2-5 shows the number of children enrolled in school and gives the grade-specific enrollment ratios for primary school through secondary school during the period from 2000 to 2015. Because the criteria for population figures and school enrollment ratios used here differ slightly from that in "National Strategy for Development of Basic Education 2003-2015", shown in Table 2-2, the school enrollment ratio for 2015 in Table 2-5 is calculated as 94.6%.

Table 2-5: No. of children enrolled in school and grade-specific enrollment ratios for primary and secondary school education

Unit : Population, Enrollment - thousand Enrollment ratio - %

	Year	2000			2001			2002			2003			2004			2005			2006			2007		
	Grade	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio
Primary Education	G-1	701	582	83.1	721	609	84.5	769	659	85.7	763	660	86.5	784	683	87.1	806	716	88.9	828	762	92.1	850	808	95.1
	G-2	679	495	72.9	701	521	74.3	721	544	75.5	769	587	76.3	763	587	76.9	784	617	78.7	806	660	81.9	828	703	84.9
	G-3	657	446	67.8	679	470	69.2	701	494	70.4	721	514	71.2	769	552	71.8	763	562	73.6	784	603	76.8	806	643	79.8
	G-4	638	422	66.1	657	443	67.5	679	466	68.7	701	487	69.5	721	505	70.1	769	553	71.9	763	573	75.1	784	612	78.1
	G-5	615	370	60.2	638	393	61.6	657	413	62.8	679	432	63.6	701	450	64.2	721	476	66.0	769	532	69.2	763	551	72.2
	G-6	587	328	55.9	615	353	57.3	638	374	58.5	657	390	59.3	679	407	59.9	701	433	61.7	721	468	64.9	769	523	67.9
	G-7	558	285	51.1	587	308	52.5	615	330	53.7	638	347	54.5	657	362	55.1	679	386	56.9	701	421	60.1	721	455	63.1
	G-8	529	247	46.7	558	269	48.2	587	290	49.4	615	309	50.2	638	324	50.8	657	346	52.6	679	379	55.8	701	412	58.8
	G-9	491	226	46.0	529	251	47.4	558	271	48.6	587	290	49.4	615	308	50.0	638	331	51.8	657	362	55.0	679	394	58.0
	Sub-t	5,455	3,402	62.4	5,685	3,617	63.6	5,925	3,841	64.8	6,130	4,016	65.5	6,327	4,178	66.2	6,518	4,419	67.8	6,708	4,760	71.0	6,900	5,101	73.9
Secondary Education	G-10	467	185	39.6	491	201	41.0	529	223	42.2	558	240	43.0	587	256	43.6	615	279	45.4	638	310	48.6	657	339	51.6
	G-11	444	151	34.0	467	165	35.4	491	180	36.6	529	198	37.4	558	212	38.0	587	233	39.8	615	264	43.0	638	293	46.0
	Art	-	61	-	-	82	-	-	90	-	-	99	-	-	106	-	-	116	-	-	132	-	-	146	-
	Sce	-	90	-	-	83	-	-	90	-	-	99	-	-	106	-	-	117	-	-	132	-	-	147	-
	G-12	437	147	33.6	444	155	35.0	467	169	36.2	491	182	37.0	529	199	37.6	558	220	39.4	587	250	42.6	615	281	45.6
	Art	-	76	-	-	77	-	-	84	-	-	91	-	-	99	-	-	110	-	-	125	-	-	140	-
	Sce	-	71	-	-	78	-	-	85	-	-	91	-	-	100	-	-	110	-	-	125	-	-	141	-
	Sub-t	1,348	483	35.8	1,402	522	37.2	1,487	572	38.5	1,578	619	39.2	1,674	667	39.8	1,760	732	41.6	1,840	824	44.8	1,910	913	47.8
Total		6,803	3,884	57.1	7,087	4,139	58.4	7,412	4,413	59.5	7,708	4,635	60.1	8,001	4,845	60.6	8,278	5,152	62.2	8,548	5,584	65.3	8,810	6,014	68.3

	Year	2008			2009			2010			2011			2012			2013			2014			2015		
	Grade	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio	Pop.	Enrol.	Ratio
Primary Education	G-1	872	855	98.1	895	895	100.0	918	918	100.0	941	941	100.0	965	965	100.0	989	989	100.0	1,013	1,013	100.0	1,038	1,038	100.0
	G-2	850	747	87.9	872	794	91.0	895	841	94.0	918	890	97.0	941	939	99.7	965	965	100.0	989	989	100.0	1,013	1,013	100.0
	G-3	828	686	82.8	850	730	85.9	872	776	88.9	895	823	91.9	918	869	94.6	941	916	97.3	965	965	100.0	989	989	100.0
	G-4	806	653	81.1	828	697	84.2	850	741	87.2	872	787	90.2	895	831	92.9	918	877	95.6	941	933	99.1	965	965	100.0
	G-5	784	590	75.2	806	631	78.3	828	673	81.3	850	716	84.3	872	759	87.0	895	803	89.7	918	855	93.2	941	920	97.7
	G-6	763	541	70.9	784	581	74.0	806	621	77.0	828	662	80.0	850	703	82.7	872	745	85.4	895	796	88.9	918	858	93.4
	G-7	769	508	66.1	763	528	69.2	784	566	72.2	806	606	75.2	828	644	77.9	850	685	80.6	872	733	84.1	895	792	88.6
	G-8	721	446	61.8	769	499	64.9	763	518	67.9	784	556	70.9	806	593	73.6	828	632	76.3	850	678	79.8	872	735	84.3
	G-9	701	428	61.0	721	463	64.1	769	516	67.1	763	535	70.1	784	571	72.8	806	609	75.5	828	654	79.0	850	710	83.5
	Sub-t	7,093	5,454	76.9	7,287	5,817	79.8	7,484	6,170	82.4	7,656	6,516	85.1	7,858	6,874	87.5	8,063	7,220	89.5	8,270	7,616	92.1	8,480	8,020	94.6
Secondary Education	G-10	679	371	54.6	701	404	57.7	721	437	60.7	769	490	63.7	763	506	66.4	784	542	69.1	806	585	72.6	828	638	77.1
	G-11	657	322	49.0	679	354	52.1	701	386	55.1	721	419	58.1	769	467	60.8	763	484	63.5	784	525	67.0	806	576	71.5
	Art	-	161	-	-	177	-	-	193	-	-	209	-	-	233	-	-	242	-	-	262	-	-	288	-
	Sce	-	161	-	-	177	-	-	193	-	-	210	-	-	234	-	-	242	-	-	263	-	-	288	-
	G-12	638	310	48.6	657	340	51.7	679	371	54.7	701	405	57.7	721	436	60.4	769	485	63.1	763	508	66.6	784	558	71.1
	Art	-	155	-	-	170	-	-	185	-	-	202	-	-	218	-	-	242	-	-	254	-	-	279	-
	Sce	-	155	-	-	170	-	-	186	-	-	203	-	-	218	-	-	243	-	-	254	-	-	279	-
	Sub-t	1,974	1,002	50.8	2,037	1,098	53.9	2,101	1,195	56.9	2,191	1,313	59.9	2,253	1,409	62.6	2,316	1,511	65.2	2,353	1,618	68.8	2,418	1,771	73.3
Total		9,067	6,456	71.2	9,324	6,914	74.2	9,585	7,365	76.8	9,847	7,829	79.5	10,111	8,283	81.9	10,379	8,732	84.1	10,623	9,235	86.9	10,898	9,791	89.8

Source : Prepared based on "National Strategy for Development of Basic Education 2003-2015" and Statistics Yearbook 2001

c. Analysis by Model Plan

Analysis of the excesses and/or shortages of textbooks is done by creating the Model Plan, based on the projected figures for the number of children enrolled in school by age group obtained from the "National Strategy for Development of Basic Education 2003-2015". The quantity of textbooks required each year was calculated in relation to the estimated number of children enrolled in school as well as its ratio as per above.

d. Reducing the quantity of textbooks and number of pages per textbook

The total number of textbooks required for grades 1 through 12, which covers both primary and secondary school education levels, was approximately 50 million copies for 2003. However, the figure for the same grades is expected to increase to 120 million copies by 2015. The total combined printing capacity of the existing Sana'a and Aden printing plants is approximately 40 million to 45 million copies. In order to meet the increased demand for textbooks in 2015, printing facilities with approximately three times the printing capacity of the current facilities will be needed.

The amount that the Ministry of Education paid to the General Corporation for Schoolbook Printing Press (hereinafter referred to as "GCSPP") in fiscal 2002 was approximately 6.45 billion Rials (approximately ¥4.4 billion) as fees to print approximately 47.6 million textbooks. This amount corresponds to approximately 6% of the total amount paid in education-related expenses in Yemen in fiscal 2001. Assuming that all 120 million

copies of the textbooks required in 2015 are printed in Yemen, printing costs will amount to 16.26 billion Rials (approximately ¥11.06 billion).

Bearing the cost for printing such huge quantities of textbooks will be a great burden on the Ministry of Education, which is already required to allocate a large part of its budget for the construction of primary schools and toward training teachers, with the goal of improving school enrollment ratios. In the end, such a huge outlay may adversely affect the policy of improving school enrollment ratios, which is the initial objective of the national education policy.

One method being considered as effective in reducing the number of textbooks printed is to decrease the number of pages per textbook as well as the actual number of individual textbook volumes which require printing. The numbers of textbooks required by grade level from 1999 to 2003 are listed in Table 2-6.

Table 2-6: The number of textbooks required by grade level from 1999 to 2003

Unit : book

Grade		Course	Year				
			1999	2000	2001	2002	2003
Primary Education	G-1	Common	6	6	8	8	6
	G-2	Common	5	5	8	8	6
	G-3	Common	6	6	10	10	6
	G-4	Common	7	7	12	12	9
	G-5	Common	10	9	15	15	11
	G-6	Common	10	9	16	16	11
	G-7	Common	15	14	21	18	14
	G-8	Common	15	12	21	18	15
	G-9	Common	17	16	21	18	15
	Sub-total		91	84	132	123	93
Secondary Education	G-10	Common	20	19	20	20	31
	G-11	Common	9	11	11	11	16
		Art	7	5	5	5	9
		Science	7	5	5	5	9
	G-12	Common	10	12	12	12	12
		Art	9	6	6	6	6
		Science	8	5	5	5	5
		Other		50			
	Sub-total		70	113	64	64	88
Total			161	197	196	187	181

Source : The contract betweent he Ministry of Education and GCSPP

In Yemen, the curriculums for primary and secondary education are reviewed mainly by the Department of Curriculum of the Ministry of Education and the Educational Research and Development Center (Hereinafter referred to as "ERDC"). In conjunction with reviewing curriculums, revision of textbooks is also performed. Textbooks are revised once every five years on the average. The frequency at which individual textbook volumes are revised cannot be confirmed solely on the basis of the data given in Table 2-6. However, it is easy to discern that the number of textbooks required changes frequently from year to year. Although, a significant increase was noted in the number of textbook volumes required for courses during the 2000 and 2001 school years, from 2002 onward, the number of required textbooks has been decreasing.

One of the goals of this project in reducing the number of pages per textbook and the number of individual textbook volumes, which are required to reduce the overall number of textbook copies in print. More precisely, in tune with revising textbooks, one way to reduce the total number of pages per textbook is to increase the number of text lines by adding two or three lines per page. Annex 1 and Annex 2 are examples of reducing the number of pages per textbook. By using this method, the total number of pages included in one textbook can be reduced by approximately 15%.

In addition, the number of textbooks required for courses can be reduced by combining 1st and 2nd term textbooks which are normally published as separate volumes into one volume. Textbooks which are suitable for integrating 1st and 2nd term study materials into one volume are those that will amount to 300 pages or less after they are combined. Measures such as these can be implemented by using the Model Plan. The Model Plan uses the 2002 textbooks as a standard for revising textbooks, as more materials were available during that year. Table 2-7 below gives a partial breakdown of the contents of the 2002 textbooks.

Table 2-7 Breakdown of required textbooks (for the 2002 school year)

No.	Subject	1st term/2nd term	Grade	No. of pages	Target no. of pages	No. of colors		Size
						Cover	Text	
1 -	Islam education	-	G-1	128	109	4	4	
2 -	Islam education	-	G-1	136	116	4	4	
3 -	Arabic	P-1	G-1	132	112	4	4	
4 -	Arabic	P-2	G-1	160	136	4	4	
5 -	Arithmatic	P-1	G-1	144	122	4	3	
6 -	Arithmatic	P-2	G-1	112	95	4	3	
7 -	Science	P-1	G-1	80	68	4	4	
8 -	Science	P-2	G-1	48	41	4	4	
Subtotal	8			940	799			
105 -	Koran	P-1	G-7	112	95	4	2	
106 -	Koran	P-2	G-7	96	82	4	2	
107 -	Muhammad biography	P-1	G-7	200	170	4	2	
108 -	Muhammad biography	P-2	G-7	184	156	4	2	
109 -	Memoir of theology	P-1	G-7	128	109	4	4	
110 -	Memoir of theology	P-2	G-7	128	109	4	4	
111 -	Arabic	P-1	G-7	176	150	4	2	
112 -	Arabic	P-2	G-7	184	156	4	2	
113 -	Worship story	-	G-7	128	109	2	1	
114 -	Science	P-1	G-7	168	143	4	4	
115 -	Science	P-2	G-7	120	102	4	4	
116 -	Mathematics	P-1	G-7	160	136	4	2	
117 -	Mathematics	P-2	G-7	128	109	4	2	
118 -	Yemen National education	P-1	G-7	80	68	4	4	
119 -	Yemen National education	P-2	G-7	56	48	4	4	
120 -	History	P-1	G-7	96	82	4	4	
121 -	History	P-2	G-7	80	68	4	4	
122 -	Geography	P-1	G-7	96	82	4	4	
123 -	Geography	P-2	G-7	64	54	4	4	
124 -	English reader	-	G-7	64	54	4	4	A4
125 -	English practice	-	G-7	96	82	4	1	A4
Subtotal	21			2,544	2,162			

Source：Textbook Distribution List; Textbook Printing Public Corporation

The figures indicated in the “target number of pages” column of Table 2-7 represent the number of pages included per textbook after reducing the total number of pages per copy by 15% based on increasing the number of lines and characters that are printed on one page. In respect to combining two textbook volumes used for the 1st and 2nd terms into one, with the exception of the “Biography of Mohammad” and “Arabic” for the 7th grade, all other textbook volumes will be less than 300 pages after they are combined and thus are suitable for printing as one integrated volume.

Under the Model Plan, measures which are undertaken to reduce the number of textbook volumes which need to be printed as well as the number of pages per textbook will begin around 2005 when the printing machines and equipment necessary under the Project are scheduled to be delivered. The pertinent measures are to be implemented in grade-specific stages, two grades at a time, in tune with revision of the textbooks that takes place once every five years. Initially, textbooks for the 11th and 12th grades are targeted for reduction, with subsequent revisions being made in the order of 4th to 5th grades and so forth. Note that textbook reduction plan will be undertaken for the 1st to 3rd grades within the period from 2006 to 2008. Table 2-8 shows the transition in the estimated number of required textbooks under this reduction plan.

Table 2-8 Estimated number of required textbooks under the textbook reduction plan

Year	Target grade	1st, 2nd terms	No. of pages	Target no. of pages	No. of textbooks (1000 books)
2005	G-11,G-12	196	28,873	27,613	70,843,250
2006	G-1,G-4,G-5	181	28,873	26,942	68,027,226
2007	G-2,G-6,G-7	163	28,869	26,099	64,104,779
2008	G-3,G-8,G-9	143	28,865	25,102	59,312,037
2009	G-10	143	28,865	24,535	63,888,538
2010		143	28,865	24,535	68,442,641
2011		143	28,865	24,535	73,281,757
2012		143	28,865	24,535	77,849,742
2013		143	28,865	24,535	82,649,184
2014		143	28,865	24,535	87,970,040
2015		143	28,865	24,535	94,430,535

Source：Prepared based on the contract between the Ministry of Education and GCSPP

As shown in Table 2-6, the total number of textbook volumes required may be reduced from 196 volumes in 2005 to 143 volumes in 2008 and remains at that level during subsequent years. Besides, the total number of textbook pages can be reduced from 28,873 to 24,535 by 2009. Accordingly, the total number of textbook copies required for printing can be reduced from the approximately 70 million required in 2005 to approximately 59 million in 2008. However, the reduction work will be completed in 2009, and the number of textbook copies required for printing will increase in subsequent years, reaching approximately 94 million by 2015.

e. Promoting the re-use of textbooks

According to Table 2-6, even if the number of textbook volumes that are printed and number of pages per text book are reduced, 94 million textbook copies will need to be printed in 2015, which is more than twice the printing capacity of the existing printing facilities.

In order to reduce the total quantity of textbooks required for printing, the Project encourages making extensive use of the textbook re-use system which is currently being implemented in the governorates and promotes more effective re-use of textbooks. The Ministry of Education, Department of Projects & Equipment dispatches a research team to the respective governorates during March of each year, to gather data on the situation surrounding the distribution of textbooks and to determine the required number of textbooks. Based on the

data gathered by the research team, the Ministry of Education confirms the quantity of textbooks required (the number requested), the number of textbooks in stock, the number of textbooks slated for re-use and the number of new orders for the following year. Annex 3 provides data on the quantity of textbooks requested, along with the number of textbooks in stock and the number of textbooks slated for re-use in each governorate for the period from 2002 to 2003. These figures are also summarized on a grade-specific basis in Table 2-9.

Table 2-9 Quantity of textbooks requested, number in stock, number slated for re-use and total number required (on a grade-specific basis)

Grade	Quantity of textbooks requested		Quantity of textbooks in stock		Number slated for re-use		Total quantity in stock		Number of textbooks required for printing	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
G1	2,839,696	4,189,664	100,659	217,357	0	0	100,659	217,357	2,739,037	3,972,307
G2	2,688,048	3,709,088	140,612	302,469	0	0	140,612	302,469	2,547,436	3,406,619
G3	2,948,660	3,943,209	217,191	523,725	0	0	217,191	523,725	2,731,469	3,419,484
G4	3,590,684	4,649,136	374,556	433,601	1,091,964	1,104,824	1,466,520	1,538,425	2,124,164	3,110,711
G5	4,043,220	5,840,435	580,289	725,195	1,287,939	1,421,999	1,868,228	2,147,194	2,174,992	3,693,241
G6	4,030,032	5,778,720	729,097	772,273	1,251,030	1,576,281	1,980,127	2,348,554	2,049,905	3,430,166
G7	4,094,104	5,416,735	230,162	488,626	1,313,880	1,199,828	1,544,042	1,688,454	2,550,062	3,728,281
G8	3,757,865	5,032,866	309,024	368,268	1,106,634	1,264,651	1,415,658	1,632,919	2,342,207	3,399,947
G9	3,441,664	4,013,520	282,861	437,867	929,279	981,229	1,212,140	1,419,096	2,229,524	2,594,424
G10	3,131,960	5,016,040	542,013	470,366	1,086,937	1,300,838	1,628,950	1,771,204	1,504,147	3,244,836
G11	2,231,323	3,504,515	395,629	181,224	706,623	600,400	1,101,968	781,624	1,136,663	2,722,891
G12	2,392,329	3,353,226	479,201	361,324	754,177	801,100	1,233,378	1,162,424	1,165,494	2,190,802
G1-G3	8,476,404	11,841,961	458,462	1,043,551	0	0	458,462	1,043,551	8,017,942	10,798,410
G4-G12	30,713,181	42,605,193	3,922,832	4,238,744	9,528,463	10,251,150	13,451,011	14,489,894	17,277,158	28,115,299
Total	39,189,585	54,447,154	4,381,294	5,282,295	9,528,463	10,251,150	13,909,473	15,533,445	25,295,100	38,913,709

Table 2-10 below sets out comparative ratios for the data provided in Table 2-9.

Table 2-10 Comparative ratios for the number of textbooks requested, in stock, slated for re-use and total number of textbooks required

Grade	Textbooks in stock		Number slated for re-use		Total no. of textbooks required	
	2002	2003	2002	2003	2002	2003
G1	3%	5%	0%	0%	96%	94%
G2	5%	8%	0%	0%	94%	91%
G3	7%	13%	0%	0%	92%	86%
G4	10%	9%	30%	23%	59%	66%
G5	14%	12%	31%	24%	53%	63%
G6	18%	13%	31%	27%	50%	59%
G7	5%	9%	32%	22%	62%	68%
G8	8%	7%	29%	25%	62%	67%
G9	8%	10%	27%	24%	64%	64%
G10	17%	9%	34%	25%	48%	64%
G11	17%	5%	31%	17%	50%	77%
G12	20%	10%	31%	23%	48%	65%
G1-G3	5%	8%	0%	0%	94%	91%
G4-G12	12%	9%	31%	24%	56%	65%
Total	11%	9%	24%	18%	64%	71%

Source : Prepared based on Ministry of Education reference materials

Under the current curriculum, the textbooks for the 1st grade to 3rd grade take the form of workbooks, and are edited and published with the idea that students will write in them. Also, students at these grade levels tend to handle textbooks in a rough manner, subjecting them to greater wear and tear. For such reasons, the textbooks for the 1st through 3rd grade levels are deemed unsuitable for re-use and only textbooks for the 4th grade and upwards will be applicable for re-use.

According to Table 2-10, the comparative ratio of textbooks slated for re-use for the 4th through 12th grades was 31% in 2002, and 24% in 2003. From 2005, when printing under the Project will be fully launched, it has been decided to maintain the textbook re-use ratio at 30%, which is nearly equivalent to the current re-use ratio. The re-use ratio for each governorate is summarized in Table 2-11.

Table 2-11 Planned reuse rate of textbooks by grade and by governorate for the year 2002 and 2003

Unit : %

Governorate	Sana'a City		Sana'a		Amran		Aden		Taiz		Al-Hodeidah		Ibb		Hadramout (Coast)		Hadramout (Inland)		Laheg		Al-Daleh	
Grade	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
G1	0	0	0	-	-	0	0	0	0	0	-	0	-	0	0	0	0	0	-	-	-	-
G2	0	0	0	-	-	0	0	0	0	0	-	0	-	0	0	0	0	0	-	-	-	-
G3	0	0	0	-	-	0	0	0	0	0	-	0	-	0	0	0	0	0	-	-	-	-
G4	20	0	30	-	-	10	60	50	33	60	-	16	-	0	52	35	69	69	-	-	-	-
G5	18	0	30	-	-	14	60	0	33	33	-	13	-	30	61	35	69	69	-	-	-	32
G6	20	0	30	-	-	15	60	67	30	31	-	16	-	31	58	35	69	69	-	-	-	30
G7	18	9	28	-	-	135	60	50	36	28	-	25	-	2	50	35	65	0	-	-	-	29
G8	18	9	28	-	-	12	-	47	35	26	-	35	-	29	47	35	65		-	-	-	29
G9	18	94	28	-	-	11	-	38	32	26	-	2	-	24	46	35	65		-	-	-	20
G10	33	9	28	-	23	17	-	50	38	25	-	37	-	34	47	35	66	66	-	20	-	33
G11	25	9	29	-	18	10	-	50	33	3	-	5	-	26	52	0	65	62	-	40	-	25
G12	28	9	30	-	16	11	-	44	34	36	-	3	-	22	63	51	65	56	-	20	-	24
G1-G3	0	0	0	-		0	0	0	0	0	-	0	-	0	0	0	0	0	-		-	
G4-G12	21	7	29	-	20	14	60	43	34	30	-	17	-	22	53	34	67	60	-	25	-	28
Total	18	6	21	-	20	9	39	33	27	24	-	12	-	18	39	27	51	41	-	25	-	28

Governorate	Dhamar		Hajjah		Abyan		Al-Baida (Al-Baida)		Al-Baida (Radah)		Sa'adah		Shabwah		Al-Mahweet		Mareb		Al-Jawf		Al-Mahrah	
Grade	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
G1	-	0	0	-	0	0	0	0	-	-	0	-	0	-	-	0	0	0	-	-	0	0
G2	-	0	0	-	0	0	0	0	-	-	0	-	0	-	-	0	0	0	-	-	0	0
G3	-	0	0	-	0	0	0	0	-	-	0	-	0	-	-	0	0	0	-	-	0	0
G4	-	30	16	-	0	0	49	33	-	-	17	-	44	-	-	5	8	8	-	-	0	0
G5	-	30	15	-	20	35	50	32	-	-	16	-	42	46	-	6	8	8	-	-	55	36
G6	-	30	16	-	20	35	49	29	-	-	15	-	36	50	-	5	8	8	-	-	43	30
G7	-	30	23	-	15	35	50	29	-	-	17	-	33	50	-	6	13	11	-	-	37	27
G8	-	28	23	-	18	33	49	29	-	-	18	-	40	50	-	6	14	0	-	-	43	33
G9	-	30	23	-	0	0	50	29	-	-	18	-	37	50	-	1	13	13	-	-	38	30
G10	-	28	23	20	30	35	50	29	-	-		-	21	28	-	11			-	-	35	41
G11	-	30	23	20	30	32	50	29	-	-		-	18	50	-				-	-	37	43
G12	-	24	20	14	0	0	49	32	-	-		-	24	50	-				-	-	52	60
G1-G3	-	0	0		0	0	0	0	-	-	0	-	0		-	0	0	0	-	-	0	0
G4-G12	-	29	20	18	15	24	49	30	-	-	17	-	35	47	-	6	11	8	-	-	36	27
Toral	-	22	15	18	11	19	36	21	-	-	12	-	27	47	-	4	8	6	-	-	23	18

Source : Prepared based on the documents from Ministry of Education

In Table 2-11, it can be seen that the percentage of textbooks that can be reused from the fourth year to the twelfth year of school in Aden Governorate and Hadramawt Governorate is high at 53% to 67%. On the basis of interview survey in Aden Governorate, a system in which a fine of 120 rials (about 82 yen) is imposed for each text book that is not returned is functioning and the percentage of returned textbooks is high.

UNICEF also conducted an investigation of the return rate, and found that with a textbook return rate of 90%, the percentage of returned textbooks that were reusable was 70% to 80%. From this, the maximum textbook reusability rate is 0.9×0.8　0.7, roughly equivalent to the actual reuse rate of 67%.

Under the Model Plan, textbook reusability rate is calculated based on the following criteria:

- Based on the current actual reusability rate of approximately 30%, the reusability rate for 2005 is estimated at 30%.
- After 2006, it is planned that, through the efforts of the Ministry of Education, the textbook reusability rate will increase by 10% each year.
- The maximum textbook reusability rate is assumed at the current maximum, which is 70%.
- Since revision of textbooks takes place once every 5 years, the reusability rate for the year in which textbooks are revised will not be calculated.
- In the case of textbooks for the first to third years of primary school, since classroom teaching calls for writing in the textbooks and damage to the textbooks in lower grades is particularly severe, these are not subject to reuse. The Project will adopt this criterion in placing a minimum on textbook reuse in the case of the first to third years of primary school.
- However, given the high number of schoolchildren in the first to third years and thus the high volume of textbooks required; from 2015 when the number of schoolchildren is expected to peak, textbook reusability for this grade bracket will be calculated at 50%.

The figures under the Model Plan for textbook reuse and number of textbooks printed from 2005 to 2015 are shown in Table 2-12.

Table 2-12 : Expected number of textbooks required for printing, after execution of reuse

Year	1st, 2nd terms	Targeted number of pages	Number of textbooks requested	Number slated for re-use		Number of textbooks required for printing
	(No. of books)		(book)	(book)	(%)	(book)
2005	196	27,613	70,843,250	13,294,246	18.8	57,549,004
2006	181	26,942	68,027,226	16,315,993	24.0	51,711,232
2007	163	26,099	64,104,779	18,671,221	29.1	45,433,558
2008	143	25,102	59,312,037	20,816,412	35.1	38,495,625
2009	143	24,535	63,888,538	30,462,287	47.7	33,426,251
2010	143	24,535	68,442,641	29,868,914	43.6	38,573,726
2011	143	24,535	73,281,757	32,406,734	44.2	40,875,024
2012	143	24,535	77,849,742	33,165,621	50.0	44,684,121
2013	143	24,535	82,649,184	35,116,549	49.7	47,532,636
2014	143	24,535	87,970,040	43,053,094	56.0	44,916,946
2015	143	24,535	94,430,535	47,939,522	50.6	46,491,013

Source : Prepared based on the Contract between the Ministry of Education and GCSPP

f. Efficient use of existing printing plants

Subsidiary printing plants of the Textbook Printing Corporation are at Sana'a and Aden. In the Sana'a Printing Plant and Aden Printing Plant, based on contracts between the Ministry of Education and Textbook Printing Corporation, 161 to 197 types of textbooks for basic education and intermediate education, as well as teachers' texts and test papers etc. are printed. When overloaded, the Textbook Printing Corporation subcontracts part of textbook printing to private printing businesses in Sana'a and Taiz based on recontracted terms with the Ministry of Education.

The maximum printing and binding quantities of existing printing plants in Sana'a and Aden are shown in Table 2-13 and Table 2-14.

Table 2-13: Current maximum capacity of Sana'a Printing Plant

	Quantity	Machine Capacity	Work time	Prints per Day (sheets)		Annual Throughput (sheets)	Max. Quantity (pages)	Annual Printing Output (pages)	Annual Folding Output (pages)	Annual Output Conversion (140 pages)
4 color rotary press	1	20,000	18		360,000	100,800,000	32	3,225,600,000	3,225,600,000	
4 color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	32	241,920,000	0	
4 color throughput						108,360,000		3,467,520,000	3,225,600,000	24,768,000
2 color rotary press	1	17,000	18		306,000	85,680,000	32	2,741,760,000	2,741,760,000	
2 color sheet-fed press	1	4,300	18	77,400	38,700	10,836,000	32	346,752,000		
2 color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	32	241,920,000		
2 color throughput						104,076,000		3,330,432,000	2,741,760,000	23,788,800
Single color sheet-fed press	1	5,000	18	90,000	45,000	12,600,000	32	403,200,000		
Single color sheet-fed press	1	4,000	18	72,000	36,000	10,080,000	16	161,280,000		
Single color sheet-fed press	1	4,000	18	72,000	36,000	10,080,000	8	80,640,000		
Single color sheet-fed press	1	4,000	18	72,000	36,000	10,080,000	8	80,640,000		
Single color sheet-fed press	1	4,000	18	72,000	36,000	10,080,000	16	161,280,000		
Single color throughput						52,920,000		887,040,000		6,336,000
Printing throughput										54,892,800
Bookbinding Department										
Folding machine	1	2,500	18		45,000	12,600,000	32		403,200,000	
Folding machine	1	2,500	18		45,000	12,600,000	32		403,200,000	
Folding machine	1	2,500	18		45,000	12,600,000	32		403,200,000	
Folding machine	1	2,500	18		45,000	12,600,000	32		403,200,000	
Folding throughput									7,580,160,000	54,144,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Binding Throughput										30,240,000

Source: Results of study of Sanaa Printing Plant

Table 2-14: Current maximum capacity of Aden Printing Plant

	Quantity	Machine Capacity	Work time	Prints per Day (sheets)		Annual Throughput (sheets)	Max. Quantity (pages)	Annual Printing Output (pages)	Annual Folding Output (pages)	Annual Output Conversion (140 pages)
4 color sheet-fed press	1	4,000	18	72,000	36,000	10,080,000	32	322,560,000	0	
4 color throughput						10,080,000		322,560,000	0	2,304,000
2 color sheet-fed press	1	2,000	18	36,000	18,000	5,040,000	32	161,280,000		
2 color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	16	120,960,000		
2 color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	8	60,480,000		
2 color throughput						20,160,000		342,720,000	0	2,448,000
Single color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	8	60,480,000		
Single color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	16	120,960,000		
Single color sheet-fed press	1	3,000	18	54,000	27,000	7,560,000	16	120,960,000		
Single color throughput						22,680,000		302,400,000		2,160,000
Printing throughput										6,912,000
Bookbinding Department										
Folding machine	1	2,500	18		45,000	12,600,000	32		403,200,000	
Folding machine	1	2,500	18		45,000	12,600,000	16		201,600,000	
Folding machine	1	3,500	18		63,000	17,640,000	32		564,480,000	
Folding machine	2	2,500	18		90,000	25,200,000	32		806,400,000	
Folding throughput									1,975,680,000	14,112,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Automatic binder	1	1,500	18		27,000	7,560,000				7,560,000
Binding throughput										15,120,000

Source: Results of study of Aden Printing Plant

The feature of current printing quantities of both printing plants is clearly the imbalance between printing capacity and bookbinding capacity. At Sana'a Printing Plant, because there are two web offset printing presses in assembly line format up to the folding stage, printing and folding capacity is high. In comparison, however, bookbinding equipment capacity is low. If the average number of pages in a textbook is assumed to be 140 pages, the difference between printing and folding capacity and bookbinding capacity (where the number of books printed and folded is 54 million books) is 24 million books, since the number of books bound stands at only 30 million books. Although there is a possibility that the future performance of the two web offset printing presses may decrease due to aging, if the reusability of textbooks remains low, it is concluded that augmenting an automatic bookbinding machine to the Sana'a Printing Plant should be equipped by the Yemeni government.

The opposite is true for the Aden Printing Plant. With respect to a 7 million book printing capacity, folding and bookbinding capacity is 14 to 15 million books.

To maximize efficiency at the Sana'a and Aden plants, it is recommended that printing volume be increased at Sana'a (textbooks with higher number of pages) and that binding (textbooks with lesser number of pages) be increased at Aden.

The quantities of textbooks printed at Aden in 2002 are shown in Table 2-15.

Table 2-15: Textbook printing quantities at Aden (2002/2003)

No.	Item	1st/2nd Term	Year	Colors	Pages	Required Print Quantity	Actual Print Quantity
1	History	I	6	2	80	439,100	116,846
2	Islamic Educatio	I	4	2	80	502,700	161,846
3	History	I	5	2	64	458,650	142,474
4	History	I	8	2	112	328,800	142,474
5	Koran	I	8	2	108	328,800	122,463
6	Geography	I	6	2	112	439,100	111,032
7	Society	I	5	1	112	458,650	123,674
8	Koran	-	12	2	144	179,860	122,463
9	Social Science	-	11	1	80	81,170	44,972
10	English	-	10	4	128	187,855	133,119
11	English	-	11	4	144	185,105	96,462
12	English	-	9	4	73	299,800	88,308
13	English	-	7	4	64	362,700	109,253
14	English	-	8	4	64	328,800	82,168
15	Social Education	I	4	2	80	502,700	136,380
16	English	-	12	4	256	199,760	104,360
17	Social Education	-	6	2	72	439,100	118,404
18	History	II	6	2	96	439,100	118,404
19	History	II	5	2	96	458,650	118,404
20	Social Education	II	9	2	96	299,800	103,308
21	Studies	-	12	1	-	-	120,000
22	Mathematics	-	10	1	60	199,345	133,507
23	Science	II	2	4	176	502,700	577,991
24	Poetry	-	10	1	128	170,645	133,075
25	Biology	-	10	1	240	200,735	133,075
26	Educational Gui	-	4～6	4	-	-	118,000
27	Social Science	II	4	2	96	502,700	136,380
28	History	II	8	2	96	328,800	142,474
29	Koran	II	9	2	80	299,800	122,463
30	Social Science	II	9	2	96	299,800	103,308
31	Islamic Educatio	II	4	2	96	502,700	161,846
32	Social Science	II	3	4	80	544,700	540,543
33	Geography	II	5	2	96	458,650	115,296
34	Geography	II	6	2	80	439,100	111,032
35	Test Practice	-	10～12	1	-	-	2,000,000
Total					3,385	11,369,875	6,945,804

Source: Aden Printing Plant

At the Aden Printing Plant, textbooks with relatively few pages (at an average of 103 pages; where the total average pages for textbooks produced overall by the GCSPP is 140 pages) are printed. However, not all commissioned textbooks are printed, while at the same time there are instances where some textbooks printed exceed the average at 144 to 256 pages. With respect to the Aden Printing Plant, textbook orders must be made consistent with the printing capacity at the plant in order to maximize effective use of existing capacity.

Table 2-16 Estimation of the number of textbooks printed by effective use of Aden Printing Plant

	Printing capacity (page)	Number of printing pages	Number of books
4-color printing	322,560,000	322,474,400	4,472,300
2-color printing	342,720,000	331,505,160	3,937,405
Black and white	302,400,000	298,394,320	2,536,105
Total	967,680,000	952,373,880	10,945,810

Source : Prepared based on the documents from Aden Printing Plant

As shown in the Table 2-16, the production capacity of Aden Printing Plant may be increased from actual 6.9 million books to 10.94 million books for the year 2002, by changing the management method of current printing plants. In the Model Plan of this project, the current printing capacity is estimated based on the textbook printing plan where the effectiveness of existing printing plants are maximized. The Table 2-17 gives the maximum production capacity of Sana'a and Aden Printing Plant.

Table 2-17 Maximum production capacity of Sana'a and Aden Printing Plant

	4 Color	2 Color	Monochrome	Number of books
Sana'a Printing Plant	3,467,520,000	3,330,432,000	887,040,000	30,240,000
Aden Printing Plant	322,560,000	342,720,000	302,400,000	15,120,000
Total	3,790,080,000	3,673,152,000	1,189,440,000	45,360,000

Source : Prepared based on the documents from Sana'a and Aden Printing Plant

Since the maximum processing quantities shown in Table 2-14 is to be determined by the number of bookbinding and printing, the final production will be estimated in the balance of the annual printing and bookbinding capacity. However, it may be drafted in the form of simple model plan as Table 2-18, by calculating excess and deficiencies in the annual required quantities and maximum processing capacity.

Table 2-18: Simple Model Calculating Excesses and Deficiencies from Required Printing Quantities and Maximum Processing Quantities of Existing Facilities

Year	Required Quantities				Excesses/Deficiencies			
	4 Color	2 Color	Monochrome	No. of Books	4 Color	2 Color	Monochrome	No. of Books
2005	4,252,321,052	2,569,314,752	986,496,344	57,549,004	-462,241,052	1,103,837,248	202,943,656	-12,189,004
2006	4,262,639,283	2,671,563,965	829,727,272	51,711,232	-472,559,283	1,001,588,035	359,712,728	-6,351,232
2007	4,267,848,714	2,380,491,933	810,772,421	45,433,558	-477,768,714	1,292,660,067	378,667,579	-73,558
2008	4,009,382,545	2,278,031,303	789,946,918	38,495,625	-219,302,545	1,395,120,697	399,493,082	6,864,375
2009	3,540,242,018	1,738,903,115	847,479,351	33,426,251	249,837,982	1,934,248,885	341,960,649	11,933,749
2010	3,763,660,200	2,022,209,197	1,191,961,308	38,573,726	26,419,800	1,650,942,803	-2,521,308	6,786,274
2011	4,545,614,159	2,403,363,427	670,504,111	40,875,024	-755,534,159	1,269,788,573	518,935,889	4,484,976
2012	3,777,610,263	2,377,837,624	774,487,946	38,960,567	12,469,737	1,295,314,376	414,952,054	6,399,433
2013	3,788,534,264	2,669,309,544	924,476,550	41,555,228	1,545,736	1,003,842,456	264,963,450	3,804,772
2014	3,389,258,408	2,267,867,745	1,206,100,108	38,717,167	400,821,592	1,405,284,255	-16,660,108	6,642,833
2015	3,639,848,105	2,716,869,519	1,774,752,361	46,698,324	150,231,895	956,282,481	-585,312,361	-1,338,324

Source: Documentation from Sanaa/Aden printing plants

In Table 2-18, although the machinery whose printing quantities would be considered deficient by the year 2015 are the four color presses, monochrome presses, and bookbinding machines (including folding machines), because there is leeway in two color printing, it is judged that the monochrome presses can be used in common for two color printing. In the choice of machinery for this project, the four color presses and bookbinding machines are central.

g. Textbook Deficiency Estimates

With respect to textbook deficiencies, the required textbook quantities for 2005 to 2015 have been drafted based on the Model Plan, with consideration given to the maximum processing quantities of each of the printing presses for each color and the maximum processing quantities of each of the bookbinding machines at existing printing plants. The annual processing quantities for each year have subsequently been calculated from that result. The Model Plans are shown in Annex 7 and Annex 8. Also, processing estimates for the Sana'a and Aden Printing Plants according to the model plan are shown in Table 2-19. In Table 2-19, the green sections are those exceeding the maximum processing quantity, but the deficiency for single color printing presses in 2014 and 2025 can be compensated for by the two color presses. It is recommended that the bookbinding deficiency for 2005 be dealt with by bookbinding at the Aden Printing Plant, by contracting to the private sector, by improving the re-use rate, etc., and not consider a bookbinding machine capacity increase for that year alone.

Table 2-19 Annual Processing Estimates for Sana'a and Aden Printing Plants

Year	Sana'a				Aden			
	4-Color	2-Color	Monochrome	No. of Books	4-Color	2-Color	Monochrome	No. of Books
Max. Processing Quantity	3,467,520,000	3,330,432,000	887,040,000	30,240,000	322,560,000	342,720,000	302,400,000	15,120,000
2005	2,659,118,508	2,233,071,868	687,684,152	35,824,800	307,657,130	336,242,884	297,812,192	10,805,930
2006	2,668,509,511	2,346,295,937	538,209,931	30,240,788	313,578,292	325,268,028	291,517,341	9,706,991
2007	2,747,035,945	2,052,875,293	519,067,565	27,268,146	237,997,832	327,616,639	291,704,856	7,736,908
2008	2,629,254,508	2,037,683,720	521,210,771	25,478,499	203,018,022	241,863,983	268,736,147	5,819,964
2009	2,497,984,300	1,556,113,009	550,096,896	22,257,998	191,060,676	183,426,331	297,382,455	5,886,465
2010	2,633,838,975	1,776,125,449	890,543,131	26,267,231	204,412,162	246,657,899	301,418,177	6,574,342
2011	3,336,765,102	2,147,237,617	434,480,663	28,633,393	263,567,516	256,783,668	236,023,448	6,397,588
2012	2,373,065,572	2,025,037,177	486,543,313	24,380,653	290,857,363	353,494,019	287,944,633	7,892,661
2013	2,360,224,737	2,379,155,984	624,171,573	27,649,069	171,270,220	292,302,360	300,304,977	6,336,512
2014	2,376,168,288	2,019,792,031	904,076,606	27,043,693	179,865,501	248,877,923	302,023,502	6,612,035
2015	2,052,562,675	2,420,813,955	1,484,033,751	31,498,064	301,906,577	296,940,210	290,718,610	7,550,607

From "Table 2-12 Expected number of required textbook for printing, after execution of reuse" and Table 2-19 above, the relationship between annual textbook reuse quantities, the printing quantities of the Sana'a and Aden printing plants, and the required textbook quantities are as shown in Figure 2-3.

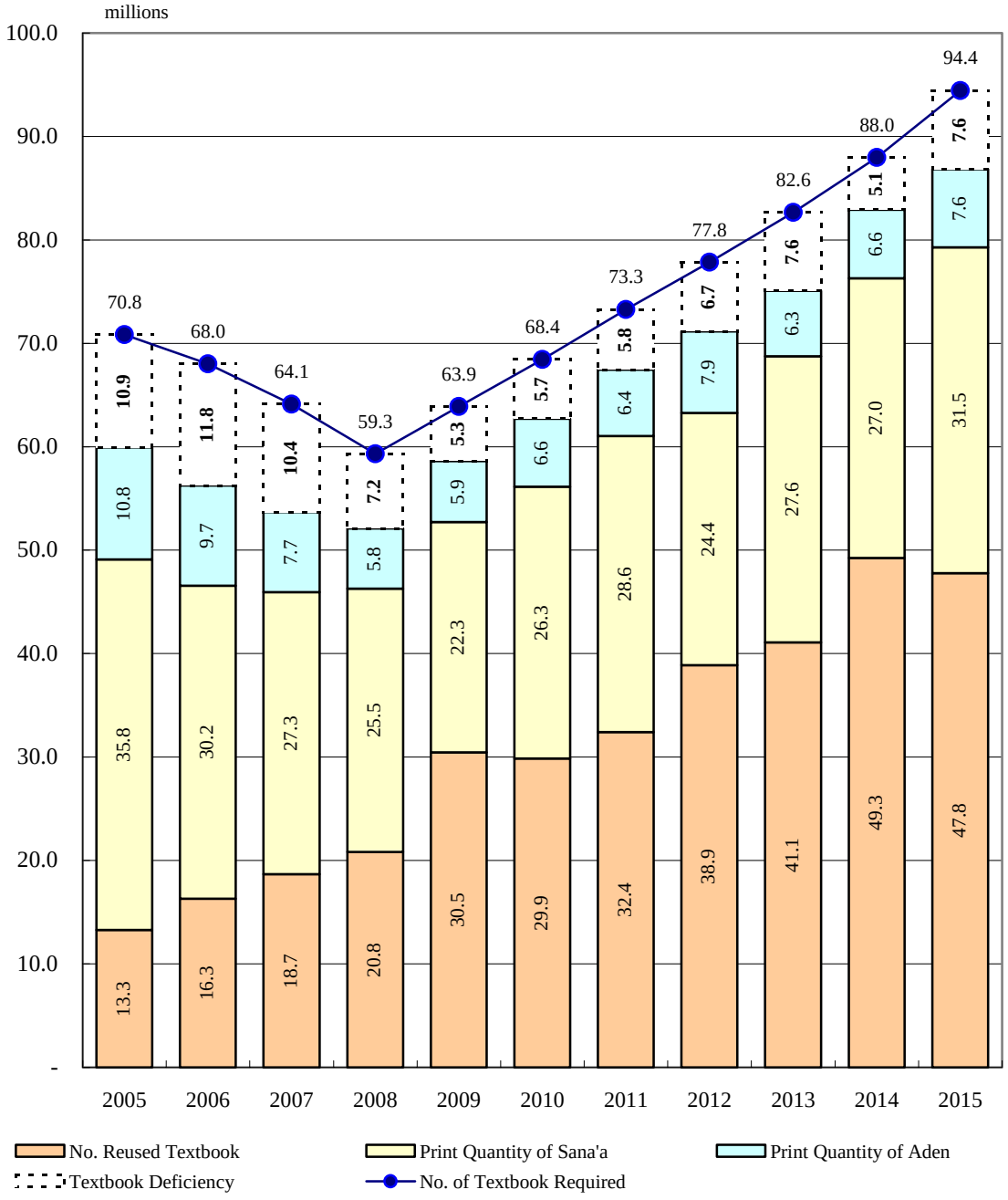


Figure 2-3: Estimated Amounts of Required Textbooks

From Figure 2-3, the textbook deficiency from 2005 to 2015 is calculated as 5.2 million to 16.5 million. However, textbook reuse is an absolute condition in order to support this decrease in deficiency.

h. Textbook distribution

Textbook delivery, according to the contract between the Ministry of Education and GCSPP, requires that textbooks be delivered to Ministry of Education textbook warehouses in main cities in each governorate. Sana'a Printing Plant and Aden Printing Plant use each five 5-8 ton trucks to deliver textbooks. Each truck travels up to 50,000km a year, the peak delivery periods being from

May to October for first half terms textbook deliveries and from December to March for 2nd half term textbook deliveries.

With regard to the current status of truck services responsible for textbook deliveries in Aden, they are shown in Annex 4.

Also, existing textbook delivery routes are shown in Annex 5.

At Sana'a and Aden Printing Plants, textbook distribution is carried out with relay points in Sana'a, Aden and Mukalla. In order to distribute textbooks smoothly, it is necessary to station trucks at each printing plant beforehand and start deliveries in a series as soon as printing is finished. The textbook delivery routes of the Mukalla Printing Plant as required by GCSPP are shown in Annex 6. Among these routes, all except one involve many deliveries and also include Sana'a, where a large amount of materials (paper, ink, etc.) dispatching are required. However, routes 2, 3 and 4 include repeat delivery in the same areas, so that it is possible to group these areas in one route. Further, since the delivery amount for Route 1 in the 2005 plan is approximately 7.6 tons, calculated from 36,737 books at an average weight of 208g per book, it is judged that a large truck is not required.

It is estimated that the scale of equipment to be supplied under the project is approximately the same scale as that currently deployed at the Aden Printing Plant.

② Criteria for selecting equipment

In choosing equipment, the content thereof should correspond to the technical level of the existing staff. Also, since the object of the Project is the printing of textbooks, equipment is to be chosen with production plants as a prerequisite and the emphasis on productivity, while equipment aimed at research and the like are outside the scope of the Project.

③ Site selection

The project site is fixed at Mukalla, as requested by Ministry of Education and GCSPP, taking into consideration the location factors for textbook distribution to eastern regions. Mukalla is also considered as important base for coastal and industrial development under planning at the national and regional levels, in line with decentralization policy.

(2) Policy with regard to environmental conditions

The planned site is on the Arabian Sea, approximately 500m from the coast, in an area of high temperature and humidity. In particular, where paper stock used in printing expands due to moisture absorption, trouble can occur in paper feeding during printing, therefore dehumidifiers must be installed where the printing presses are located. Also, protection of the plant from the air in the vicinity of the coast must be increased to suppress salt corrosion to an absolute minimum. Table 2-20 shows the annual weather for 2001.

Table 2-20: Weather Conditions (2001)

Weather	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum temperature (℃)	32.2	30.7	31.7	34.4	36.8	36.0	34.6	35.0	34.3	33.4	34.2	31.5
Minimum temperature (℃)	13.0	11.8	14.3	15.4	24.8	23.2	21.8	21.6	22.8	20.6	16.8	19.5
Average temp. (℃)	22.5	22.0	24.4	26.2	30.4	30.7	29.6	29.0	28.8	28.3	25.8	25.6
Rainfall (mm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	8.3
Wind direction	SE	SE	SE	SE	SE	SE	SE	E	E	SE	SE	SE
Wind speed (m/s)	7.7	7.5	8.0	7.9	7.8	7.1	6.9	6.5	7.2	7.4	7.3	9.2
Humidity (%)	57	68	75	76	78	74	72	73	78	75	63	72

(3) Policy regarding socio-economic conditions

1) Electricity

Although Mukalla, where the site is to be located, has had frequent power failures in the past, because a 100GW power plant has been recently installed, power outages have essentially disappeared. However, since Mukalla is situated on the coast, unexpected power failures can occur due to salt damage of transformers on telephone poles when insulation is insufficient. Corrosion of electrical wires is also a possibility. Consequently, installation of an uninterruptible power supply for protecting prepress computer data is necessary. Voltages used under the project will be single phase 230V and three phase 400V.

2) Road Conditions

Since the site is at a location 230m from a national road that runs to Aden and the connecting road has a width of more than 20m, delivering equipment does not entail any problems. There is also sufficient space for equipment to be delivered to the site by container, and there are no obstacles to conveying and unpacking equipment.

Procured equipment is normally unloaded at Aden port and delivered to Mukalla overland from Aden. En route, the road is approximately 10m wide, but well paved and presenting no problems to overland travel. However, there are checkpoints at various locations along the road monitoring the movements goods and people, therefore delivery delays due to goods inspections must be considered. It is necessary to obtain passage from the Ministry of Education for transport of equipment for the project to ensure smooth inland deliveries.

3) Waste

Chemicals (etching solutions, gum Arabic, rubber, etc.) used in developing fluids, inks, and wetting solutions, machine oil, etc. are waste products of printing processes that have an effect on the environment. Currently, although no regulations regarding the disposal of industrial wastes have been enacted in Yemen, such measures as installing oil traps for ink, machine oil, etc., preventing circulation into the sewerage system, and installing water tanks to dilute chemicals with large quantities of water should be adopted against the possibility of future problems. Also, with regard to developing solutions, a method is to be adopted for storing waste solution temporarily in a drum or the like, and then neutralizing before disposing of it.

(4) Procurement issues

The bulk of items to be procured are precision equipment, requiring care in installation, maintenance, repair etc., daily operation and management. Furthermore, much of this equipment is expensive and unavailable locally in Yemen. As a result, the Project is premised on procurement from Japanese manufacturers. Nevertheless, equipment procurement from third country sources (European) will be considered in cases where operation and maintenance capabilities are not in place for the originally envisioned Japanese item. Nevertheless, all equipment to be procured will be subject to the condition that the supplier's after sales service agent for operation, maintenance and repair is located in a country with direct flights into Yemen (Saudi Arabia, UAE, Europe, etc.) to facilitate emergency response to equipment maintenance and repair issues if so necessary.

(5) Construction issues

1) Site description

The equipment under the Project comprising prepress, printing and bookbinding equipment are to be installed at the Mukalla Printing Plant planned by GCSPP. The Mukalla Printing Plant center site is located 12km to the west of Al Mukalla city at a site approximately 500m from the coastline (refer to the site map at the beginning of this Report). The planned construction site fronts on new residential area currently under construction. A mosque and scattered human settlements are currently located in the immediately surrounding area (refer to the aerophoto of the planned Mukalla construction site at the beginning of this Report). Ground is a mixture of gravel and stone with bearing capacity of 15~20 tons/m². This is more than sufficient to support the facility envisioned under the Project. The facility site is an irregularly shaped four-sided area with respective linear dimensions of 56m, 75m, 210m and 236m. Total area is around 14,000 squre meter. A rough map of the site area is given in Figure 2-4.

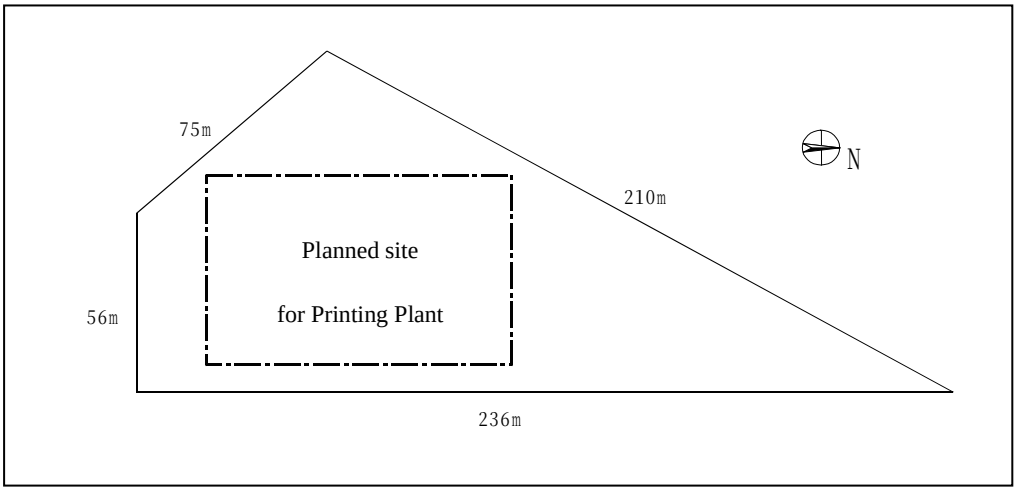
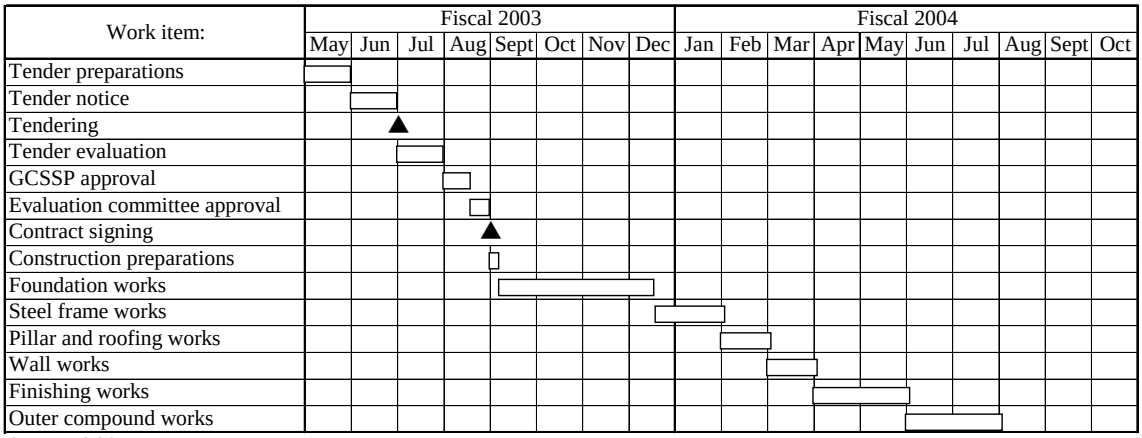


Figure 2-4 Planned site for Mukalla Printing Plant

Construction of the printing center structure will be the responsibility of the Yemeni Implementing Agency. Care in tendering procedure, selecting contractors and monitoring construction progress will be essential. In particular, attention must be given to foundation works since any delay here will have a significant effect on the overall construction schedule.

The Construction schedule proposed by the executing agency is shown in Figure 2-5.



Source : GCSPP

Figure 2-5 Construction schedule proposed by the Executing Agency

Furthermore, given the fact that the construction site is located in an area of human settlement, the printing plant is to be enclosed by a high wall to dampen noise produced by printing equipment as well as private generator operation during blackouts. Furthermore, plant enclosure is to be enhanced by an air conditioning system to prevent salt-damage to printing equipment given the facility's close proximity to the coast.

According to data released by the Implementing Agency as of June 22, 2003, formal announcement of tendering for construction of the printing plant building was published on June 21, with tender opening scheduled for July 22. And e-mail from the Implementing Agency of August 28, 2003, the first lowest tenderer was Al-Shabah and their tender price was 190,241,079 Y.R. Their tender also was accepted technically. The schedule is roughly same as the proposed schedule, but it is imperative that the subsequent construction schedule be carefully adhered to.

(6) Engagement of local contractors

Of the equipment to be supplied under the Project, printing press and perfect binding line will require special installation works. Because these items are precision equipment, it will be necessary for the manufacturer to dispatch engineers to oversee all phases of installation. As for cargo unloading and handling of such equipment as well as electrical works, it can be contracted to general heavy cargo transporter, employing necessary labors and power distribution technicians. The technical level of these local contractors is considered adequate to maintain these jobs. In order to reinforce quality control for these activities, engineers shall be dispatched from the respective manufactures to supervise the relevant works. Under this combination of contractor supervision and local expertise, it is concluded that sufficient human resources will be deployed for effective execution of the envisioned works. Accordingly, it is assumed that general works (cargo unloading, handling and electrical works) will be carried out by local contractors. With regard to operation and maintenance, as discussed in the section on Procurement, it will be mandatory that the nominated manufacturer have a nearby agent (access to Yemen by direct flight).

(7) Operation and maintenance capacity of the Implementing Agency

At present, the bulk of the printing press equipment in operation at the Sana'a and Aden printing plants was supplied along with technology transfer under German assistance. The general printing operations at existing plants are deemed to be at adequate level. Furthermore, the current set-up entails the permanent assignment of mechanical and electrical engineers in the printing field capable

of appropriately rapid response to equipment malfunction. Also, despite the fact that printing equipment procured in the late 1970s and early 1980s has suffered a drop in efficiency due to superannuation, the fact that this machinery is still in operation is indicative of an effective operation and maintenance structure already in place.

(8) Equipment selection

1) Pre Press section

Textbook drafts are prepared by ERDC with original hard copy and data-housing CD handed over to GCSPP. On the basis of the textbook preparation plan distributed to each printing plant operated by GCSPP, necessary hardcopy and CDs are forwarded to each printing plants which the plants in turn use as core data for plate making and print processing. Under this prepress operation, it is essential to input the plant logo and job number so that it is clearly evident which plant is to print which textbook material. Furthermore, in cases where there are errors in the ERDC prepared data, these must be corrected at the plant level. Accordingly, in the prepress process, the requisite DTP computer system must be compatible with computer equipment and software used by ERDC.

In addition, editing operations are necessary that reduce the physical number of textbook pages and thus textbook printing volume. Because this editing work is carried out at ERDC, GCSPP computer software specifically designed to reduce the number of textbook printed pages must be deployed to ERDC, with engineers also to be dispatched from GCSPP to support ERDC software instruction and use. At present, preparation of manuscripts at ERDC with DTP computer equipment begins with analog output to A4-size film (halftone dot and raster image processing as well as film processing for each color type). After creating 16 sheets of A4-size film, this is synthesized (montage) onto a master film. Extreme care is essential at this point, since failure to precisely align each film sheet in the case of multi-color printing will result in color drift. Nevertheless, this precision is a demanding 0.1mm or less and cannot be achieved under current manual methods. This deviation effects downstream processes including printing and folding (paper sheet edges are unaligned) and collating, ultimately resulting in a poor quality textbook product.

Accordingly, in order to upgrade the precision of master film creation, imposition software for correct manuscript alignment as well as image setter compliant with large-scale film processing will be supplied under the Project.

2) Printing Section

Existing printing plants are well equipped with web offset printing presses, four-color sheet offset printing presses, two-color sheet offset duplex printing presses, single-color sheet offset printing presses, etc. At present, development of multi-color sheet offset printing press technology has undergone dramatic advances with eight-color and four-color duplex printing presses aimed at rich catalog printing garnering close attention. Nevertheless, these cutting-edge printing presses are aimed at catalog, pamphlet and brochure printing, where fine color tuning is a high priority. In light of the fact that the Project is aimed primarily at increased production of currently lacking textbooks, it is deemed inappropriate to introduce excessively advanced press equipment, and instead the Project will supply machinery that is in line with equipment currently operated by the Implementing Agency and thus can be effectively operated and maintained without further human resources development.

Furthermore, it is concluded that introduction of a four-color sheet offset printing press will fully complement existing printing plant requirements.

3）Book making and Binding Section

Equipment under the bookbinding process comprises Paper folding machine, Collating machine, Stitching machine, Binding machine, and Cutting machine. Paper folding machine operates as an independent entity at the outset of the binding process. The downstream collating, stitching, binding and cutting machines can be installed either independently or in a production line format. In general, an independent equipment layout is suited to a small amounts production over a broad range of categories where binding size and type of paper are frequently changed. It is not suited to large-volume production. Existing printing plants operated by GCSPP emphasize productivity and have hence adopted a production line layout for binding equipment. In light of this and to also focus on high-volume production, the collating, stitching, binding and cutting machinery under the Project as well will be integrated in production line format.

4）Vehicles

Under the contract that GCSPP signs with the Ministry of Education each year, it is the obligation for GCSPP to deliver the prepared textbooks to the ministry's branches in the various governorates. Accordingly, vehicles for this purpose will be supplied under the Project. However, the vehicle for delivery along Route 1 will be a light truck.

(9) Determining equipment grade

1) Pre Press section

GCSPP plans to produce 23 varieties of textbook at the new Mukalla Printing Plant. Under the prepress process, 16 pages worth of manuscript will be transposed onto one sheet of film. In the case of a four-color printing press, a separate sheet of film is prepared for each color CMYK (i.e. C: cyan, M: magenta, Y: yellow, B: black), then, four film sheets in total are needed. Under these conditions, a total of 884 sheets of film will be required for textbook printing at the Mukalla Printing Plant. Since imposition and film making work by image setter are carried out at a pace of 4 sheets of film per hour, approximately complete 1 month would be required to prepare all the required film:

884 sheets ÷ 4 sheets/hr＝221 hrs

221 hrs ÷ 7 hrs /day＝31.6 days

As discussed under Basic Plan, it is necessary to reduce the number of textbook pages in order to limit the volume of textbook printing. To reduce the number of textbook pages, it is essential to prepare a high quality manuscript and create precision film sheets using imposition software. In addition, an image setter compatible with large-sized film is necessary. Accordingly, it is recommended that film required at the Sana'a and Aden printing plants be prepared as well at Mukalla. Number of textbook pages and required film quantities for fiscal 2002 are shown in Table 2-21.

Table 2-21 Film requirement in Fiscal 2002

	No. of textbooks	No. of pages	4 color pages	2 color pages	Monochrome pages	Total
Total	246	34,781	18,141	10,932	5,708	34,781
No. of pages per film			16	16	16	48
Required amt. of film			4,535	1,367	357	6,259
Processing days			162	49	13	224

On the basis of Table 2-21, it is concluded that the minimum requirement of 1 image setter would be capable of preparing all the film required at Mukalla Printing Plant, and GCSPP's other plants as well.

Textbook production at the Mukalla Printing Plant as planned by GCSPP is shown in Table 2-22. Nevertheless as discussed under Basic Plan, planned production amount must be compatible with actual production performance at existing printing facilities. (Refer to Attached Materials)

Table 2-22 Forecasted textbook production at the Mukalla Printing Center

	Discipline	Grade	Number of colors		Number of pages		Number of Film	
			Cover	Main text	Cover	Main text	Cover	Main text
1	Islamic education (P-1)	4	2	4	4	80	2	20
2	Geography	6	4	4	4	112	4	28
3	National Islamic education	9	4	4	4	80	4	20
4	Geography	5	4	4	4	96	4	24
5	Quaran	12	2	2	4	144	2	18
6	Arabian (P-1)	1	4	4	4	132	4	36
7	Arithmetic (P-1)	2	3	4	4	96	3	24
8	Arabian (P-1)	2	4	4	4	160	4	40
9	Arabian (P-1)	3	4	4	4	160	4	40
10	Arithmetic (P-1)	4	3	4	4	144	3	36
11	Science (P-1)	4	4	4	4	144	4	36
12	Science (P-1)	5	4	4	4	136	4	36
13	Arabian (P-1)	6	4	4	4	224	4	56
14	Yemen history and culture	6	4	4	4	72	4	20
15	Islamic education (P-1)	7	2	4	4	112	2	28
16	Science (P-1)	8	4	4	4	180	4	48
17	Arabian (P-2)	9	2	4	4	176	2	44
18	Science（P-1)	9	4	4	4	168	4	44
19	Chemistry	10	4	4	4	288	4	72
20	Economics	11	1	1	4	168	1	11
21	Physics	11	2	2	4	320	2	40
22	Physics	12	2	2	4	152	2	20
23	Biology	12	4	4	4	272	4	68
Subtotal							75	809
Grand total								884

Source: GCSPP

2) Printing process

The number of textbooks required in Yemen is forecast to increase from 54.8 million volumes in 2004 to 120 million volumes in 2015. In order to address this growth in demand, it will be necessary to reuse textbooks and/or reduce the number of new volumes printed as well as the number of pages per volume. The Project will assume effective reuse of textbooks, and on this basis target new printing capacity for an estimated 13 million volumes that would otherwise be lacking. In computing required number of equipment under the Project, critical values were adopted as set out in the Model Plan and design criteria were established as set out below. Fiscal 2005 is excluded from capacity computation given the fact that equipment will still not be fully in place and the new plant will subsequently not be operating at full capacity.

a. Design criteria

In designing printing equipment, it is necessary to compute the requisite capacity and equipment parameters based on required production volume, number of operating hours per day, number of days of operation per year, number of work shifts, rate of capacity utilization, etc. Most salient computational criteria in this regard are indicated below.

① Number of textbook pages required to be printed per year
② Printing capacity (number of sheets printed in 1 lot : 16)
③ Operational hours per day
④ Operational days per year

b. Scale computation

On the basis of the above conditions, the requisite printing capability is determined in line with the following

$$\text{Required printing capacity} = \frac{①}{②\times③\times④}$$

c. Criteria

① Number of textbook pages required per year

On the basis of the Model Plan, this is set at maximum 1.29 billion pages.

② Number of printed sheets

Printing will be carried out in two stages. First 16 pages of textbook would be front-side printed. After ink drying, the same 16 pages would be back-side printed for a total of 32 pages of text material.

③ General operational hours

In light of the current fact that working hours in a printing facility in Yemen is 8 hours, this will be adopted as the standard labor framework under the project. Given the fact that (i) there is a 1 hour break during working hours, (ii) 30 minutes are required for PS change and pilot run, and (iii) 30 minutes are required for color adjustment and verification; actual print working time is 6 hours per employee.

④ Operational days per year

Operational days are envisioned at 280 per year given factors of (i) 17 national holidays, (ii) 54 weekday holidays (Fridays) and (iii) approximately 14 days due to shutdown for maintenance.

d. Facility scale calculation

Based on the above criteria, the printing volume at the envisioned facility is as follows:

$$\frac{1{,}290{,}000{,}000 \text{ pages}}{16 \text{ pages}\times 6 \text{ hours / day}\times 280 \text{ days}}$$

$$= 47{,}991 \text{ sheets / hour}$$

At present, the maximum speed of a sheet offset printing press is around 13,000~15,000 sheets per hour as shown in the equipment catalog. Nevertheless, this speed depends on a range of variables related to both paper and ink characteristics. Specifically with regard to paper these would be paper body, strength, surface resilience, and ink compatibility. In terms of ink, this would apply to stability, cohesiveness, fineness, and transparency. In the case of Japan, printing tends to be small amounts over a broad range of categories, thereby mandating a focus on stable printing quality. Printing speed is thus under 50% the maximum productivity. In the case of textbook printing, however, continuous equipment operation is possible making an effective operational speed of 60~70% feasible. Given these criteria, ideal maximum printing volume is 13,000 sheets per hour. However, effective printing speed under the Project is computed at 65% of this: or the equivalent of 8,450 sheets per hour.

e. Number of printing presses

The number of printing presses to output the volume deemed feasible on the basis of the above criteria is computed as:

47,991sheets/hr÷8,450sheets/hr＝5.679 units

f. Work hours

The above computed number of printing presses assumes a worker hour period of overall 8 hours (effectively 6 hours). However, in light of the current local practice of 3 working shifts in printing facilities, this method will be also applied in computing the equipment for this Project. In case, the number of printing equipment required becomes 1.893 units. In consequence, two printing presses would be considered appropriate under the Project.

3） Paper Folding section

Required production scale at the Mukalla Printing Center is envisioned at 47,991 sheets per hour. Computed in terms of duplex printing, this would be a capability of 47,991÷2＝23,996 per hour. In light of the folding machine capacity of 4,000 sheets per hour, required capacity is 23,996÷（4,000×3）＝1.999 units; equivalent to two units of equipment used in three operational shifts.

Due to the shortage of paper changing time, the continuous feeder will be adopted for the machine.

4） Book making and Binding section

Under the Model Plan, book binding at the Mukalla Printing Plant would be 11.76 million books per year. In terms of required per hour production, this would equate to 11,760,000÷（280 days ×18 hours）＝2,333 books per hour. In light of the fact that the required binding per machine would be 3000 books per hour, procurement under the Project will be 1 binding machine, tuning to the printing and paper folding machine.

(10) Procurement and construction plan

1） Equipment procurement plan

① Prepress section

The computer setup in the Prepress section carries out sheet layout and PS plate making, after some corrections and serial number editing necessary, based on the CD distributed by ERDC. With the exception of English language courses, all textbooks will be in Arabic mandating that the OS and keyboard for supplied computer equipment shall be available in Arabic mode.

② Printing, Book making and binding section

Printing equipment operation will require periodic component replacement and procurement of consumables. At present, the only printing equipment agent in Yemen is that of the German firm Heidelberg. Nevertheless, even this firm does not have a system of parts and consumables stock for replacement. In most cases it brings in order basis for needed items by either air or ship. This agent also supports such needs for book making and binding section, in this manner. Accordingly, given requirements for usual maintenance as well as emergency repair, availability of a technical support agent in neighbor countries or in Europe shall be principal.

2-2-2 Basic Plan

(1) Plan for selection of planned equipment

Equipment to be selected under the Project deemed appropriate for their operation and management, which has been assessed in terms of GCSPP's technologies and experiences. Therefore, with regard to study of the requested equipment, the points of note in Table 2-23 were applied, as criteria for evaluating purpose, function, specifications, etc, in line with the discussion with GCSPP, and the relevant people, engineers of each printing plant, basing on the original requested equipment list. In addition, equipment selection reflects study of conditions at similar, relevant facilities.

Table 2-23 Points of note in equipment selection

① Essential to textbook printing.
② Will contribute to increased textbook production.
③ Will not require special technologies, huge number of engineers and/or technicians, or Operation and maintenance costs, comparing to the setup level of existing printing facilities.
④ Will not require excessive foundation works or structure.
⑤ Operation and maintenance requires no excessive technical expertise or funding outlay.

(2) Study on requested equipment

Concerning the requested equipment under the Project, the role and function and present situation of printing facilities have been studied. The conclusion of this, with regard to necessity, appropriateness of the equipment is as set out below.

1) Equipment for Prepress section

The following process is essential in carrying out prepress works necessary for textbook printing, based on CD housed manuscripts created by ERDC. The Prepress process and requisite equipment are indicated in Figure 2-6.

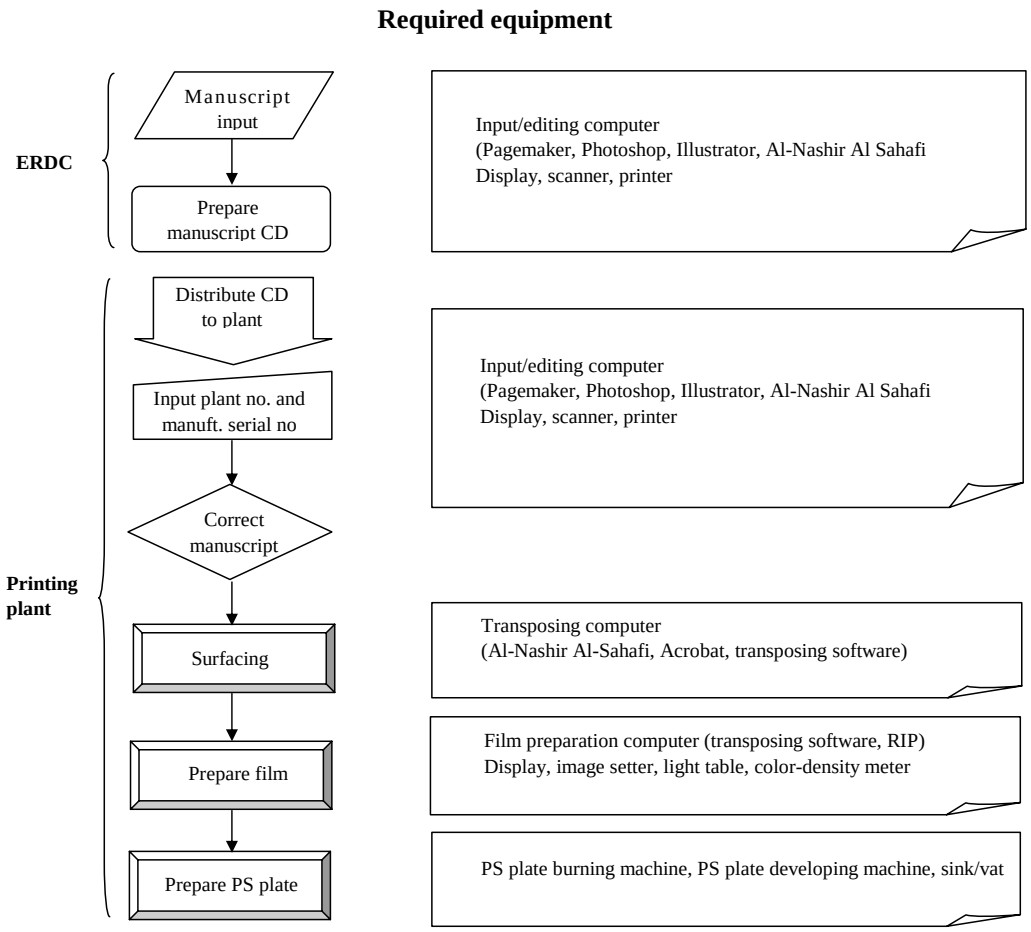


Figure 2-6 Prepress Section and Requisite Equipment

① Computer for Input and editing

Ten units of input and editing computer have been requested. Six of these were planned to be deployed to the textbook manuscript preparing department within ERDC. At ERDC, textbook manuscripts prepared by the commissioned authors are input to the computers for desktop publishing as one integrated volume, including insertion of required pictures and illustrations. A hardcopy printout of the textbook as well as the data saved on a CD are delivered to GCSPP which then distributes the materials to the appropriate printing plant.

Data input is carried out in three shifts. Ample time is thus taken for input works, and there is no observed “harrying” pressure imposed on staff. At this point, rather, the salient issue is one of upgrading data input staff skills at ERDC rather than providing a large amount of additional equipment. Accordingly under the Project, one unit of input and editing computer is to be provided to ERDC, via GCSPP, with the aim of realizing a layout that reduces the number of physical pages per textbook.

After input, the data-housing CD will be delivered to the new Mukalla Printing Plant where plant manufacturing number will be added to the data and any necessary manuscript corrections made. Following this, film and PS plate will be prepared. Under the Project, the minimally appropriate equipment will be provided to enable this process. Given the fact that Apple computers (MAC) are used at ERDC to prepare textbook manuscripts, Apple computers (MAC) will be supplied under the Project in the interest of compatibility of CD-stored data..

・Computer for Editing

Textbook manuscripts prepared by the commissioned authors are input at ERDC, with images and pictures added were necessary using editing software. The end result is a finalized textbook volume. The finalized volume is then printed out in hard copy and the data saved to CD. Both of these materials are then forwarded to GCSPP which subsequently passes this on to the designated printing plant. At the Mukalla Printing Plant, plant symbol and manufacturer's serial number are added and any necessary manuscript corrections effected based on the CD received from GCSPP. On this basis film and PS plate are then prepared. Given the parameters of this operation, one editing computer each is to be supplied under the Project to ERDC, via GCSPP, and the Mukalla Printing Plant.

・Computer for Imposition

One unit of computer is to be supplied under the Project with the aim of enhancing film precision. This will serve to eliminate the misalignment as a result of manual transposing of small film on to large-size film.

・Computer for Image setter

This computer print transposed data onto the film. The equipment is essential to the film preparation process, and one unit will accordingly be supplied under the Project.

② High resolution scanner

Based on the previously discussed CD prepared at ERDC, the textbook manuscript is then corrected if necessary and the printing plant symbol and manufacturer's serial number are added to the data. Since it is assumed that a high resolution scanner will not be required to accomplish this, a 2,400 dpi resolution A-4 size scanner as has been requested in another article will be supplied under the Project. This scanner will comprise peripheral equipment to be provided in one lot with the Computer for input and editing.

③ Image setter

Based on the data generated during the page make up process, it is necessary to prepare film for PS plate printing. This piece of equipment takes the data output from the editing computer, develops and positions the film. Since this equipment is essential to PS plate preparation, one unit is to be supplied under the Project.

④ RIP (Raster Image Processor)

The manuscript prepared at the input and editing computer comprises data (imaging) equivalent to 16 pages per single-side sheet of film. For actual printing, imaging needs to be color-separated (CMYK) on halftone dotted form. The RIP (Raster Image Processor) is a type of driver software that color-separates and halftone-dots image data. Accordingly, this software under the Project will not be categorized as a separate item but rather will be included under the category of software for computer.

⑤ Plate Processor

Using the film prepared from the CD data, PS plate is printed to be put on the printing machine later on. This processing equipment is essential in light of the need to develop and position film in the course of PS plate preparation. In light of the number of film sheets to be produced, one unit of Plate processor is to be supplied under the Project.

⑥ Sink and vat

There are times where partial PS plate correction is necessary. Accomplishing this by repeating the entire PS plate preparation process can be extremely wasteful in terms of time and resources. Accordingly, one unit of sink and vat is to be provided under the Project to enable manual developing and positioning in response to sudden and minor correction requirements.

⑦ Light table

Prior to PS plate creation, it is necessary to carefully inspect the prepared film. The light table comprises a glass top underlain with fluorescent illumination enabling a close check of readied film, which is indispensable procedure. Because there is a 10 to 20 minute time margin under the film preparation process, one unit of light table is deemed sufficient under the Project.

⑧ PS Plate Vacuum Printer

This equipment is essential for print the film content to the PS plate, which is also indispensable process. Accordingly, one unit will be supplied under the Project, coordinating with the film preparation process.

⑨ Densitometer

Film prepared from the computer output (textbook manuscript), is printed to the PS plate. The PS plate is then set in the printing press. In the case of color printing, four colors corresponding to CMYK (C: cyan, M: magenta, Y: yellow, B: black) are needed. This requires the creation of 4 sheets of film and four PS plates. Final print quality hinges on the efficacy of this film and PS plate preparation. Because failure anywhere along this process necessitates recreation of the film all over again, the printing work is consequently suspended with a resultant major impact on productivity.

Furthermore, offset printing is performed with a roughly 1 μm coating on the body paper. In the case of an excessively thin coating, print luminescence is poor and conversely paper impurities become more apparent. On the other hand, if the coating is excessively thick, printed images are overly dark with subsequent significant ink wastage. Therefore, the setting of color coating thickness is one of the most important jobs. Since precisely measuring this is difficult, conventionally, a control strip (printed in the margin of the proofed material to assess ink density and halftone dot pitch) is printed to gauge color density and provide a criterion for adjusting ink supply volume.

At present, neither the Sana'a nor the Aden printing plants are equipped to control this offset print coating. Film preparation, Plate processing and actual printing are performed on the basis of long-time worker “feel” by experience. A problem emerges here, however, in the fact that inappropriate film is sometimes created, which in turn is compensated for by injecting an excessive ink volume. Accordingly, a color density meter will be supplied under the Project to upgrade printing efficiency and reduce ink consumption.

A Transparency type, as well as a Reflect type densitometers will be supplied under the Project for confirming film quality and printed materials quality. This will enable a shift from worker “feel” to a numerical means of verifying work output.

2) Printing equipment

① Printing press

Under the printing press category, one unit each of a four-color sheet offset press, a two-color sheet offset duplexing press, a small two-color sheet offset press and a monochrome sheet offset press are requested.

It was subsequently identified under the Model Plan that although four-color printing capacity is presently lacking, monochrome and two-color printing can be adequately handled by existing facilities. Accordingly, only the four-color sheet offset printing press will be supplied under the Project.

In the case of its existing sheet offset presses, 720×1020 mm base paper are used, which GCSPP purchase in bulk by tendering. Changing the paper size may cause some problems for the efficiency of inventory management and cost effectiveness. Accordingly this same base paper size will be adopted as well for the printing presses to be supplied under the Project. On the basis of the previously discussed calculation, two units of printing press will be supplied under the Project.

② Plate puncher

When attaching the PS plate for offset printing on to the printing machine, positioning is extremely important. Misalignment will degrade color tone and color vibrancy of the printed product. To prevent this, it is necessary that the respective PS plates for each color (CMYK) be pre-punched with holes in precisely the same locations. The Plate puncher performs this function and will be procured as one set with the printing presses from the same manufacturer, given the fact that hole location and shape vary depending on the equipment manufacturer.

③ Color viewer

Close scrutiny using a standard light source (5,000K) is required when verifying the quality of completed printing. The color viewer serves this function. Nevertheless, currently available multi-color printing presses have come to include a viewer as a standard accessory attached to the ink-key adjustment console. Accordingly, this equipment need not be separately supplied under the Project.

3) Paper processing equipment

Paper processing comprises base paper cutting, as well as paper folding after printing in preparation for binding.

① Guillotine Cutter

Erratic dimensions of base paper has been a major cause of paper feed jamming at the printing presses operated by GCSPP. Furthermore, paper corner precision has a major impact on product quality in the case of follow-up printing (flipping printed sheets over and performing back-side printing in the case of a one-side printing press). A cutting machine is generally used to address these issues, and will accordingly be supplied under the Project. Cuttable length will be compatible with the above described base paper size. Capacity of the cutting machine is 5,000 sheets per single cut, with several minutes being required for each cut. Because this capacity far exceeds the printing speed of the two presses combined, one unit of cutting machine is deemed sufficient under the Project.

② Folding machine

With the current base paper size (720×1020 mm) used, 16 pages worth of printing can be accommodated by one base paper side. The total in the case of duplex printing is thus 32 pages per sheet of base paper. The folding machine folds the printed manuscript after exiting the printing press, and is immediately downstream of the collating machine in terms of location in the production line. The folding machine folds the printed sheets to the textbook size, and two units will be supplied under the Project based on the above discussed calculation. The feeder will be adopted the continuous type.

4) Book making and Binding equipment

Under the book making and binding process, 32 pages worth of printed manuscript are collated in lots, stapled together and scroop subsequently glued to the spine. The three sides excluding the scroop are finish-cut to yield the final textbook product. Although independent equipment for independently performing each stage of the binding process (collating, stapling, gluing and cutting) is available on the market, an automatic binding system will be supplied under the Project that performs the entire process in production line format. This reflects the Project's primary goal of upgrading printing productivity given the serious shortage of textbooks in Yemen. The number of hoppers for collating is determined to accommodate the maximum number of pages planned for output at the Mukalla Printing Plant.

One complete unit of perfect binding line will be supplied under the Project, based on the previously described calculation. And as the maximum pages of the textbook printed in Mukalla printing center will be less than 432 pages, the quantity of the stage of the collating machine (gathering machine) will be 12.

The perfect binding line flow is shown in Figure 2-7.

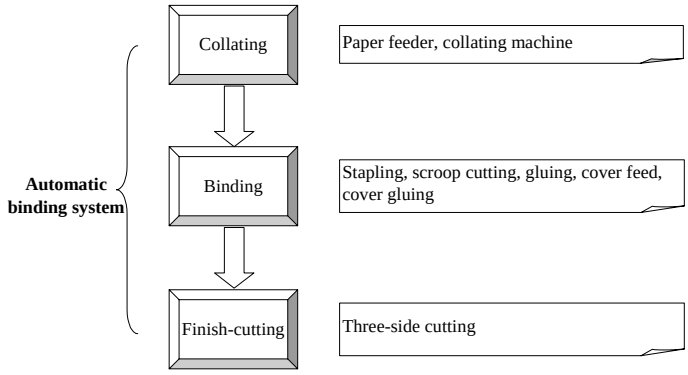


Figure 2-7 Perfect binding line flow

5) Knife Grinding machinery

① Knife Grinder

Cutting blades installed in Guillotine Cutter and bookbinding line quickly incur damage from cutting paper stock and need to be periodically ground. The size of blades used in cutting machines is 115cm or more in order to cut the paper stock. Consequently, for this project, a grinding machine of a size that is capable of grinding cutting blades for cutting machines must be installed. The required quantity should be the same as the number of cutting machines, which is one.

6) Packing machinery

① Paper Jogging machine

Where paper stock is cut by cutting machines, in order to facilitate operability, it is bundled to a height of 10 to 15cm and cut. This machine stacks paper on an inclined table and aligns the paper by imparting vibration, and is indispensable prior to cutting. The required number should be the same as the number of cutting machines, which is one.

② Air table

Stacks of aligned paper can be quite heavy, and moving them to the cutting machine is heavy work. This machine discharges compressed air and uses that power to save the labor involved in moving the paper. The required number should be the same as the number of cutting machines, which is one.

③ Tying machine

The bound textbooks are bound together in 20 to 40 groups and stored in a warehouse. This machine is installed immediately after the bookbinding machine and is used for the purpose of binding these bundles, therefore the same number (1) as that of the bookbinding machine is installed.

7) Maintenance tools

① Tools

Mechanical maintenance of all machinery related to the printing presses both before and after operation is indispensable, and by performing this correctly, the printing speed and accuracy of machinery can be maintained. Consequently, general repair tools (screwdrivers, spanners, closed wrenches, hexagonal wrenches, torque wrenches, box wrenches, hammers, plastic hammers, grease guns, etc.) and electrical inspection equipment (testers, clamp meters, etc.) must be provided.

8) Automatic voltage regulators

Electrical power supply stabilizing devices for computers for editing and input, printers, etc. The power supply at the planned site is nominally single phase 230V±10%, but fluctuations in the power supply are large, and at night in particular the power consumption of individual homes is high, causing large voltage reductions. Consequently, in order to prevent damage to input/editing computers and loss of input data, a UPS with in-built AVR should be provided. Since the computers will be located in a number of different places, there should be one UPS for each computer.

9) Handling and delivery section

① Forklift

For use in interior operations such as transporting to the warehouse paper stock that has been delivered by truck, and moving goods (textbooks), a minimum of one electric forklift is required.

② Hand pallet trucks

Used for moving paper stock that has been cut by the cutting machine to the printing presses, moving the paper after printing, etc. Since it is necessary to move paper in the narrow spaces around cutting machines and printing presses, compact hydraulic manual type trucks should be provided. One truck each should be provided at the paper supply end and the paper output end of the printing presses, therefore a total of four trucks are required.

③ Air-conditioning

One of the atmospheric conditions for operating printing presses is that humidity be kept constant to prevent deformation of the paper stock due to moisture absorption and reduce emergency printing press stoppages. However, since the machinery prepared for this project will be installed in a printing plant built at the cost of the Government of Yemen, air-conditioners should be considered part of the facilities. Consequently, they are outside the scope of contributions.

④ Office Supplies

The contents of the request from the Yemeni government include furniture such as desks, chairs, etc. Since it has been judged that these would originally be provided by the Yemeni side, they are outside the scope of cooperation.

⑤ 8 ton trucks

In producing textbooks, GCSPP makes a contract with the Ministry of Education and produces the textbooks according to the conditions of that contract. Transport of the finished products is also included in the contract, GCSPP is responsible for transporting the textbooks to education ministries of each governorate. Consequently, for the purpose of transporting the textbooks, three 8 ton trucks, for each of routes 2, 3 and 4, Route 5, and Route 6, will be supplied.

⑥ 2 ton trucks

One truck will be supplied for transport from Hadhramout governorate to Al-Mahara governorate (Route 1).

10) Training

Many machines that operate in the field of printing are precision machines and require reliable maintenance, therefore sufficient training will be necessary when this equipment is delivered under the Project. Consequently, a sufficient amount of time must be set for operation and maintenance instruction after equipment installation, and this must be reflected in the project cost estimation. This item will accordingly be deleted from the equipment request itself.

The results of the study of the above requested equipment are shown in Table 2-24.

Table 2-24 Study on requested equipment

Requested equipment					Equipment selection		Planned equipment		
Item No.	Equipment name	Q'ty	GCSPP's Priority		Yes/ No	The reason for Yes/No	Item No.	Equipment Name	Q'ty
1. Pre Press Section							1. Pre Press Section		
1-1	Publishing Set	10 set	A		○	Quantity change （－）	1-1	Computer for Input and Editing	
							1-1-1	Computer for ERDC	1 set
							1-1-2	Computer for Editing	1 set
							1-1-3	Computer for Imposition	1 set
							1-1-4	Computer for Image Setter	1 set
1-2a	High quality Scanner	1 unit	A		×	Deleted due to inconsistency with needs in Prepress section			
1-2b	Scanner	1 unit	C		○	To be comprised in the Publishing computer.			
1-3	Image Setter	2 set	A		○		1-2	Image Setter	1 unit
1-4	RIP (Raster Image Processor)	2 set	A		○	To be comprised in the Image setter.			
1-5	Plate Processor	2 unit	A		○	Quantity change （－）	1-3	Plate processor	1 unit
1-6	Sink & Vat	2 set	A		○	Quantity change （－）	1-4	Sink and Vat	1 set
1-7	Light Table	3 units	A		○	Quantity change （－）	1-5	Light Table	1 unit
1-8	PS Plate Vacuum Printer	2 units	A		○	Quantity change （－）	1-6	PS Plate Vacuum Printer	1 unit
1-9	Densitometer	3 units	B		○	Quantity change (Transmission type, Color reflection type, 1 unit each）	1-7	Densitometer	1 unit each
2. Printing Section							2. Printing Section		
2-1	Sheet Offset Press 4-Color	1 units	A		○	Quantity change （＋）	2-1	Sheet Offset Press 4-Color	2 units
2-2a	Sheet Offset Press 2-Color both side	1 unit	A		×	Deleted due to inconsistency with printing needs			
2-2b	Sheet Offset Press 2-Color, small size	1 unit	B		×	Deleted due to inconsistency with printing needs			
2-3	Offset Press 1-Color	1 unit	C		×	Deleted due to inconsistency with printing needs			
2-4	Plate Puncher	4 units	A		×	To be included in item 2-1, as plate preparation tool			
2-5	Color Viewer	3 units	A		×	To be included in item 2-1, as color control console			
3. Book Making Section							3. Book Making Section		
3-1	Guillotine Cutter	2 units	A		○	Quantity change （－）	3-1	Guillotine Cutter	1 unit
3-2	Paper Folding Machine	4 units	A		○	Quantity change （－）	3-2	Paper Folding Machine	2 units
4. Binding Section							4. Binding Section		
4-1	Perfect Binding Line	1 unit	A		○		4-1	Perfect Binding Line	1 set
5. Knife Grinder Section							5. Knife Grinder Section		
5-1	Knife Grinder	1 unit	A		○		5-1	Knife Grinder	1 unit
6. Packing Section							6. Packing Section		
6-1	Paper Jogging Machine	2 units	A		○	Quantity change （－）	6-1	Paper Jogging Machine	1 unit
6-2	Air Table	2 units	A		○	Quantity change （－）	6-2	Air Table	1 unit
6-3	Tying Machine	2 units	A		○	Quantity change （－）	6-3	Tying Machine	1 unit
7. Maintenance tools							7. Maintenance tools		
		1 unit	A		○	Detailed as Maintenance tool set	7-1	Maintenance Tool	1 set
8. Automatic Voltage Regulator									
		1 set	A		○	To be included in item 1-1			
9. Handling and delivery section							9. Handling and delivery section		
9-1	Folk Lift, 2 tons	1 unit	A		○		8-1	Folk Lift	1 unit
9-2	Manual Lifter	4 units	A		○		8-2	Hand Pallet Truck	4 units
9-3	Air Conditionner	1 set	C		×	To be installed by the recipient country			
9-4	Office Equipment	1 set	C		×	To be installed by the recipient country			
9-5a	Track 8 tons	6 units	A		○	Quantity change （－）	8-3	Track 8 tons	3 units
9-5b	Track 2 tons	2 units	A		○	Quantity change （－）	8-4	Track 2 tons	1 units
10. Trainings									
10-1	Training for maintenance work of Pre Press section	1 set	A		×	To be provided after setting up of equipment by the manufacturers' engineers and/or in the concept of Software component.			
10-2	Training for maintenance work of Printing Section	1 set	A		×				
10-3	Training for maintenance work of Binding Section	1 set	A		×				

(3) Overall Plan

The equipment to be supplied under the Project will be installed in a printing plant that will be commissioned and paid for by the Government of Yemen. The construction site will be in Mukalla, approximately 540km east of the capital of Sana'a, and the Mukalla Printing House is situated 12km west of the city center, approximately 500m from the coast. The geology of the site is a mixture of gravel and sand, and the bearing capacity of the ground is 15 to 20 tons/m², so there will be no problems involved in building the envisioned printing plant structure. Also, this location is within an urban area, so it has been judged that there will be no electrical supply, water supply or drainage problems. Although the site of the printing plant may change in shape, the total surface area is 14,000m² and it has been ensured that the site will present no problems for construction.

(4) Equipment Plan

The names, main specifications, and quantities of equipment selected based on the "Selection plan" and study on "Requested equipment" are shown in Table 2-25.

Table 2-25 Equipment plan

Item No.	Equipment Name	Specification	Q'ty
1. Pre-Press Section			
1-1	Input・Editing Computer		
1-1-1	Computer for ERDC	Mac G5、OS X、CPU：1.5 GHz、Memory：1GB、HD：80GB、17" Color monitor Software： Photoshop、Illustrator、PageMaker、Al-Nashir Al-Sahafi Color laser printer：A4、Resolution：600dpi Scanner：A4、Resolution：3,200dpi UPS：1,500W	1 set
1-1-2	Computer for Editing	Mac G5、OS X、CPU：1.5 GHz、Memory：1GB、HD：80GB、17" Color monitor Software： Photoshop、Illustrator、PageMaker、Al-Nashir Al-Sahafi Color laser printer：A4、Resolution：600dpi Scanner：A4、Resolution：3,200dpi UPS：1,500W	1 set
1-1-3	Computer for Imposition	Mac G5、OS X、CPU：1.5 GHz、Memory：1GB、HD：80GB、17" Color monitor Software：Impostrip、Acrobat UPS：1,500W	1 set
1-1-4	Computer for Image Setter	Mac G5、OS X、CPU：1.5 GHz、Memory：1GB、HD：80GB、17" Color monitor Software：RIP UPS：1,500W	1 set
1-2	Image Setter	Laser type、Media size：Width 700 ㎜、Film thickness：0.1mm、Resolution：3,000dpi	1 set
1-3	Plate Processor	Speed：1m/min、Plate size：80cm、Positive	1 set
1-4	Sink and Vat	Max. Film size：800mm×1,000mm	1 set
1-5	Light Table	Transparency table、Size：950×700mm、Light source：fluorescent light	1unit

	1-6	PS Plate Vacuum Printer	Effective area：850×1,000mm	1unit
	1-7	Densitometer	Film（Transparency type、Dot %：0～100%、Density：0.00～6.00D） Print（Reflect type、Dot area：0～100%、Density：0.00～2.50D）	1set
2. Printing Section				
	2-1	Sheet Offset Press 4-Color	Printing Type：Offset、Color：4、Paper size：720×1,020mm、Speed：13,000～15,000s/hr、Control Console、Plate puncher	2sets
3. Book Making Section				
	3-1	Guillotine Cutter	Cutting width：1150 ㎜、Clump height：150 ㎜、Computer control	1unit
	3-2	Paper Folding Machine	Knife and Buckle Type、32pages folding、Paper size：700×1,000mm	2units
4. Binding Section				
	4-1	Perfect Binding Line	Composition：Gathering machine、Book binding、Three side trim Gathering machine：Paper size：A4、Speed：5,000 sets/hr Stretching by wire : 2 places Book binding：Cover page paste、Clump：20mm、Speed：3,000 book/hr Three side trim：Trim size：260×300mm、Trim thickness：30mm、Speed：2,500 stroke/hr	1set
5. Knife Grinder Section				
	5-1	Knife Grinder	Grinding length：1,500 ㎜、Traveling speed：5～10m/min、In feed amount：0.01～0.1mm	1unit
6. Packing Section				
	6-1	Paper Jogging Machine	Table size：800×1,000mm、Paper height：150mm、Releasing air	1unit
	6-2	Air Table	Table size：720×1,000mm、Table height：800～950mm、Air blower type	1unit
	6-3	Tying Machine	Tape size：12mm、Tape material：PP、Binding method：Heater、Packing size：450×600mm、Speed：1.5 s/time	1unit
7. Maintenance Tools				
	7-1	Maintenance Tool	Mechanical tool：Driver、Spanner、Wrench、Hexagon wrench、Box wrench、Hammer、Plastic hammer、Grease gun Electrical tool：Multi meter、Clump meter	1set
8. Handling and Delivery Section				
	8-1	Folk Lift	Battery drive、Capacity：1.75 tons、Charger	1 unit
	8-2	Hand Pallet Truck	Capacity：1 ton、Hydraulic	4 units
	8-3	Truck 8 tons	Fuel：Diesel、Left steering、Cargo：Aluminum	3 units
	8-4	Truck 2 tons	Fuel：Diesel、Left steering、Cargo：Aluminum or Steel	1 unit

2-2-3 Basic design drawing

(1) Design layout of the Mukalla Printing Plant

Some of the printing presses, related equipment and materials setup under the Project require special installation works. Therefore, the layout of the machines and equipment must focus on upgrading printing productivity, by considering the textbook production that is the primary goal of the Project.

Figure 2-8 indicates a basic plan for the layout of machines and equipment slated for installation in the new printing plant that is to be constructed at the responsibility of the Yemeni side under the Project.

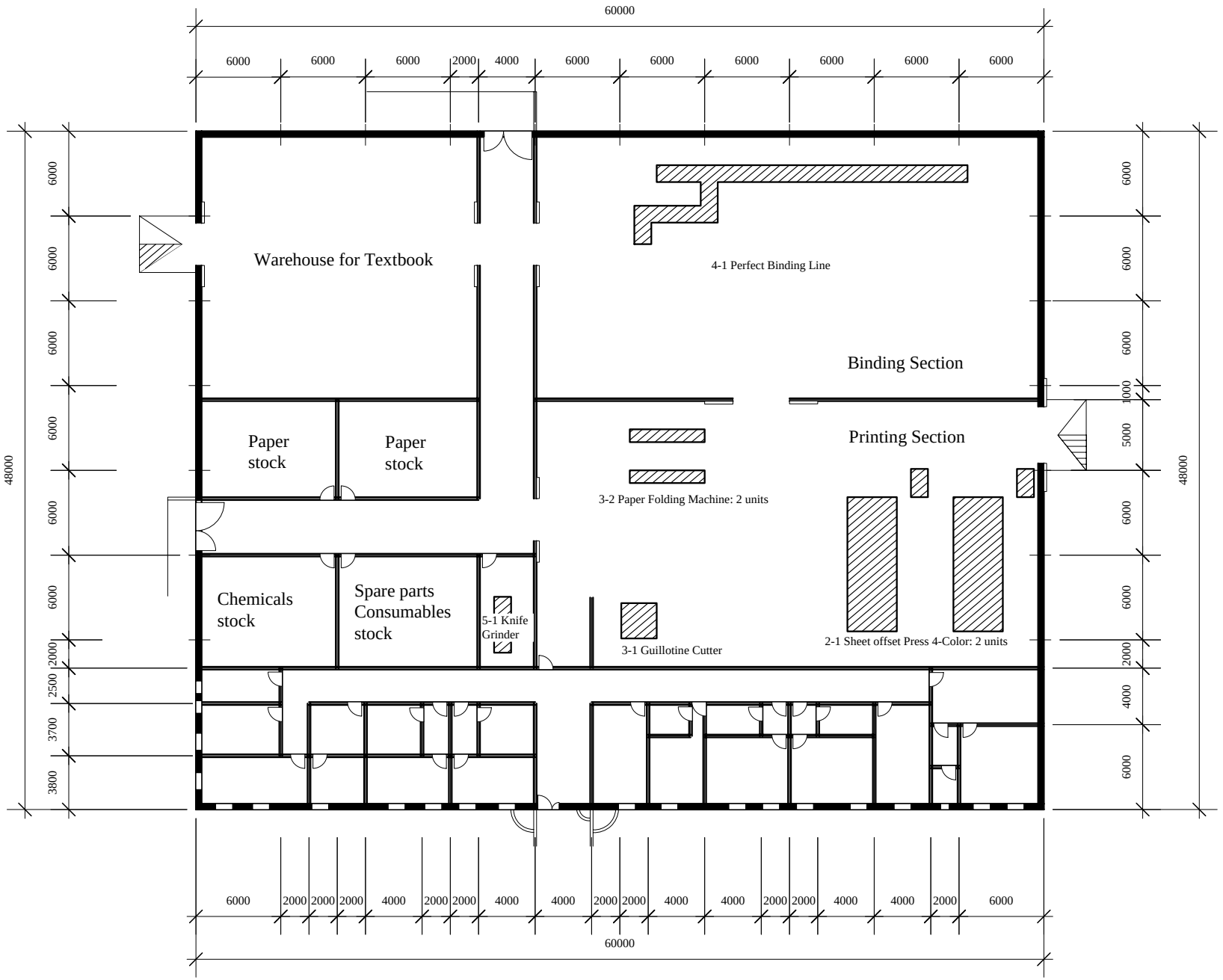


Figure 2-8 Mukalla Printing Plant equipment layout design drawing

Republic of Yemen The Project for Supply for School Textbook Printing Equipment	S = 1:400	Mukalla Printing Plant Layout Plan 1st floor

2-2-4 Implementation Plan

2-2-4-1 Implementation policy

(1) Funding for implementation of the Project is being provided under Grant Aid from the Japanese government. Accordingly, throughout the course of its implementation of the Project it is hoped that all parties involved, including the Implementing in Yemen, the consulting firm commissioned by the Japanese government (herein after referred to as “the Consultant”) and the equipment supplier in Japan (herein after referred to as “the Contractor”) responsible for supplying and installing the pertinent printing-related machinery and equipment engage in full exchange of opinion with the aim of maintaining a close and amicable relationship so as to ensure that implementation of the Project proceeds smoothly as a Japanese Grant Aid program.

(2) In order to facilitate ongoing maintenance that will be carried out by the Yemeni side after the Project has been implemented, Japanese products having sales offices or dealerships in countries neighboring Yemen shall be used to supply printing-related equipment and materials. Also, as Arabic will be used as the main language for computer data input and editing, computer equipment with Arabic language data input and editing capabilities shall be obtained locally.

(3) The scope of responsibility of the parties for utilities including power supply, water supply, etc. should be clarified to ensure smooth and efficient installation.

(4) Responsible efforts should be made to prevent theft or accidents from occurring in relation to the printing presses, related equipment and materials, etc., during temporary storage before installation, on delivery, or while performing installation and setup work.

(5) Arrangements are to be made to have engineers dispatched from Japan for installation and setup work performed under the Project. These personnel will be specialists in prepress, printing-press operation and printing production management.

(6) Technicians and workers required for installation of the machines and equipment shall be hired locally.

2-2-4-2 Implementation conditions

(1) In implementing the Project, progress on the construction work for the Mukalla Printing Plant, which is to be carried out under the responsibility of the Yemeni government, is to be carefully monitored so as to ensure smooth implementation of the Project.

(2) As the printing presses to be used under the Project will operate at high speeds, a strong, durable foundation will be required for printing press installation. Accordingly, after the Contractor are selected, the pertinent technical aspects of installation scope and schedule should be discussed fully among the Implementing Agency on the Yemeni side, the Consultant and the Contractor, so that the necessary foundation work can be accomplished, well before the arrival of the equipment to the installation site.

2-2-4-3 Scope of works

The work processes required in implementing the Project are divided into those to be undertaken at the responsibility of the Japanese side and those to be performed at the responsibility of the Yemeni side as shown in Table 2-26.

Table 2-26 Allocation of work responsibilities

No.	Item	Responsibility of the Japanese side	Responsibility of the Yemeni side
1	Ground leveling at the site, construction of roads inside the premises, installation of sound-proof walls		○
2	Construction of the printing plant building, installation of utilities, construction of foundations for machines and equipment installed inside the plant.		○
3	Installation of furniture required inside the plant		○
4	Supply of materials related to the printing of textbooks.	○	
5	Commission fees to the Japanese banks		
	Advisory commission fees for A/P		○
	Payment handling fees		○
6	Unloading, custom clearance procedures and inland transportation of printing presses, related equipment and materials		
	Transportation of printing presses, related equipment and materials, etc., from Japan to Yemen by air cargo or vessel.	○	
	Obtaining tax exemption and customs clearance at port of unloading.		○
	Inland transportation from the port of unloading to the Project site.	○	
7	According Japanese staff with proper immigration papers and conveniences to facilitate their stay in Yemen.		○
8	Ensuring the proper use of printing presses, related equipment and materials, etc., provided under the Grant Aid program.		○
9	Bearing of expenses incurred in relation to the Project for additional items not covered by the grant.		○

2-2-4-4 Consultant supervision

The basic policy for supervision of implementation, and important points to note in relation to implementation of the Project are described below.

In order to ensure smooth delivery and installation of the printing presses, related equipment and materials, the Consultant needs to discuss and iron out details accurately with GCSPP, which is the Implementing Agency for the Project. Particularly, in relation to installation of equipment, the construction work under the responsibility of the Yemeni government, the foundation and utility setting work needs to be completed before the delivery of the equipment. For this reason, progress on the construction work should be continuously checked between both parties. Furthermore, it is anticipated that public utilities including electricity, water supply, drainage facilities, etc. used for construction work by the Yemeni side will also be available to the Japanese side for installation of printing presses and related equipment. Thus, the schedules, work details, capacities, etc., for the construction work need to be discussed between the pertinent parties beforehand to ensure that proper coordination is in place to ensure smooth implementation of the construction work.

2-2-4-5 Quality control plan

The printing presses, related equipment and materials, etc., procured under the Project must be products actually produced (not subcontracted out) by the selected manufacturer. They must also be products that are readily available on the market and must be free of quality-related problems.

2-2-4-6 Procurement plan

(1) Procurement of equipment

Almost all equipment and materials to be supplied under the Project will be procured offshore. Most of this procurement will be from Japan or a third party country. Procurement of spare parts and consumables in particular is an important element in ensuring efficient use of printing presses, as is the speedy dispatch of service engineers to the site in cases when the printing presses malfunction or when emergency maintenance is required. For such reasons, printing presses, related equipment and materials should be procured from a maker (vendor) having sales offices or dealerships in countries neighboring Yemen in order to provide technical support and maintenance services in a timely manner whenever required.

(2) Spare parts and consumables

Once operation of the printing-press and related equipment begins under the Project, the ink rollers required for applying ink smoothly and evenly, blanket rollers for transferring ink between the sheets, impression rollers and other such parts will require replacement at some stage during use. However, these parts do not require frequent replacement and are replaced on the average once a year, even in the case of printing plants in Japan where the rate of equipment utilization is very high. For this reason, spare parts and consumables that require replacement infrequently during use of the printing presses and related equipment are excluded from the list of items required for supply under the Project. However, consumables such as developing solution, films, PS plates, ink and other items used in conjunction with on-the-job training in operating printing presses after they are installed are within the scope of items to be supplied in conjunction with the Project.

2-2-4-7 Soft component

Implementation of the soft component discussed below is expected to significantly enhance effective utilization of the equipment to be procured under the Project.

(1) Database driven Editing Department operations

Introduction of a database for storing and managing Editing Department data will reduce the number of textbook pages and number of textbook volumes by upgrading editing efficiency.

1) Currently at ERDC, illustrations to be inserted into textbooks are performed on a case-by-case basis by scanning requisite maps, photographs, etc. in line with instructions from the textbook author. Creation of map templates using Adobe Illustrator, etc. is not performed; and general know-how about readying illustration and photograph inserts appropriate for printing is low.
2) In addition to poor page transposing precision, printing operations by the Textbook Printing Corporation adopt a page layout where the block of text per page is small and conversely page margins are excessively large. This causes the number of pages per textbook to increase, and greatly aggravates the printing burden during textbook production.
3) Based on breaking apart, and then reassembling through cut-and-paste textbooks collected by the Study Team in Yemen, it was verified that an approximate 15% economy of page number per volume is possible in the case of textbooks for both the lower and upper grades. In other words, it was proven that a physical reduction in printing load is possible without any modifying whatsoever of either curricula or textbook content as currently implemented by the Yemeni Ministry of Education.

4) By reducing number of textbook pages, and hence textbook thickness, it then becomes possible to combine the currently separate first-term and second-term textbooks for a particular course into a single volume for the entire school year. This in turn will result in reduced book binding work volume.
5) At present, five staff are on assignment to ERDC from the Textbook Printing Corporation. By encouraging close collaboration between these persons and the ERDC editing staff in preparing manuals and a layout library database for textbook layout procedure in line with requirements for precision film and PS plate preparation, it is deemed possible to begin reducing the number of pages per textbook and the number of textbook volumes immediately after installing the equipment to be supplied under the Project.
6) Specific approach with regard to the above is indicated in the following box.

Minimum margin width, header and footer location and size, font size, paragraph width, etc. are to be determined on a subject-wise and grade-wise textbook basis, and embodied in a manual prepared in close collaboration between ERDC and the Textbook Printing Corporation. At the same time, standard textbook layouts are to be prepared. A search function is to be incorporated for finding desired layouts within the database layout library.

② Preparing standard layouts (including size, etc.) for illustration and photograph inserts.

③ Based on the layout library, a trial printing of textbook manuscript is to be carried out at the Mukalla Printing Plant to verify effect on reducing the number of textbook pages (trial printing is to be done for a minimum of one lower-grade textbook and one upper-grade textbook), and a CD prepared.

④ After procuring and installing the equipment under the Project, trial textbook page makeup, printing and binding is carried out to verify finished product quality.

⑤ Based on finished product quality check, modification of manuals and layout templates is carried out if necessary, and this data is then registered in database format within the computer equipment Project.

(2) Operation and maintenance; drafting manuals to upgrade work efficiency

1) Although staff at the Textbook Printing Corporation have adequate technical knowledge regarding individual items of printing equipment, detailed quality control is not being carried out at each respective stage of the printing process. As a result, there is a large amount of wasted paper space, excessive ink consumption due to improper equipment settings, wastage stemming from failures in the binding process, etc. It is thus necessary to instill technical staff with a deeper awareness of the need to minimize losses occurring at each and every stage of the total printing process.
2) Upon assessing current conditions, it is deemed necessary to revamp worker attitudes regarding defective products. Specifically, it is necessary to establish a work improvement team comprising foremen, senior electrical engineers and maintenance personnel from each section deployed at the Mukalla Printing Plant. This team would evolve troubleshooting methodology for resolving envisioned potential problems at all critical junctures along the printing line, and nurture a work environment that gives full play to the self-initiative of small quality control circles in tackling issues within their respective spheres of responsibility. The creation of such small quality control circles is seen as a highly effective QA/QC approach. Parallel to this, methodology is to be introduced for mathematically quantifying and statistically analyzing the overall printing and binding flow to upgrade operational efficiency.

3) By adopting the PDCA ("Plan Do Check Act") cycle within the work improvement team for addressing areas of operational upgrading, troubleshooting, etc., the present status of production is to be constantly monitored to maximize efficiency and minimize defective output.
4) Under the Project soft component, (i) QA/QC procedures are to be introduced, (ii) a pilot program for mathematically quantifying the overall printing process is to be carried out, (iii) a trial program of small quality control circles for troubleshooting is to be run, and (iv) one of the salient problem issues identified is to be selected for trial resolution under the "Act" segment of the PDCA cycle.
5) Under the "Act" segment of the pilot PDCA cycle, tools compatible with the Mukalla site environment (temperature, humidity, printing paper quality, textbook cover properties, etc.) are to be prepared for respective equipment items. With this as a basis, paper and book flow along the production line is to be adjusted to eliminate locations of jamming, etc. which are a source of defective product output. Specifically, creative trial measures above and beyond the content of the manufacturer's O&M manual are to be encouraged to minimize defective printing and binding. Procedures evolved as a result, including details of the PDCA process itself, are to be drafted into an instructional manual setting out O&M and operational improvement guidelines for both soft and hard components under the Project.
6) The above described soft component under the Project is aimed at imbuing the workers themselves at the envisioned Mukalla Printing Plant with awareness and self initiative towards carrying out proactive O&M and operational improvements regarding page setup, printing and binding equipment to be procured under the Project. This is anticipated to have a significant impact on effective equipment use in line with the requirements of the site environment, which in turn will serve to greatly reduce defective plant output.

2-2-4-8 Implementation schedule

In case the project is implemented under the Japanese Grant Aid program, after both countries sign an official Exchange of Notes, a contract needs to be concluded between the government of Yemen and the Consultant. Once the consultant agreement is verified by the Japanese government, the Consultant carries out Detailed design. Following this, the Implementing Agency and the Consultant prepare Tender documents, and the Tender itself for procurement and installation of relevant equipment, and subsequently evaluate the submitted tenders. After tender evaluation, the Implementing Agency then concludes contract(s) with the nominated Contractor(s) from which the pertinent equipment to be procured. Following this, after obtaining verification for the Contract from the Japanese government, procurement and installation of the equipment under the Project is implemented.

(1) Detailed design

Based on the Basic Design Report, the Consultant reviews the specifications for the pertinent printing presses, related equipment and materials, and studies the local construction site. Following this, the Consultant then assists the Implementing Agency in preparing the requisite tender documents. In regard to specifications for the planned equipment prepared at the time when the basic design was carried out, the Consultant confirms whether or not items meeting these specifications are still available on the market. The Consultant also investigates whether changes have occurred in the social situation in Yemen which may affect the Project. If necessary, equipment specifications are restudied. The time required for carrying out detailed design is expected to be approximately two months.

(2) Tendering

After completing Detailed design, the Consultant makes an on-site inspection of progress in the construction of the printing plant structure being implemented by the Implementing Agency. Once the progress of the construction work has been locally confirmed, the Consultant inserts an invitation-to-tender announcement in newspapers in Japan for the procurement and installation of the planned equipment under the Project. Tenders are subsequently opened with the attendance of all the relevant parties. The tendering process takes a period of approximately two months to complete.

(3) Procuring and installing printing presses, related equipment and materials

After signing a contract for procurement and installation of the pertinent equipment with the government of Yemen, the Contractor has to get the verification by the Japanese government on the above. After completing this procedure, the Contractor commences with the manufacturing, procurement, and installation of the specified equipment and materials in line with the terms of the contract. This process is expected to take approximately eight months.

Figure 2-9 below gives the overall project implementation schedule.

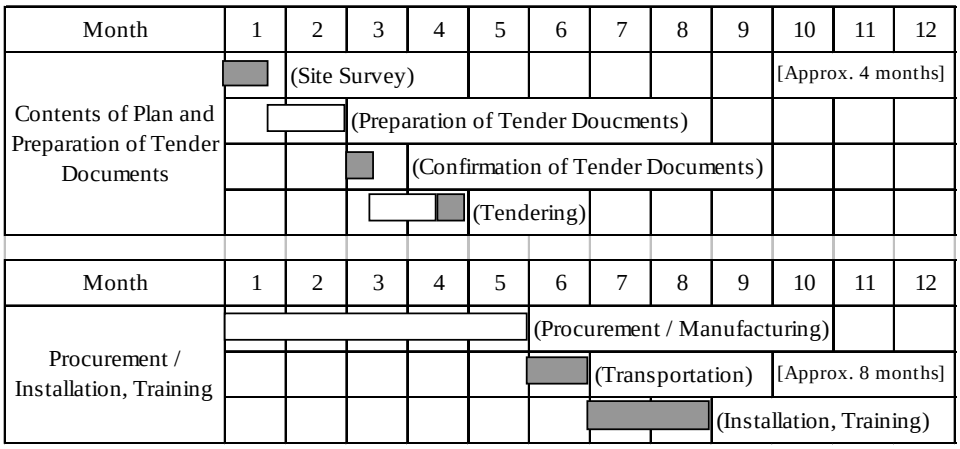


Figure 2-9 Project Implementation Schedule

2-3. Obligations of the Recipient Country

The following is a list of the work-related items to be carried out by the Yemeni side for implementation of the Project.

(1) Construction of the facility to house the pertinent printing presses, related equipment and materials to be installed, and construction of appurtenant facilities

The Project aims to procure and install planned equipment for the Mukalla printing plant to be built in Yemen. In accordance with this, responsibilities for construction of the printing facility to house the relevant equipment, as well as construction of requisite appurtenant facilities, are to be borne by the Yemeni government.

(2) Permits, authorizations and custom clearance procedures

Expenses required for obtaining requisite permits and authorizations, as well as documents for custom clearance for the planned equipment importing into Yemen are to be prepared by the Yemeni government.

(3) Procedures for obtaining tax exemption status

The appropriate procedures for obtaining exemption from taxes imposed on the planned equipment at the time of custom clearance shall be taken by the Yemeni government.

(4) Banking Arrangement

The standard banking arrangement followed by Japanese banks shall be adhered to in order to ensure timely issuance of Authorization to Pay during the implementation stage of the Project.

2-4. Project Operation Plan

Much of the personnel employed at the Sana'a and Aden printing plants owned by GCSPP have extensive experience in the Printing Production Department. Therefore, at the outset of the Project, factory managers, mechanics, electricians and warehouse supervisors with such experience should be selected from these facilities for appropriate transfer to the envisioned Mukalla Printing Plant. This staff would then work in close collaboration with the plant manager, who will be newly employed for the Mukalla Printing Plant, in planning an effective facility operation schedule.

Generally, personnel working at the new printing house should be able to gain an understanding of emergency measures to be taken in response to malfunction or problems that may occur during operation of the printing house within a period of approximately one year, Thus, all the personnel selected from other printing plants to help out at the Mukalla Printing Plant should be able to return to their original printing plant assignments after the first year of operation. Newly employed mechanics and electricians will mainly be responsible for operation and maintenance of printing presses and other printing equipment, and for making parts replacement and repair checks, etc. When new or replacement part procurement is required, procurement of such parts should be carried out under the direction of the plant manager.

2-5. Project Cost Estimation

2-5-1 Cost Estimation for the Project

The total cost estimation for the Project is 740 million yen. This cost estimation is provisional and would be further examined by the Government of Japan for the approval for the Grant. The breakdown of the cost to be borne by the recipient country and Japanese Government in accordance with the “Scope of works” as shown in Table 2-26. The cost estimation under the following cost calculation criteria is as follows;

(1) Cost estimation to be borne by Japanese Government

Cost estimation to be borne by Japanese Government is shown in Table 2-27.

Table 2-27 Cost estimation to be borne by Japanese Government

	Project Cost
(1) Equipment Cost	576 million yen
(2)D/D and S/V	34 million yen

* D/D means Detailed Design and S/V means Supervise by the Consultant.

(2) Cost estimation to be borne by the recipient country

1) Construction cost

Construction cost for the Mukalla Printing Plant: 190million Rials (approx. ¥129 million)

2) Miscellaneous

Bank commission: 857,000 Rials（Approx. ¥580,000）

3) Cost calculation criteria

- Date of estimate : May 2003
- Foreign currency exchange rate for estimate: US$1 = ¥120.32
  One (1) unit of local currency (Rial) ＝ ¥0.68
- Implementation period : Construction is to proceed as a one-phase operation.
  The periods required for the respective detailed design stage, procurement of relevant equipment is as indicated in the project implementation schedule.
- Other : The Project is to be implemented in line with the guidelines of the Grant Aid system by the Japanese government

2-5-1 Cost Estimation for the Operation and Maintenance

Table 2-28 below shows the annual operation and maintenance costs for printing presses, related equipment and materials slated for installation as part of the Project.

Table 2-28 Estimated annual costs for operation and maintenance of printing presses, related equipment and materials under the Project

Item	Electricity	Water	Fuel	Film	PS plate	Replacment of parts	Labor costs	Total (Rial)
Unit price	18 Rials/kw	59 Rials/m3	15 Rials/L.	5,000 Rials/ sheet	690 Rials/sheet	5,400,000 Rials/ replacement	26,000 Rials/ person	
Amount used	468,720 kw	100.8 m3	45,000 L.	1,300 sheets	1,300 sheets	Used only once	1,920 people	
Subtotal	8,436,960	5,947	675,000	6,500,000	897,000	5,400,000	49,920,000	71,834,907

According to the above table, annual operations and maintenance costs are approximately 72 million rials (approx. ¥49.0 million).

On the other hand, the budget shown in Table 2-29 is the estimated budget provided by the Textbook Printing Corporation for newly building the Mukalla Printing Plant structure. Under this plan, labor and O&M costs for running the plant are calculated at 103,980,491 rials (approx. ¥70.1 million)

The above amount corresponds to approximately 69.1% of the total cost required for operating the printing presses, related equipment and materials to be installed under the Project. It is evident from this that operation and maintenance costs required to keep printing presses, related equipment and materials running under the Project can be covered within the budget allocated for implementing the Project.

Table 2-29 Budget for operation of Mukalla Printing Plant (Draft)

	Item	Budget	Subtotal (Rial)
Salary/ maintenance costs	Salary	51,774,891	103,980,491
	Electricity	16,000,000	
	Fuel	9,518,400	
	Lubricant	1,267,200	
	Water supply	1,920,000	
	Consumables/tool purchasing expenses	20,000,000	
	Maintenance control	3,500,000	
General administrative costs	Office supply	800,000	9,620,000
	Advertising/PR	2,500,000	
	Training	2,500,000	
	Transportation	1,000,000	
	Clearning	320,000	
	Others	2,500,000	
		113,600,491	

Source : GCSPP

2-6. Other Relevant Issues for the Project Implementation

Almost equipment procured in the Project will be installed in the new building that is constructing at the Mukalla by GCSPP. The construction works will be terminated by August, 2004. The construction is on schedule at September, 2003. But the construction schedule shall be examined regularly for the smooth Project implementation.

Chapter 3. Project Evaluation and Recommendation

3-1 Project Effects

The implementation of the project is expected to produce the following benefits.

1) Direct benefits

- The text shortage without the Project is anticipated as maximum 11.7 million copies for each year from 2005 to 2015. Enough textbooks will be printed and supplied to cover this shortage.

The total school textbook demand, 2005 demand (the Project implementing year) and 2015 demand (the school enrollment ratio will be expected up to 95%) are shown in Table 3-1.

Table 3-1 Textbook demand and lack of textbook (2003, 2005, 2015)

Item	Conditions	2003	2005	2015
School textbook demand	Same as existing	55.25 million	70.84 million	120 million
Lack of school textbooks	Same as existing	0	11.00 million	49.62 million
	After reducing pages	---	10.92 million	27.76 million
	After this project	---	0	0

Capacity for the existing printing centers are 45.00 million

- Approximately 2,000 tons of paper per year will be saved by 2015 through reducing the number of pages per textbook.

Table 3-2 below shows what the textbook situation would be like if the Project is not implemented and the outcome if the Project is implemented. It compares the situation in relation to the total number of textbook pages contained in the textbooks in use at present with the estimated total number of textbook pages to be contained in textbooks in use in 2005 when the printing equipment for the Project is introduced and the plan for reducing the total number of pages per textbook begins. It also gives an estimate for total number of pages for all textbooks in 2015, along with the estimated reduction in the number of textbook types (individual volumes) for the same year, when school enrollment is expected to reach 95%.

Table 3-2 Total pages and total kinds of school textbook (2003, 2005, 2015)

	Conditions	2003	2005	2015
Total pages	Same as existing	28,873pages	28,873pages	28,873pages
	After the Project	---	27,613pages	24,542pages
Reducing pages	Same as existing	---	0 頁	0 頁
	After the Project	---	1,260pages reducing	4,331peges reducing
Number of kinds of textbook	Same as existing	196kinds	196kinds	196kinds
	After the Project	---	196kinds	143kinds

2) Indirect benefits

- By distributing textbooks without delay to primary and secondary school classes, the quality of education will increase.
- The literacy rate, which was 46.2% as of the year 2000, will improve as the educational environment is consolidated through the spread of textbooks.
- Employment opportunities will increase in the Mukalla area, which is an intensive development region in Yemen.

3-2 Recommendations

The Project is intended to cope with the demand for textbooks which is expected to continue increasing in the future due to the growing population and improvement in the school enrollment rate. Improving the literacy rate is the major strategy for the education sector in Yemen and the “Plan for Improving the School Enrollment in Basic Education to 95% by 2015,” drafted by the Ministry of Education of Yemen has been put forth as the means for accomplishing this.

On the other hand, costs for building a textbook printing plant and installing machines and equipment to provide printing capabilities for fully meeting the demand for textbooks by 2015, which is estimated to be twice the current demand, will put further pressure on the budget for the education sector, which is already highly strained. For this reason, the effect that the costs of constructing a new printing plant will have on other needs in the education sector, such as building schools and training new teachers, increasing the number of classrooms, improving classroom facilities, etc., cannot be ignored — all of which are factors that will affect improvement of the school enrollment rate. In addition, the costs for procuring resources for printing, such as paper, also need to be considered.

The main purpose of the Project is to first minimize the increasing demand for textbooks and then to print the number of textbooks to offset the number that are in short supply. It is recommended that the following measures be implemented in line with achieving this purpose.

① Thoroughly promote the reuse of textbooks, which is already being implemented in some of the governorates, throughout the nation. Aim at achieving a reuse ratio of approx. 18% of the total number of textbooks required by 2005, the year this Project is launched, then achieve a reuse ratio of approx. 50% of the total number of textbooks required by 2015, the final target year of the Project. We need to undertake activities to increase the reuse ratio in order to reduce the number of textbooks which require printing.

② In parallel with promoting reuse of textbooks, it is necessary to reduce the number of pages per textbook and the total amount of textbooks that require printing. The plan for reducing the number of pages per textbook can be accomplished by modifying the physical page layout of the textbooks. This is an activity that is different from modifying school curriculums and is to be undertaken with the goal of reducing the number of textbook pages as swiftly as possible. In addition, some textbooks which are published as different volumes for the first and second semesters should be combined to reduce the number of textbook volumes used for courses. This is recommended as another method of reducing the total number of textbooks that require printing.

③ Another measure for improving textbook production capacity would be to improve the production capacity of the existing Sanaa and Aden printing plants. This can be implemented by identifying the characteristics peculiar to the respective printing plants, then drafting a textbook production plan that improves the efficiency for printing textbooks each year, with reference to the annual plan that was included in the model plan for the Project.

④ Based on the quality control methods implemented under the soft components for the Project, efficient utilization of the related machines, equipment and materials should be promoted with the aim of reducing printing waste and losses due to improper operation of printing equipment or work procedures.

⑤ A prerequisite for the Project is promoting the reuse of textbooks and then printing only the number of required textbooks to make up for shortage that remains after the reuse plan is implemented. It is not intended to print all of the required textbooks independent of the reuse plan. Before ordering textbook production each year, the Ministry of Education of Yemen should prepare a detailed textbook production plan for the year, then order textbooks based on the textbook editing schedules and ratio of textbooks that are being reused. In instances when delays occur, such as delays in the plan for reuse of text books, the Ministry of Education should consider filling orders from private corporations in order to secure the number of required textbooks on a timely basis.

⑥ With the cooperation of UNICEF and the World Bank the Ministry of Education is implementing a plan for reducing the number of pages per textbook and for reducing the individual textbooks volumes required for courses by reviewing school curriculums. This plan should be implemented together with the above recommendations with the aim of reducing the amount of textbooks that require printing.

Appendices 1. Member Lists of the Study Team

1-1 Basic Design Study

Sector in charge	Name	Organization
Team Leader	Hirotaka NAKAMURA	First Project Management Division Grant Aid Management Department, JICA
Chief Engineer / Educational Development Planning	Masami SUDA	System Science Consultans Inc.
Engineer for Printing, PrePress equipment/ Operation and Maintenance Planning	Toshiharu HATA	System Science Consultans Inc.
Engineer for Binding Equipment Planning	Masashi AKIHO	System Science Consultans Inc.
Equipment Layout, Procurement and Estimation	Eriko OHARA	System Science Consultans Inc.

1-2 Basic Design Study (Explanation on Draft Report)

Sector in charge	Name	Organization
Team Leader	Hirotaka NAKAMURA	First Project Management Division Grant Aid Management Department, JICA
Chief Engineer / Educational Development Planning	Masami SUDA	System Science Consultans Inc.
Engineer for Printing, PrePress equipment/ Operation and Maintenance Planning	Toshiharu HATA	System Science Consultans Inc.

Appendices 2. Study Schedule

2-1 Basic Design Study

Date			Official	Chief Engineer (Mr Masami Suda)	Engineer for Printing, Preperss equipment (Mr Toshiharu Hata)	Binding equipment (Mr Masashi Akiho)	Equipment Layout / Cost Estimation (Ms Eriko Ohara)
1	May 2nd	Fri		Narita→Bangkok JL717 11:05/15:30 Bangkok→Dubai EK371 20:25/23:30	←	←	←
2	May 3rd	Sat		Dubai→Sana'a EK961 04:05/06:05 Courtesy visit to Embassy of Japan, to Ministry of Education, GCSPP Presentation of Inception Report, Questionnaire, Request of Counter part	←	←	←
3	May 4th	Sun	Narita→Paris JL405 11:10/16:35	Confirmation of Request Explanation of Inception Report to Ministry of Education, and GCSPP	Confirmation of the request Meeting with GCSPP, with Sana'a Printing Plant	←	Procurement study on printing, binding materials
4	May 5th	Mon	Paris→Sana'a IY749 08:55/18:30	Explanation of Inception Report, Interview related to Questionnaire to Ministry of Education, GCSPP	Field survey at Sana'a Printing Plant (Existing equipment, facilities)	←	Procurement study on printing, binding materials Local agent survey
5	May 6th	Tue	Courtesy visit to Embassy of Japan, Meeting with Ministry of Education, and with GCSPP	←	Field survey at Sana'a Printing Plant (Technical level, Staff positionning)	←	Procurement study on third countries equipment, Local agent
6	May 7th	Wed	Meeting with Ministry of Education, GCSPP	←	Field survey at Sana'a Printing Plant (Production planning, Process planning)	←	Field survey on Custom clearance, Tax exemption Internal transport fee
7	May 8th	Thu	Field survey at Sana'a Printing Plant	←	Sana'a→Mukalla IY814 07:00/08:00 Field survey at planned site in Mukalla	←	Study on contents of textbook
8	May 9th	Fri	Sana'a→Mukalla IY420 06:00/07:00 Field suvey at planned site in Mukalla	←	Mukalla→Sana'a IY507 1230/1330 Sana'a→Aden IY854 1945/2030	←	Sana'a→Mukalla IY420 06:00/07:00 Field survey on planned site in Mukalla
9	May 10th	Sat	Mukalla→Aden IY433 13:45/14:45 Field survey at Aden Printing Plant	←	Field survey at Aden Printing Plant (Existing equipment / Facilities)	←	Mukalla→Aden IY433 13:45/14:45 School textbook supply condition study in Hadramout Maintenance study at Aden Printing Plant
10	May 11th	Sun	Meeting with Aden Printing Plant Aden→Sana'a IY403 16:30/17:15	←	Field survey at Aden Printing Plant Aden→Sana'a IY403 16:30/17:15	←	Textbook distribution process study in Aden Aden→Sana'a IY403 16:30/17:15
11	May 12th	Mon	Meeting with Ministry of Education Discussion on Minutes of Meeting	←	←	←	Study on sufficiency and defficiency of textbook supply in Yemen
12	May 13th	Tue	Signing of Minutes of Meeting Report to Embassy of Japan	←	Field survey and meeting at Sana'a Printing Plant (Equipment list)	←	Financial status survey at GCSPP Cost estimation for School book distribution
13	May 14th	Wed	Sana'a→London IY742 11:45/18:55	Meeting with Ministry of Education, GCSPP	Sana'a→Aden IY822 08:00/08:45 or IY742 11:00/11:45 Field survey and meeting with Aden Printing Plant	←	Textbook distribution survey in Aden Operation and maintenance survey at existing facilities in Aden
14	May 15th	Thu	London→Narita JL402 19:45/15:25	Documentation	←	←	Sana'a
15	May 16th	Fri	Narita	Sana'a→Aden IY854 19:45/20:30	Aden	Aden	Sana'a→Aden IY854 19:45/20:30
16	May 17th	Sat		Field survey at Aden Printing Plant Aden→Mukalla IY520 13:15/14:15	←	←	Field survey on construction materials, labour cost, custom clearance, inland transport
17	May 18th	Sun		Mukalla→Sana'a IY425 06:00/07:00	←	←	Field survey on distribution condition of textbook in Aden Aden→Sana'a IY403 16:30/17:15
18	May 19th	Mon		Meeting with Ministry of Education (Items to be covered by recipient country, Other donor, International cooperation survey)	Reguration survey for Construction of factory, Waste management, Noize level	←	Project implementation planning in Sana'a Cost estimation to be borne by recipient country
19	May 20th	Tue		Meeting with Ministry of Education (Textbook development, Distribution, Base line survey)	Meeting with GCSPP (Equipment planning, Technical Appropriateness)	Sana'a→Dubai IY802 06:00/11:15 Dubai→Bangkok TG518 22:45/10:10	Equipment maintenance study in Sana'a Equipment layout planning
20	May 21th	Wed		Meetging with Ministry of Development and Planning (PIC for other donors) Meeting with GTZ	Meeting with GCSPP (Production planning, Production process management, Quality control)	Bangkok→Narita TG640 11:20/19:30	Sana'a→Dubai EK962 08:00/12:00
21	May 22th	Thu		Documentation, Internal meeting	←		Dubai→Osaka JL5090 02:20/16:35 Osaka→Narita JL344 17:50/18:55
22	May 23th	Fri		Meeting with GCSPP (Textbook production process)	←		
23	May 24th	Sat		Meeting with Ministry of Education (Curriculum planning) Meeting with ERDC	Meeting with GCSPP (Equipment planning, Technical specification)		
24	May 25th	Sun		Meeting with Ministry of Education, GCSPP (Project implementaion planning, effectiveness, Appropriateness of cooperation) Meeting with World Bank (Education sector cooperation)	Meeting with GCSPP (Equipment planning, Technical specification) Field study at Printing plant under Ministry of Information		
25	May 26th	Mon		Meeting with GCSPP (Quality management, Operation, maintenance planning) Meeting with ERDC Meeting with GTZ (Education sector cooperation planning)	Meeting with GCSPP (Equipment planning, technical specification) Meeting with ERDC		
26	May 27th	Tue		Meeting with Ministry of Education, with UNICEF Report to Embassy of Japan	←		
27	May 28th	Wed		Sana'a→Dubai EK962 08:00/12:00	←		
28	May 29th	Thu		Dubai→Osaka JL5090 02:20/16:35 Osaka→Narita JL344 17:50/18:55	←		

Appendices 2. Study Schedule

2-2 Basic Design Study (Explanation on Draft Report)

Date			Official	Chief Engineer (Mr Masami Suda)	Engineer for Printing, Preperss equipment (Mr Toshiharu Hata)
1	Aug. 7th	Fri	Haneda→Osaka JL349 2045/2200 Osaka→Dubai JL5099 2330/0455	←	←
2	Aug. 8th	Sat	Dubai→Sana'a EK961 0630/0830	←	←
3	Aug. 9th	Sun	Courtesy visit to Embassy of Japan, to Ministry of Planning and Development, to Ministry of Education	←	←
4	Aug. 10th	Mon	Meeting with GCSPP (Equipment list, Contents of Minutes of Discussion)	←	Meeting with GCSPP (Equipment planning, Technical specifications)
5	Aug. 11th	Tue	↓	←	↓
6	Aug. 12th	Wed	Signing of Minutes of Discussion, Report to Embassy of Japan	←	↓
7	Aug. 13th	Thu	Sana'a→Dubai EK962 1000/1400	Meeting with GCSPP (Equipment list, Technical specification)	←
8	Aug. 14th	Fri	Dubai→Osaka JL5090 0230/1725 Osaka→Tokyo NH148 1910/2015	Documentation	←
9	Aug. 15th	Sat		Sana'a→Dubai EK962 1000/1400	←
10	Aug. 16th	Sun		Dubai→Osaka JL5090 0230/1725 Osaka→Tokyo NH148 1910/2015	←

List of Parties concerned in the Recipient Country

Ministry of Planning and Development

Deputy Minister, International Cooperation	Mr. Hisham Sharaf Abdalla
General Manager, Bilateral cooperation with the states of Asia and Australia	Mr. Omar A. Abdulghami
Director, Bilateral Cooperation with the states of Asia and Australia & The National Coordinator for WFP project	Mr. Fadhl Abbas M. Al-Wazir
International Organization	Ms. Galal M. Moula, Director General

Ministry of Education

Deputy Minister	Mr. Abdul Karim Al-Jindari
General Manager, Project Design and Implementation	Mr. Eng. Mohammad Hassan Al-Sharafi
Director General, Project Planning	Mr. Mohammad Hussein Saad
Deputy of the Project Sector	Mr Abdo Alkarim
General Director, Project and School Equipment	Mr. Ali Mohammed M. Alharethe
General Director of Curriculum	Mr Sami Ali Shamsan
General Director of Maintenance	Mr Ahmed Hamud Al-Haj

Ministry of Education, Aden Branch Office

Director General	Dr. Mahdi Ali Abdulsalam
General Director, Maintenance Services	Mr. Salem Ahmed Dhira'an
Coordinator	Mr. Alwai Abdulla Alwai

Ministry of Education, Hadramut Branch Office

Director General, Project and Supply	Mr El Hussin Ahmed Abu Aikhith
Project and Supply	Mr. Hussein Abul Ghaith (PIC for Mukalla Printing Plant project)

General Corporation for School Book Printing Press (GCSPP)

General Manager	Mr. Eg. Mohamed A. Al-Shamsi
Office Manager of the General Manager	Mr. Taha Ali M. Al-Mahfadi
General Manager Office	Mr Fahad Y. Al-Sunidar
Technical Manager	Mr. Ahmed H. Hakimi
Director, Planning and Finance	Mr. Ahmed Abdulwahab Dubhani
Control Director	Mr. Aref H. Al-Kaff (Eng.)

General Corporation for School Book Printing Press, Sana'a Branch

Director General	Mr. Ali H. Al-Kulibi

General Corporation for School Book Printing Press, Aden Branch

Director General	Mr. Alezzi Mohamed Alwageh
Director General, Technical and Commercial Affaires	Mr. Shaef Adbulla Hussein
Technical Manager	Mr. Shahid A. Abulhamed
Director, Stock control	Mr. Mustafa Hussein

Educational Research and Development Center (ERDC)

Head of the Center	Dr Saleh Nasser Al-Soofi
Assistant Director of Planning Department	Mr. Sami Ali Shamsan

Central Bank of Yemen

Director, Foreign Operations and Research	Mr Mohamed A. Bin Humam
Manager, Grants & Agreements	Mr Abdullah Ahmed AL-ANISI

Ministry of Finance

Deputy Director, Tax Exemption	Mr Bajel, Assistant General Manager

Ministry of Finance, Tax Department

Deputy Director, Tax Exemption	Mr Fathi Al-Arami

UNICEF

Senior Programme Officer	Dr. Solofo R. Ramaroson

The World bank Office Sana'a

Economist	Dr. Mohammed Al-Sabbry

GTZ

Team Leader, Advisory Service to the Ministry of Planning and Development	Dr. Eva Weidnitzer
Advisor, Basic Education Improvement Program	Dr. Dagmar Awad-Gladewits

Minutes of Discussions
on the Basic Design Study
on the Project for Supply for School Textbook Printing Equipment
in the Republic of Yemen

In response to a request from the Government of the Republic of Yemen (hereinafter referred to as "the GOY"), the Government of Japan has decided to conduct a Basic Design Study on the Project for Supply for School Textbook Printing Equipment (hereinafter referred to as "the Project"), and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Yemen the Basic Design Study Team (hereinafter referred to as "the Team") headed by Mr. Hirotaka Nakamura, First Project Management Division, Grant Aid Management Department, JICA, with a field survey period between 5th May and 14th May, 2003.

The Team held a series of discussions on the Project with the officials concerned with the Ministry of Education and General Corporation for School Book Printing Press(hereinafter referred to as "GCSPP") in the Republic of Yemen.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets.

The Team will proceed to further works and prepare the Basic Design Study Report.

SANA'A, 13th May, 2003

中村浩孝	
Hirotaka Nakamura Leader Basic Design Study Team Japan International Cooperation Agency	Mohamed A. Al-Shamsi General Manager General Corporation of School Book Printing Press The Republic of Yemen
Hisham Sharaf Abdalla Deputy Minister Ministry of Planning and Development The Republic of Yemen	Mohammad Hassan Al-Sharafi Director General of Project Formulation Ministry of Education The Republic of Yemen

ATTACHMENT

1. Objective

The objective of the Project is to improve educational environment in Yemen, especially in eastern region, by enhancing school textbook printing capacity of GCSPP through supplying printing equipment.

2. Project Site

The Project site is Mukalla.

3. Responsible and Executing Organization

(1) Responsible organization of the Project is Ministry of Education.

(2) Executing organization of the Project is GCSPP.

Organization chart is described in Annex 1.

4. Items requested by the Yemeni Side

After discussions with the Team, items listed in Annex 2 were finally requested by the Yemeni side.

However, the final components of the Project will be decided by the Japanese side after further studies and analysis.

5. Japan's Grant Aid System

(1) The Yemeni side has understood the system of Japanese Grant Aid Program explained by the Team, described in Annex 3.

(2) The Yemeni side will take necessary measures described in Annex 4-5 for the smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the Study

(1) The consultants will proceed to further studies in Yemen until 28th May, 2003.

(2) Based on the Minutes of Discussions and technical examination of the study results, JICA will prepare a draft report and dispatch a mission in order to explain its contents around July, 2003.

(3) In case that the contents of the draft report are acceptable in principle by the Yemeni side, JICA will complete the final report and send it to GOY around September, 2003.

7. Other relevant issues

(1) Construction of a new school textbook printing building in Mukalla

The Team requested that the Yemeni sides should commence construction of a new school textbook printing building in Mukalla as soon as possible.

The Yemeni side answered that it was preparing a final detail design drawing of the new school textbook building.

(2) Examination for new equipment

The following data will be examined by the Japanese side in order to estimate proper size and grade of new equipment to be procured under the Project;

- Technical competence of GCSPP on maintenance and operation;
- Inventory data of existing equipment of school textbook printing factories in Sana'a and Aden;
- Personnel and financial affairs of GCSPP;
- Distributional situation of textbooks in Yemen
- Socio-economic data (type and grade of equipment used in private companies); and
- Others.

(3) Criteria for equipment selection

Equipment requested by the Yemeni side will be selected by the Japanese side in accordance with the criteria listed below;

- To be appropriate in order to improve the present printing and distributional situation;
- To have enough space to store itself in the new school textbook printing building ;
- To be related to school textbook printing, not for general use; and
- To be properly maintained financially and technically.

(4) Items to be submitted by the Yemeni side

The Yemeni side shall submit the following items to the Japanese side by 25th May, 2003;

- Concrete construction schedule of the new school textbook printing building,
- Final detail design drawing of the new school textbook printing building,
- Layout plan of equipment of the new school textbook printing building;
- Operation plan of printing equipment and vehicles for a new school textbook printing factory;
- Needs and distribution plan of all textbooks(nationwide)
- Type and grade of soft-wares for personal computers; and
- Others

(5) Environmental measures

Both sides agreed that it was important to take measures to meet environment in terms of noise, smell, paper dust, some kinds of liquid waste such as waste water, waste ink, chemical regents and so forth from the new school textbook printing factory.

(6) Privatization

The Yemeni side assured that privatization policy would not be effected on the Project.

(7) Others

- The Team explained that the demarcation between the Ministry of Education and GCSPP should be more clarified in terms of the chain of command, budgetary system and so forth. The Yemeni side agreed on it and would provide more information for the Team.

- Both sides confirmed that renovation of equipment at existing school textbook printing factories in Sana'a and Aden was not included in the Project.

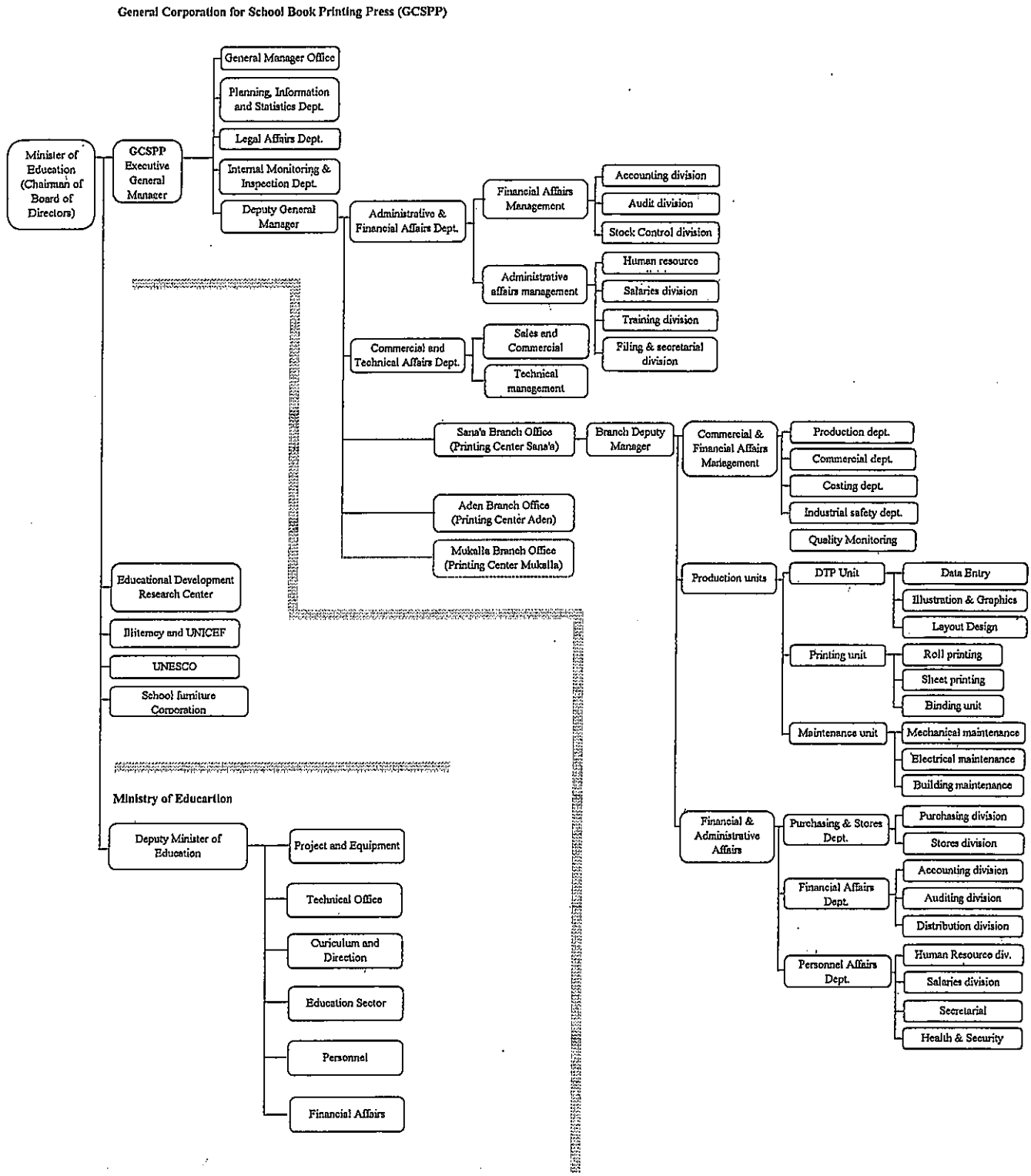
- The Team asked if the Amount of 50 million Yemen Rial(YR 50,000,000) which was already allocated was enough for constructing the new school textbook printing building or not.
  The Yemeni side answered that GCSPP would find out the actual construction cost after tendering, and would then demand the Ministry of Finance to approve the allocation of any shortfall in the budget of the next fiscal year of 2004, if necessary.

- The Team explained that the Japanese Government might not approve the implementation of the Project when the construction of the new school textbook printing building was delayed by any reasons. The Yemeni side understood it.

End

4-1 Minutes of Discussions on Basic Design Study

ORGANIZATION CHART



Requested Equipment List

Item	Description	Q'ty	Priority
1. Pre Press Section			
1-1	Publishing Set	10 sets	A
1-2a	High quality Scanner	1 unit	A
1-2b	Scanner	1 unit	C
1-3	Image Setter	2 units	A
1-4	RIP	2 sets	A
1-5	Plate Processor	2 units	A
1-6	Sink & Vat	2 sets	A
1-7	Light Table	3 sets	A
1-8	PS Plate Vacuum Printer	2 units	A
1-9	Densitometer	3 sets	B
2. Printing Section			
2-1	Sheet Offset Press 4-Color	1 unit	A
2-2a	Sheet Offset Press 2-Color both side	1 unit	A
2-2b	Sheet Offset Press 2-Color, small size	1 unit	B
2-3	Offset Press 1-Color	1 unit	C
2-4	Plate Puncher	4 units	A
2-5	Color Viewer	3 units	A
3. Book Making Section			
3-1	Guillotine Cutter	2 units	A
3-2	Paper Folding Machine	4 units	A
4. Binding Section			
4-1	Perfect Binding Line	1 set	A
5. Knife Grinder Section			
5-1	Knife Grinder	1 unit	A
6. Packing Section			
6-1	Paper Jogging Machine	2 units	A
6-2	Air Table	2 units	A
6-3	Tying Machine	2 units	A
7. Maintenance tools		1 set	A
8. Automatic Voltage Regulator		1 set	A
9. Handling and delivery section			
9-1	Folk Lift, 2 tons	1 unit	A
9-2	Manual Lifter	4 units	A
9-3	Air Conditionner	1 set	C
9-4	Office Equipment	1 set	C
9-5a	Track 8 tons	6 units	A
9-5b	Track 2 tons	2 units	A
10. Trainings			
10-1	Training for maintenance work of Pre Press section	1 lot	A
10-2	Training for maintenance work of Printing Section	1 lot	A
10-3	Training for maintenance work of Binding Section	1 lot	A

※ All machines include spare parts and consumables above.

Annex 3 Japan's Grant Aid Program

The Grant Aid Scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

(1)Japan's Grant Aid Scheme is executed through the following procedures.

- Application (Request made by a recipient country)
- Study (Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by Cabinet)
- Determination of Implementation
  (The Notes exchanged between the Governments of Japan and the recipient country)

(2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preliminary Study Team to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

(1) Contents of the Study
The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;
b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
d) preparation of a basic design of the Project; and
e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design.

3. Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Undertakings required to the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

a) to secure a lot of land necessary for the construction of the Project and to clear the site;
b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;

d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;

e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;

f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and

g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

(6) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

(7) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

(8) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

Annex 5 Necessary measures to be taken by the Yemeni side

1. To provide necessary data and information whenever the Japanese side requests;
2. To complete construction of the new school textbook printing building in Mukalla including utilities(distribution of electricity, water supply, telephone, drainage, sewage and so forth) required prior to the installation of equipment and settings;
3. To allocate enough budget to procure required spare parts and materials necessary for operation and maintenance; and
4. To allocate enough numbers of engineers and administration staff for the Project.

4-1 Minutes of Discussions on Basic Design Study

Annex 4 **Major undertakings by each government**

No.	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contact such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant		●
6	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for transportation and installation of the equipment		●

Minutes of Discussions
on the Basic Design Study
on the Project for Supply for School Textbook Printing Equipment
in the Republic of Yemen
(EXPLANATION ON DRAFT REPORT)

In May 2003, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for Supply for School Textbook Printing Equipment (hereinafter referred to as "the Project") to the Republic of Yemen (hereinafter referred to as "Yemen"), and through discussions, site surveys and technical examination of the results in Japan, JICA prepared a draft final report of the study.

In order to explain and to consult the Yemeni side on the components of the draft final report, JICA sent to Yemen the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Hirotaka NAKAMURA, First Project Management Division, Grant Aid Management Department, JICA, from August 8 to August 15, 2003.

As a result of discussions, both sides have confirmed the main items described on the attached sheet.

SANA'A, 12th Aug, 2003

中村浩孝

Hirotaka Nakamura
Leader
Basic Design Study Team
Japan International Cooperation Agency

Eg. Mohamed A. Al-Shamsi
General Manager
General Corporation of School Book Printing Press(GCSPP)
The Republic of Yemen

12/08/2003

Abdullkarierm M. AL-Jendari
Deputy Minister
Ministry of Education
The Republic of Yemen

Hisham Sharaf Abdalla
Deputy Minister
Ministry of Planning and Development
The Republic of Yemen

ATTACHMENT

1. **Contents of the draft report**

The Yemeni side agreed and accepted in principle the contents of the draft final report proposed by the Team.

2. **Japan's Grant Aid Scheme**

The Yemeni side understood the Japan's Grant Aid Scheme explained by the Team and described in Annex3-5 of the Minutes of Discussions signed by both sides on May13, 2003.

3. **Project sites**

The Project site is Mukalla already confirmed by both sides on May13, 2003.

However, Educational Development Research Center in Sana'a, which is an editorial organization of school textbooks, would be included of its functionality.

4. **Final report**

JICA will complete a final report in accordance with the result of discussions and forward it to the Yemeni side around October, 2003.

5. **Other relevant issues**

(1) Construction of a new school textbook printing building in Mukalla(hereinafter referred to as "the Construction")

The Team explained that the Yemeni side should by any means finish the Construction before the arrival of equipment to be procured under the Project(hereinafter referred to as "the Equipment"), and that it was difficult for the Japanese side because of the budgetary system in Japan, to extend its Grant Aid to the Project if the Construction cannot be finished by the end of October, 2004.

The Yemeni side, the Ministry of Planning and Development, the Ministry of Education and GCSPP, assured with the Team that it should complete the Construction by abovementioned deadline, and explained that the contract on the Construction would be verified by the Minister of Education at latest by the end of August, 2003.

(2) Progress report of the Construction

The Team requested the Yemeni side to submit a monthly progress report of the Construction to the Japanese side and to reply promptly on any request from the Japanese side till completion of the Construction.

The Yemeni side agreed on it.

(3) Necessary measures taken by the Yemeni side for the Construction

Both sides confirmed that the following items should be included in the Construction;

- an air conditioned system for proper printing,
- utility mains(distribution of electricity, water supply and other incidental items) and
- a sewage treatment system and a soundproof system for meeting environments.

(4) Examination of the Equipment

The Team explained that the number and grade of the Equipment were properly examined by the Japanese side based on the technical competence of GCSPP and on the

estimated volume of demand for school textbooks from 2005 to 2015 as designated in the National Strategy of the Basic Education Development (2003-2015). However, both the Team and the Yemeni side agreed that such examination and estimation by the Japanese side had been done under the condition that the Yemeni side would promote the following measures in order to fulfill the needs;

- recycling school textbooks(from grade-3 to grade-12),
- reducing the number of school textbooks and
- reducing the number of pages of each school textbook.

The Yemeni side understood and agreed with the policy of the basic design explained by the Team, and promised to report the conditions proposed by the Team to the Supreme committee of the Ministry of Education for its approval. The Yemeni side further agreed not to relocate the Equipment among school textbook printing factories during and/or after the Project.

(5)Personnel and budget

The Yemeni side assured to allocate sufficient staff and necessary budget in order to functionally operate and maintain the Equipment.

Regarding the Construction, the Yemeni side assured that the amount of 140 million Yemen Rial(YR 140,000,000) would be additionally allocated in the fiscal year of 2004, while the amount of 50 million Yemen Rial(YR 50,000,000) was already allocated in the fiscal year of 2003.

(6)Soft component services

Because of low efficiency on operation and maintenance at pre-press and printing stages, the Team proposed the following training items in order for the Yemeni side to make the most of the Equipment;

- training in effective input and editing methods by using personal computers and
- training in effective printing method to avoid paper and ink waste.

The Yemeni side requested the above training items as soft component services to the Japanese side.

(7)Privatization

The Yemeni side assured that the Equipment would not be affected by the privatization policy and would be utilized under the supervision of the Ministry of Education.

(8)Confidentiality

Both sides confirmed that the contents of the draft report would be confidential.

Regarding confidentiality, both sides would not disclose the contents to the third parties and not duplicate the draft final report itself.

(9)Others

For public relations(P.R.) effect, the Japanese side requested the Yemeni side to introduce the Project on some school textbooks printed at Mukalla(Project site).

The Ministry of Education assured to describe the Project in Geography textbooks.

End