

PROJECT COMPLETION REPORT

Title of the Project;

Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink
Production

Project Period;

29 November 2014 – 28 November 2017 [Three years]

Submitted;

January 2018

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4.2.6	Basic requirements for ink production facility		■	■

Table of abbreviations

Word	Description
ATM	Automated Teller Machine
HRD	Human Resource Development
ICD	International Corporation Department (in SBV)
ISO	International Organization for Standardization
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
M/M	Minutes of Meeting
MP	Master Plan
NBPP	National Banknote Printing Plant
NPBJ	National Printing Bureau, Japan
OJT	On-the-Job-Training
OVI	Optically Variable Ink
PDM	Project Design Matrix
PMU	Project Managing Unit
PO	Plan of Operation
QC	Quality Control
QMS	Quality Management System
R&D	Research and Development
R/D	Record of Discussion
RTU	Ready-To-Use
SBV	State Bank of Viet Nam
VND	Vietnamese Dong
VPIA	Vietnam Paint & Printing Ink Association

1. Executive summary

This project is a technical cooperation project with the goal of improvement of the capacity of the State Bank of Viet Nam (hereinafter referred to as SBV) in the field of banknote printing through improved capacity of banknote printing-ink production. Specifically, it was set as the project goal "The SBV can access the ink-production technology and be able to manufacture for experimental printing ink".

The National Printing Bureau that manufactures Bank of Japan's notes ran the short-term training programs for SBV staff and dispatched experts on long-term and short-term basis. Technical cooperation with focus on areas such as printing ink manufacturing and banknote production management were carried out in the 3 years from November 2014 to November 2017.

As a result, with regard to 2 outputs of the project set at the planning stage, all 5 indicators were achieved. In addition, evaluation indicators on the achievement of the project purpose were also obtained sufficiently evidenced by fulfillment of the 2 indicators. Although the goal of this project is "Experimental Ink", knowledge on large scale ink manufacturing beyond the experimental ink is also obtained finally, which can be said to be more than the target achievement.

1.1. Background of the Project

The SBV, a ministerial agency of the Government of the Socialist Republic of Viet Nam, organizes banknote printing and minting in Viet Nam (according to Paragraph 2, Article 18, Law on the State Bank of Viet Nam). Currently, the NBPP, which was built in 1984, is under the SBV and responsible for implementing these functions. Since 1991, Vietnam has been fully self-reliant in printing banknotes, but NBPP still imports printing substrates and printing inks from outside. This situation has many inadequacies such as limited production initiative, un-sufficient production caused by no value added. And the purely external imports reduce the dynamism of R&D activities. On the other hand, in the next 5 - 7 years, the banknote printing capacity of NBPP will not be able to meet the demand of the SBV. To overcome these inadequacies, the Prime Minister of Viet Nam has approved of the proposal to build a new banknote printing plant and appointed SBV to implement the project. The project includes not only building a modern and synchronized banknote printing plant but also constructing an ink production plant.

In 2010, when studied the construction of a new banknote printing plant, the Governor of the SBV reported to the Prime Minister requesting technical cooperation in improving printing ink production to the Japanese Government.

“The Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production” was approved by the governments of Vietnam and Japan for a period of 3 years, from November 2014 to November 2017. JICA and the NPBJ are on the Japanese side of this project. On the Vietnamese side, NBPP is assigned by the SBV to be the project owner.

Reference material (not attached to this Report)

- 1) “Application Form for Japan's Technical Cooperation”, submitted by the State Bank of Viet Nam and registered on 6th January 2014 by JICA.
- 2) “Record of Discussions on the Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production”, mutually signed on 7th October 2014 between the State Bank of Viet Nam and JICA.
- 3) “Project document of ‘Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production’ supported by JICA”, approved by SBV on 10th June 2015 (written in Vietnamese).
- 4) “Basic information on JICA projects”,
<http://gwwweb.jica.go.jp/km/ProjectView.nsf/fd8d16591192018749256bf300087cf d/645066d273e7c0fe49257d740079e71e?OpenDocument>

1.2. Project outline

1.2.1. General information

Classification	Description
Project Number	1400617*
Title	Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production
Country	VIET NAM
Project Type	Technical Cooperation Projects
Field	Economic Policy-Financial System
Sector	Planning/Government-Government-Banking/Finance
Program Title	Market economic system, fiscal, and financial reforms
Program ID	0270000000042*
Cooperation Area	Growth and strengthening competitiveness
Development Issue	Strengthening market economic systems
Project Site	Hanoi
Term of Cooperation	2014/11~2017/11
Implementing Organization	The State Bank of Viet Nam (SBV), National Banknote Printing Plant (NBPP)

*The number is used by JICA for its operational management.

1.2.2. Project overall goal

Improvement of the capacity of SBV in the field of banknote printing through improved capacity of banknote printing-ink production.

<Indicators>

Printing of higher quality banknotes

<Means of Verification >

(1) Annual report of SBV

(2) Questionnaire Survey (if necessary)

Note 1; As was written on Application Form, the SBV aims to build the printing-ink production plant project in line with the objective of building an ink production workshop (production line) within the framework of new banknote printing plant project of Viet Nam with the production capacity of 700 tons per year¹.

1.2.3. Project purpose

The SBV can access the ink-production technology and be able to manufacture for experimental printing ink.

<Indicators>

- (1) Establishment of PMU in charge of implementation of the Master Plan (MP)
- (2) Conducting test printing with experimental ink for 6 times

<Means of Verification >

- (1) Annual report of SBV
- (2) Project Report
- (3) Questionnaire Survey (if necessary)

Note 2; Required volume of ink for experimental printing is relative much smaller than the manufacturing volume.

However, possessing the ink production at pilot scale which will be the foundation for the SBV to carry on technology research and development and the construction of ink production plant in order to meet basic needs of printing ink. ²⁾

Note 3; PMU (Project Management Unit) is formed for smooth implementation of activities/tasks of the MP.

1.2.4. Outputs

- (1) Master Plan (MP) for ink production is developed
- (2) The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop)

<Indicators for the output 1>

- (1) Developing the MP
- (2) Agreement with SBV regarding various measures to implement the MP

<Means of verification for the output 1>

MP approved by SBV

<Indicators for the output 2>

- (1) 5 experts trained for ink production technology
- (2) Acquisition of ink production technology for R&D activities
- (3) Summarizing basic requirements for ink production facility

<Means of verification for the output 2>

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Note 4; MP shall be described on ink production from pilot scale to expected production scale to support printing activities by the SBV; and at the same time, having a list of production machineries, laboratory equipment, other requirements on the plant premises design, production environment, production technology selection and implementation roadmap.²⁾

Note 5; Trained and qualified 5 experts specialized in ink production technology

will play as core staff for the project implementation. ²⁾

1.2.5. Project activities

<Activities to gain the output 1>

- (1) Review challenges and external issues on ink production
- (2) Classify challenges and goals of future plan of ink production, and develop a draft MP (including road map)
- (3) Review the details of managerial resources necessary for the implementation of the MP
- (4) Conduct trainings and consultancy regarding implementation of MP and efficient plant operation and management as necessary

<Activities to gain the output 2>

- (1) Review the necessary equipment for R&D activity, and develop a program for the procurement of equipment
- (2) Review the distribution channel of raw materials necessary for ink production in Vietnam
- (3) Review the R&D facilities and its capacities in SBV
- (4) Conduct trainings of ink production and printing test using SBV's equipment
- (5) Conduct trainings of ink production using NPB's equipment in Japan
- (6) Research published information on technology of intaglio ink in the world and search for cooperative varnish makers

1.2.6. Inputs from Japanese side (JICA)

<Personnel for the project>

- (1) Dispatch of long-term experts; Chief Advisor/Ink Production
- (2) Dispatch of short-term experts; mainly in the area of ink production¹⁾

<Training course>

- (1) Ink production and printing test with the SBV equipment in Viet Nam¹⁾
- (2) Ink production with National Printing Bureau of Japan (NPBJ) equipment in Japan¹⁾

<Equipment>

Equipment, upon necessity.

<Supporting costs>

Cost for the activities of the project including tools, seminars and training courses.

Note 6; JICA and NPBJ will dispatch a long-term expert to Viet Nam to support the SBV (NH09 Project Management Unit) as well as provide advanced training courses on ink production technology for some technical officials

of SBV.²⁾

1.2.7. Inputs from Vietnamese side (SBV)

<Personnel for the project>

- (1) Necessary administrative staff for smooth implementation of the project
- (2) A task force on the study of masterplan
- (3) A task force on the ink-making
- (4) A task force (which is needed temporarily) on the printing experiment
- (5) A task force on the ink plant architecting

<Building and facilities>

- (1) Office rooms for Japanese Experts
- (2) Conference rooms for workshops and seminars

<Administrative and operational costs>

- (1) All expense (excluding international communication fee) necessary to maintain the office room for Japanese experts
- (2) Cost for activities of counterparts and task force members including salaries and travel allowance, cost for seminars, training courses including allowance for trainees, if necessary.

1.2.8. Reference material

- 1) "Record of Discussions on the Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production", mutually signed on 7th October 2014 between the State Bank of Viet Nam and JICA.
- 2) "Application Form for Japan's Technical Cooperation", submitted by the State Bank of Viet Nam and registered on 6th January 2014 by JICA.

1.3. Basic concept of activities

In the first two years when Mr. Hiwatashi was dispatched as a long-term expert (CA; Chief Advisor), activities focused on developing a MP were conducted. In the final year when Mr. Iwasaki was replaced as a long-term expert (CA), activities focused on training human resources through local technical guidance were conducted. Details of concept of activities are as follows.

1.3.1. Master Plan development related activities

Since there are many factors related to the achievement of the final goal (vision) of ink-production, it was requested to set up intermediate targets (milestones), divide the activity period (phase), and prepare a medium to long-term plan (Master Plan) until the final goal is achieved.

The Benefits of developing MP are as shown in Table 1.3.1.

Note 1; The word of "project" in the table below means a project of ink-production that MP covers with long-term timeline.

Table 1.3.1. Benefits of master plan creation

Benefits	Description
Project's detail plan will become precise	Since the tasks that need to be considered are indicated, it helps to create detailed plans
Project progress become easy to manage	Since the achievement status of the intermediate target can be evaluated by all stakeholders, the plan can be changed flexibly during the activity
Achievements will be obtained reliably	Even in the case of cancellation of plan, certain achievements can be obtained just before the intermediate target

The final goal was changed from the original "Establishing the ink production plant " to "In-house intaglio ink manufacturing by milling raw materials" at the request from the NBPP in October 2016. The target timing to achieve the final goal was set at the end of 2030 as a result of consultation with the NBPP.

Note 2; Raw materials = Pigments, varnishes and additives

The MP was to be developed for the purpose of supporting the planning of detailed plans and promotion measures by NBPP. To achieve the final goal, this MP would include a wide range of contents such as strengthening ink R&D activities, establishing an ink production plant, procuring equipment and materials.

The first phase of the MP would be the period of this technical cooperation project and milestones and action schedule for each phase after the second phase would be considered in consultation with the NBPP.

(A) Preconditions

As a result of consultation, the preconditions for banknote ink manufacturing in-house from raw materials were arranged as follows.

- 1) All of the ink raw materials would be purchased from outside
- 2) Conduct incoming raw materials check and introduce necessary equipment
- 3) Conduct ink quality inspection and introduce necessary equipment
- 4) Weighing of raw materials would be done manually for the time being

(B) Basic concept of managerial resources on MP

The basic idea of managerial resources on MP is as follows.

1) Human resource

- Develop 5 experts in the 1st phase.
- Expert development program according to the timing of preparation of work place and introduction of required equipment should be made.
- Experts trained in the 1st phase would develop next experts after the 2nd phase.

2) Infrastructure

- Organize the building requirements such as the layout and incidental facilities, from necessary manufacturing equipment and work description.
- Consistency with the future new ink production plant.

3) Material resource

- Investigate raw material suppliers domestically in Vietnam.

4) Capital

- Organize necessary expenses and provide information to relevant departments

(C) Develop a draft MP

Based on the idea of (A), (B), a draft MP shall be prepared. Mr. Hiwatashi would create a draft MP based on NBPP's request and complete it in the first two years when he was dispatched as a long-term expert.

(D) Revise and submit MP to SBV

The MP developed shall be approved within SBV. Since the departments other than NBPP, such as personnel and budget planning for medium to long-term efforts are also involved, explaining the draft MP to relevant

departments shall be conducted as necessary, then it shall be reflected their comments in the final version of MP.

1.3.2. Capacity development related activities

In order to manufacture banknote printing inks, it is necessary to obtain ink manufacturing related capacities and to develop inks suitable for Vietnamese banknotes.

With regard to capacity development, it needs to efficiently proceed with clarifying the capabilities required for development based on the request and current status of the counterpart.

In this project, capacity development related activities were conducted with the following basic concept.

(A) NBPP's request

When completed the project, NBPP would be expected to have basic capacities to undertake consideration independently for the establishment of the ink production plant. Specifically, it is requested to improve the experimental printing ink manufacturing capacity and the capacity to plan ink production work place.

In the project document, within the project period until the end of November 2017, developing 5 experts trained for ink production technology and acquisition of ink production technology for R&D activities are required. In promoting activities, it should be clarified what capacities necessary to be experts and what ink production technology necessary for R&D activities. (described later)

With regard to experimental printing ink, it was also requested to make intaglio ink in addition to offset ink during the project period.

The future plan on NBPP's in-house ink production was confirmed as shown in Table 1.3.2.

Table 1.3.2. Current status and future plan on NBPP's in-house ink production

Classification	Current status	Future plan
Intaglio ink	Purchase	In-house
Offset ink (for paper substrate)	In-house	In-house
Offset ink (for polymer substrate)	Purchase	In-house
UV offset ink	Purchase	In-house
Numbering ink	Purchase	In-house
Over-coating ink	Purchase	Purchase

Note 3; Specific inks such as patented technology or requires special manufacturing technology are purchased externally.

(B) Current status on NBPP's ink production technology

In the future ink manufacturing framework to be constructed in NBPP, it is assumed that "in-house ink production for current series of Vietnamese banknotes" shall be required. This means that the inks to be formulated shall be match the properties of conventional ink. Therefore, it is necessary to understand current status on ink production technology at NBPP and the ink features used in current Vietnamese banknotes.

The current status on ink production technology at NBPP is as follows.

- 1) Except for some offset inks, RTU offset inks are purchased from ink manufacturers.

Note 4; RTU = Ready-To-Use

- 2) Although NBPP owns the same type of measuring equipment used by ink manufacturer, but quality inspection of ink characteristics is not done.
- 3) Offset inks for paper substrates (for low denominations) is manufactured in-house by mixing base inks purchased from ink manufacturer.

Note 5; Base ink = Highly concentrated, mono-pigmented ink

- 4) Since the ink recipe for above 3) was created long ago, current staffs don't have the ability to formulate (make a recipe).

The ink features used in current Vietnamese banknotes (polymer substrate) are as shown in Table 1.3.3. Since the inks for polymer substrates are authenticated by banknote equipment such as ATM, experts in ink to be trained shall know the outline of the machine authenticating technologies such as luminescent features and other machine readable features used in current Vietnamese banknotes. If NBPP starts ink production with inadequate knowledge, large volume of rejected notes may cause social confusion and credibility loss of SBV.

Table 1.3.3. Ink features used in current Vietnamese banknotes (polymer)

Classification	Specialty features			
	Optically Variable	Luminescent	Machine Readable	Surface Protect
Intaglio ink	---	---	■	---
Intaglio ink (OVI)	■	---	---	---
Offset ink	---	■	■	---
UV offset ink	---	■	---	■
Numbering ink	---	■	■	---
Over-coating ink	---	---	---	■

(C) Ink production technology to be trained

In order to develop experts within the short period of this project, it is necessary to clarify the capacities necessary for ink manufacturing and ink R&D activities, and to develop the un-obtained capacities in a systematic manner. The following capacities are required to realize the final goal of the MP, "In-house intaglio ink manufacturing by milling raw materials".

The capacities necessary to be experts in ink manufacturing are 1) to 4) below, and the ink production technologies necessary for R&D activities are 5) and 6).

1) Ink manufacturing capacity

Capacity to operate three-roll mill safely and manufacture high-quality inks.

2) Color matching capacity

Capacity to match hue and density to specified inks (in case of matching conventional inks) or color patches (in case of newly designed inks).

Since the purpose of NBPP is in-house ink manufacturing to be used for the current Vietnamese banknotes, in addition to match colors seen by human eyes, match the reflectance spectrum of conventional RTU inks seen by machinery's eye (optical sensors) are necessary. If the spectrum is different, there is a possibility of being rejected when processed by vending machines or ATMs.

Note 6; In order to match reflectance spectrum, it is necessary to formulate pigments of the same hue at the same concentration as conventional inks.

3) Ink quality control capacity

Capacity to inspect quality of inks in the middle of manufacturing or finished inks using tools and measuring instruments.

4) Raw material quality control capacity

Capacity to inspect quality of ink raw materials (pigments, extenders, varnishes, waxes, dryers) using tools and measuring instruments.

5) Ink formulating capacity

Capacity to select pigments, varnishes, additives and other raw materials, and to make a recipe for ink that meets the requirements of printability, resistance, specialty features (machine readable features, luminescence) etc.

6) R&D conducting capacity

Capacities to find problems on promoting ink development (selection of raw materials, ink formulating), research of ink manufacturing method and quality control method, and to solve the problems through planning print

trials and considering results.

The degree of achievement of experts developed during this project period is expected as "along with understanding the basic requirements of inks, capable of weighing, mixing, milling, inspecting and capable of conducting R&D activities by print trials".

In addition to this, since there are so many things to learn to be an ink expert within the short period of this project, it was proposed by CA that it should be better to make a mixed team of specified field of experts (e.g. ink manufacturing expert, ink quality control expert, raw material quality control expert). Actually in the work of ink manufacturing, there are various kinds of processes so that it's difficult to manufacture many inks alone and it needs a team work. Moreover, this mixed team concept will encourage motivating every member to be trained as a major player in ink manufacturing.

(D) Various trainings to be combined

To develop the project members' capacities (above mentioned) efficiently, local guidance (technical guidance and print trial guidance) by long-term experts, trainings in Japan, training workshops in Vietnam, and corresponding exercises by NBPJ Tokyo plant should be combined.

The guidance categories of each capacity are as shown in Table 1.3.4.

Note 7: Corresponding exercises with regard to the handling of manufacturing equipment (three-roll mill) and ink color matching would be conducted with the aim of reviewing the training contents and confirming the capacity acquisition status. Under the corresponding exercises, NBPJ-Tokyo plant remotely gave assignments to the NBPP's training team members, the NBPP team made the assigned color ink and sent it to Tokyo plant. Tokyo plant checked and evaluated the ink made by NBPP.

Table 1.3.4. Guidance categories of each capacity

Required capacity	By CA	Training in Japan		In-country training by Short-term expert	Corresponding exercise by Tokyo plant
		NPB-RI	NPB-Plant		
Ink manufacturing			■	■	■
Color matching	■		■	■	■
Ink QC	■			■	
Raw materials QC	■		■		
Ink formulating	■	■			
R&D conducting	■			■	

Note 8; NPB-RI = Research Institute

NPB-Plant = National Printing Bureau Tokyo plant or Odawara plant

In the training program, publicly known technologies and knowledge, and commonly used ink raw materials would be applied. And also the base inks manufactured by the ink manufacturer would be applied for the technical guidance in NBPP premises.

(E) Print trials to be conducted

The purpose of the print trials would be to provide guidance on ink R&D activities through conducting print trials. With regard to print trials, CA requested NBPP to conduct at specific denomination for the following reasons.

In print trials on inks, since it is easier to evaluate how the previous problems will be improved in the next trial, various conditions other than inks should be fixed as possible. This would contribute to conduct R&D activities efficiently.

Further, print substrates and printing methods are different for each denomination in the current Vietnamese banknote. It is more efficient to conduct print trials on the denomination using both of wet-offset printing and intaglio printing since the difficulty levels of developing wet-offset ink and intaglio ink are high, so that experimental inks to be evaluated diversely.

It is also assumed that individual activities of NBPP regarding ink R&D after the project completion will be proceeded denomination by denomination, so the print trial on the same denomination will be able to give guidance on step by step procedure of ink R&D.

In the banknote production plan of NBPP, there are no denomination printed through a whole year. However, considering above mentioned requests based on CA's idea, NBPP realized to carry out the print trial on the fixed denomination

after the 3rd print trial.

(F) Technical guidance on intaglio ink

There exist 5 difficulties on intaglio ink R&D activities.

1) Substrate matter

Polymer substrate printing is totally different from NPBJ's paper printing.

2) Material matter

Global standard intaglio ink is totally different from that of NPBJ.

3) Printing matter

Printing conditions are totally different from those of NPBJ. This heavily affects the intaglio ink set-off property.

4) Wiping matter

Global standard intaglio wiping technology is totally different from that of NPBJ.

5) Security matter

Intaglio ink is one of the highly secured core technologies of Bank of Japan's notes.

Concerning above mentioned difficulties, SBV and JICA agreed to conduct following proposed activities by NPBJ.

- 1) Research published information on technology of intaglio ink in the world.
- 2) Search for cooperative varnish makers.

These activities on developing intaglio ink were agreed both sides on the 1st JCC held on 7th October 2015 and added within the PDM hereafter.

With the above-mentioned basic concept of activities, the project activities were progressed as described in the following "3. Project activities" with the "2. Project Inputs", and thus the project purpose was achieved shown as "1.4 Degree of achievement" (the details of achievement of outputs are described in 4."Project Output") in the below part of this report.

1.4. Degree of achievement

The evaluation indicators and achievement status on the project purpose "The SBV can access the ink-production technology and be able to manufacture for experimental printing ink" are as follows. It can be said that the project purpose has been achieved.

(1) Establishment of PMU in charge of implementation of the MP

Although not yet established at now (as of December 2017), it was declared at the 3rd JCC (November 2017) that NBPP will set up the PMU. Before, NBPP was assigned by SBV to (i) prepare the (confidential) rough estimation of the budget for ink workshop (construction, equipment); (ii) submit additional information to the Governor to get his principal approval on such investment policy and prepare for investment plan; (iii) NBPP is assigned as focal point to work with related units to propose next concrete actions and report to SBV Board. It is according to the direction from SBV leader by September 2017.

(2) Conducting test printing with experimental ink for 6 times

Test printing was carried out 7 times.

Through the technical guidance, project members (5 trained experts) acquired knowledge about large scale ink manufacturing beyond the experimental ink, so that it can be said that a degree of achievement is higher than the initial target.

At the planning stage of this project, 2 outputs and 5 indicators were set and then all achieved.

(Output 1) MP for ink production is developed.

- Indicator 1; Developing the MP
- Indicator 2: Agreement with SBV regarding various measures to implement the MP

(Output 2) The capacity of experimental printing-ink production is improved.

- Indicator 1; 5 experts trained for ink production technology
- Indicator 2; Acquisition of ink production technology for R&D activities
- Indicator 3: Summarizing basic requirements for ink production facility

2. Project inputs

2.1. NBPP project members

	Name	Description
1	Mr. Nguyen Van Toan	Project Manager
2	Mr. Pham Minh Quoc	Deputy Project Manager [SBV NH09 project]
3	Mr. Nguyen Van Long	Deputy Project Manager
4	Ms. Phan Thi Hong Tham	Accounting
5	Mr. Pham The Hung	Procurement
6	Mr. Bach Duc Chinh	Training team member (Full-time)
7	Mr. Le Viet Ha	Training team member (Full-time)
8	Ms. Nguyen Thi Thuy Ngoc	Training team member (Full-time)
9	Ms. Ho My Thanh	Training team member (Full-time)
10	Ms. Nguyen Thanh Tam	Training team member (Full-time)
11	Mr. Tran Duy Dung	Training team member (Part-time)
12	Mr. Nguyen Anh Tu	Training team member (Part-time)
13	Mr. Nguyen Van Huy	Training team member (Part-time)
14	Mr. Nguyen Hong Phong	
15	Mr. Bui Viet Hung	

2.2. Dispatch records of experts

2.2.1. Dispatch of Long-term Experts as Chief Advisor

	Name	Affiliation in NPBJ at the time of dispatch	Field	Period
1	Mr. Kazuhiro Hiwatashi	Head Office	Technical Experts	2014/11/29 – 2016/11/28 (2 years)
2	Mr. Hiroshi Iwasaki	Head Office	Technical Experts	2016/11/14 – 2017/11/28 (1 year)

2.2.2. Dispatch of Short-term Experts

	Name	Affiliation in NPBJ at the time of dispatch	Field	Period
1	Mr. Takaharu Ishii	Head Office	Plant main-tenance	2015/1/12 – 2015/1/15 (4 days)
2	Mr. Tatsuya Inaba	Head Office	Plant main-tenance	2015/1/12 – 2015/1/15 (4 days)
3	Mr. Asao Fukuura	Research Institute	Ink R&D	2015/7/6 – 2015/7/10 (5 days)
4	Mr. Masahiro Kaneko	Tokyo Plant	Ink manufactur-ing	2015/7/6 – 2015/7/10 (5 days)
			Ink manufactur-ing	2017/2/20 – 2017/2/24 (5 days)
5	Mr. Hiroshi Iwasaki	Research Institute	Ink R&D, Test print-ing	2016/8/22 – 2016/8/26 (5 days)
6	Mr. Ryosuke Yoshida	Tokyo Plant	Ink manufactur-ing	2017/2/20 – 2017/2/24 (5 days)

2.3. Project assistants

	Name	Description	Period
1	Ms. Nguyen Thi Thuy Tien	Vietnamese ↔ Japanese	2015/1 – 2017/11
2	Ms. Quach Thi Thuy	Vietnamese ↔ English	2015/7 – 2016/4

2.4. Training program records in Japan

The total of 3 times of Training and Dialogue Program were conducted within the project period of 3 years. Followings are the outline of the program.

2.4.1. 1st Training and Dialogue Program

Classification	Description
Program Number	J1522171
Course Title	Vietnam, Ink manufacturing technology
Training Site	(1) Toshin Yushi Co., Ltd. Yashio Plant (Saitama) (2) NPBJ Tokyo Plant (Tokyo) (3) NPBJ Research Institute (Kanagawa) (4) NPBJ Odawara Plant (Kanagawa)
Term of Program	2015/11/23 (Mon) - 2015/12/5 (Sat)
Program Attendees	6 technical officials of NBPP (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha (4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam
Outline of Program	(1) Toshin Yushi Co., Ltd. Yashio Plant [2015/11/24] - Plant tour of varnish manufacturing process (2) NPBJ Tokyo Plant [2015/11/25 - 27] - Training workshop on ink manufacturing (3) NPBJ Research Institute [2015/11/30 – 12/4] - Training workshop on offset ink and varnish (4) NPBJ Odawara Plant [2015/12/4] - Plant tour of ink manufacturing process and banknote production processes

2.4.2. 2nd Training and Dialogue Program

Classification	Description
Program Number	J1622059
Course Title	Vietnam, Ink manufacturing technology
Training Site	(1) NPBJ Tokyo Plant (Tokyo) (2) NPBJ Research Institute (Kanagawa) (3) Inoue Mfg., Inc. Isehara Factory (Kanagawa)
Term of Program	2016/10/17 (Mon) - 2016/10/28 (Fri)
Program Attendees	6 technical officials of NBPP (same as the 1 st program) (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha

	(4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam
Outline of Program	(1) NPBJ Tokyo Plant [2016/10/18 - 21] - Training workshop on ink manufacturing (2) NPBJ Research Institute [2016/10/24 – 26] - Training workshop on UV offset ink and varnish (3) Inoue Mfg.,Inc. Isehara Factory [2016/10/27] - Lecture on three roll mill and its handling - Plant tour of ink manufacturing related machineries

2.4.3. 3rd Training and Dialogue Program

Classification	Description
Program Number	J1722174
Course Title	Vietnam, Ink manufacturing technology
Training Site	(1) Printing Museum (Tokyo) (2) Bank of Japan Currency Museum (Tokyo) (3) NPBJ Odawara Plant (Kanagawa) (4) NPBJ Research Institute (Kanagawa) (5) DIC Graphics Corp. Tokyo Plant (Tokyo) (6) NPBJ Tokyo Plant (Tokyo)
Term of Program	2017/10/16 (Mon) - 2017/10/28 (Sat)
Program Attendees	6 technical officials of NBPP (same as the 1 st program) (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha (4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam
Outline of Program	(1) Printing Museum [2017/10/17] - Study on the history of printing technology (2) Bank of Japan Currency Museum [2017/10/18] - Study on the history of Japanese currency (3) NPBJ Odawara Plant [2017/10/19] - Plant tour of intaglio ink manufacturing process (4) NPBJ Research Institute [2017/10/20] - Training workshop on equipment for R&D (5) DIC Graphics Corp. Tokyo Plant [2017/10/23] - Plant tour of offset ink manufacturing process (6) NPBJ Tokyo Plant [2017/10/23 - 27] - Training workshop on large scale ink manufacturing - Training workshop on incoming materials check

2.5. Training program records in Vietnam

The total of 4 in-country trainings, 7 corresponding exercises, 7 print trials, 43 lectures and 11 study sessions were conducted within the project period of 3 years. Followings are the outline of the program. All programs were taken place in NBPP, Hanoi.

Classification	Conductor	Description
In-country training	Short-term expert	3 training workshops on ink manufacturing and ink R&D (3 days each)
		1 training workshop on machine maintenance
Corresponding exercise	NPBJ Tokyo plant ink division	7 corresponding exercises on ink manufacturing and color matching to check the learning level of trainings conducted by NPBJ Tokyo plant.
Print trial	Long-term expert	7 test printings (offset 5x, intaglio 2x) on experimental ink to learn ink production technologies for R&D activities
Lecture	Long-term expert	43 theoretical and interactive exercises to complement the activities for ink manufacturing and ink R&D
Study session	Training team member	11 study sessions conducted to share knowledge through explaining the ink QC manuals edited by each of training team member

2.5.1. In-country trainings

(A) 1st in-country training program

Classification	Description
Program Number	
Course Title	Vietnam, Ink manufacturing technology
Term of Program	2015/7/6 (Mon) - 2015/7/10 (Fri)
Program Attendees	8 technical officials of NBPP (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha (4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam (7) Mr. Nguyen Anh Tu (8) Mr. Nguyen Van Huy
Lecturer	Short-term experts (1) Mr. Asao Fukuura (2) Mr. Masahiro Kaneko
Outline of Program	Training workshop on ink manufacturing [2015/7/7 - 9]

	<ul style="list-style-type: none"> - Guidance on ink manufacturing preparatory work - Guidance on protectors and safety operation - Guidance on cleaning up the mess
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(B) 2nd in-country training program

Classification	Description
Program Number	
Course Title	Vietnam, Ink manufacturing technology
Term of Program	2016/8/22 (Mon) - 2016/8/26 (Fri)
Program Attendees	8 technical officials of NBPP (same as the 1 st program) (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha (4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam (7) Mr. Nguyen Anh Tu (8) Mr. Nguyen Van Huy
Lecturer	Short-term expert Mr. Hiroshi Iwasaki
Outline of Program	Training workshop on ink manufacturing [2015/8/23-25] <ul style="list-style-type: none"> - Guidance on implementation method of test printing - Guidance on evaluation methods for trial inks - Lecture on intaglio ink

(C) 3rd in-country training program

Classification	Description
Program Number	
Course Title	Vietnam, Ink manufacturing technology
Term of Program	2017/2/20 (Mon) - 2017/2/24 (Fri)
Program Attendees	8 technical officials of NBPP (same as the 1 st program) (1) Mr. Tran Duy Dung (2) Mr. Bach Duc Chinh (3) Mr. Le Viet Ha (4) Ms. Nguyen Thi Thuy Ngoc (5) Ms. Ho My Thanh (6) Ms. Nguyen Thanh Tam (7) Mr. Nguyen Anh Tu (8) Mr. Nguyen Van Huy
Lecturer	Short-term experts (1) Mr. Masahiro Kaneko (2) Mr. Ryosuke Yoshida
Outline of Program	Training workshop on ink manufacturing [2017/2/21-23]

	<ul style="list-style-type: none"> - Guidance on color matching with neutral colors - Comments on the result of the latest exercise - Guidance on daily maintenance of three roll-mill - Guidance on the care for ink drawdown spatula
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(D) In-country training program on machine maintenance

Classification	Description
Program Number	
Course Title	Vietnam, Machine maintenance method
Term of Program	2016/1/12 (Tue) - 2016/1/15 (Fri)
Program Attendees	83 technical officials from Plant maintenance, Printing, Prepress, Finishing and Engineering section of NBPP
Lecturer	Short-term experts (1) Mr. Takaharu Ishii (2) Mr. Tatsuya Inaba
Outline of Program	Workshop on machine maintenance [2015/1/13, 14] <ul style="list-style-type: none"> - Lecture on machine maintenance by experts - Lecture on machine maintenance by operators - Discuss the machine maintenance matters

2.5.2. Corresponding exercises

Nr.	Period	Description
1 st	2015/7/28 - 2015/8/18	Exercises on ink manufacturing and color matching <ul style="list-style-type: none"> - Making 4 primary color inks (Yellow/Magenta/Cyan/black) using Y/M/C/K pigments to check the learning level of in-country training conducted in July 2015 - Color matching using above Y/M/C/K inks to match with 25 color patches
2 nd	2015/8/24 - 2015/10/20	Exercises on ink manufacturing and color matching <ul style="list-style-type: none"> - Retrying the 1st exercise regarding ink manufacturing - Making green ink with 30% of cyan pigment, 70% of yellow pigment and varnishes to check the basic capacity of ink manufacturing
3 rd	2015/11/25 2016/3/11	Exercises on ink manufacturing and color matching <ul style="list-style-type: none"> - Making 3 colors (bluish/reddish/dull) of green ink and violet ink using Y/M/C/K pigments to check the basic capacity of ink manufacturing
4 th	2016/4/15 - 2016/7/10	Exercises on ink manufacturing and color matching <ul style="list-style-type: none"> - Retrying the 3rd exercise to check the capacity building - Color matching using Y/M/C/K pigments to match with the total of 6 color patches (green/violet/brown)
5 th	2016/11/10 -	Exercises on color matching <ul style="list-style-type: none"> - Color matching using Y/M/C/K pigments to match with the

	2017/1/6	total of 9 color patches (dark/light colors) including 3 pair ink
6 th	2017/4/4 2017/5/26	Exercises on color matching - Color matching using primary and neutral color pigments to match with the total of 5 color patches (orange/green/violet)
7 th	2017/7/17 - 2017/10/15	Exercises on color matching - Color matching using primary and neutral color pigments to match with the total of 20 color patches (vivid/light/dark colors)

2.5.3. Print trials

Nr.	Date	Process	Denom.	Substrate	Description
1 st	2016/ 5/24	Offset	d20,000	- Polymer - Paper	Check the print quality on polymer/paper according to the ink tack difference
2 nd	2016/ 8/24	Offset	d100,000	- Polymer - Paper	(1) Check the fitness of candidate varnishes to polymer/paper (2) Check the appropriate dryer concentration
3 rd	2016/12/23	Offset	d10,000	- Paper - Polymer	(1) Check the needs of different ink tack for cotton/polymer (2) Test the wet offset printability of trial inks (3) Check the needs of adding waxes for trial inks
4 th	2017/ 6/14	Offset	d50,000	- Polymer	(1) Check the properties of SICPA offset base inks (2) Check the basic ink formulation of NBPP trial ink
5 th	2017/ 9/ 5	Offset	d50,000	- Polymer	(1) Fine tuning of trial inks (2) Test of fluorescent ink and pigment
6 th	2017/ 9/ 6	Intaglio	d50,000	- Polymer	(1) Check the fitness of GSI intaglio base inks to NBPP requirements (2) Test the impact of the additives for set-off and blocking matters

7 th	2017/11/23	Intaglio	d50,000	- Polymer	(1) Fine tuning of GSI inks (2) Check the fitness of selected raw materials for the future R&D
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2.5.4. Lectures

(A) Lectured by Hiwatashi CA

Nr.	Date	Description
1 st	2015/ 3	Basics of printing methods
2 nd	2015/ 3	Introduction to Printing ink
3 rd	2015/ 4	Raw materials - Pigments and its testing
4 th	2015/ 4	Raw materials - Varnishes and Additives
5 th	2015/ 4	Drying of printing inks
6 th	2015/ 5	Rheology
7 th	2015/ 5	Color theory

(B) Lectured by Iwasaki CA

Nr.	Date	Description
1 st	2016/12/ 2	Quality control and technical standard
2 nd	2016/12/ 9	QC method for security inks examples
3 rd	2016/12/16	Security ink technologies in modern banknotes (1)
4 th	2017/ 1/ 6	Security ink technologies in modern banknotes (2)
5 th	2017/ 1/13	UV flexo for banknote over-coating
6 th	2017/ 1/20	Pigments for security inks
7 th	2017/ 2/ 3	Ideal procedure for executing print trial
8 th	2017/ 2/10	Interactive exercise on IR inks (1)
9 th	2017/ 2/17	Interactive exercise on IR inks (2)
10 th	2017/ 3/3	Manufacturing with base inks
11 th	2017/ 3/10	Interactive exercise on Fluorescent inks (1)
12 th	2017/ 3/17	Interactive exercise on Fluorescent inks (2)
13 th	2017/ 3/24	Banknote equipment; Vending, Banking
14 th	2017/ 6/29	Reflectance spectrum match
		Color density measurement
15 th	2017/ 8/ 3	Evaluation method for intaglio print trial
16 th	2017/ 8/ 4	Health & Safety - Use of Safety Data Sheet
17 th	2017/ 9/22	Resistance tests

18 th	2017/ 9/29	Rheology and Rheometer measurement
19 th	2017/10/2	Materials QC - Quality plan
20 th	2017/10/2	Materials QC - Color-Tint Strength-Opacity
21 st	2017/10/3	Materials QC - Preparation/Hoover muller
22 nd	2017/10/6	Materials QC - Oil Absorption
23 rd	2017/10/6	Materials QC - Moisture/volatile content
24 th	2017/10/13	Materials QC - Fineness of Grind
25 th	2017/10/13	Materials QC - Water soluble matter
26 th	2017/10/13	Materials QC - Ignition residue-Ash
27 th	2017/10/13	Materials QC - pH Value
28 th	2017/10/13	Materials QC - Viscosity
29 th	2017/10/13	Materials QC - Acid Value
30 th	2017/10/13	Materials QC - Refractive Index
31 st	2017/10/13	Materials QC - Melting point
32 nd	2017/11/15	Procurement specification
33 rd	2017/11/24	Ink QC/Materials QC - Luminescence Properties
34 th	2017/11/24	Materials QC - Sampling
35 th	2017/11/24	Materials QC - Preparation of reference sample

2.5.5 Study sessions

Nr.	Date	Description	Lecturer
1 st	2017/07/14	Ink QC - Quality Plan	Mr. Chinh
2 nd	2017/07/21	Ink QC - Fineness of Grind	Mr. Chinh
3 rd	2017/07/21	Ink QC - Color	Ms. Tam
4 th	2017/07/28	Ink QC - Tack	Ms. Ngoc
5 th	2017/07/28	Ink QC - Viscosity	Ms. Thanh
6 th	2017/08/04	Ink QC - Drying Time	Mr. Tu
7 th	2017/08/17	Ink QC - Preparation of test prints	Ms. Tam
8 th	2017/08/17	Ink formulation designing manual	Mr. Chinh
9 th	2017/9/22	Ink color matching manual	Mr. Chinh
10 th	2017/10/9	Three roll-mill operating manual	Mr. Ha
11 th	2017/10/6	Ink QC - IR Properties	Mr. Dung

2.6. Equipment and reference literatures financed by JICA

2.6.1. Equipment procured by JICA

Place; NBPP

Nr	Item	Price	Dates
1	Hoover Automatic Muller Manufacturer: Toyo Seiki Seisakusyo Model: No.465	85,392,524 VND	Delivery: Aug. 2015
	Glass plate for Muller (2 plates x 6 sets = 12 plates)		Delivery: Aug. 2015
2	Brookfield-type Viscometer Manufacturer: Atago Model: LVDV-E	64,733,336 VND	Delivery: Aug. 2015
3	Burette, Flask, etc	Unknown	Delivery: Dec. 2014
4	Stirrer, Jack	Unknown	Delivery: Dec. 2014
5	Digital Scale Manufacturer: A&D Model: HV-15KGV-K	Unknown	Delivery: Dec. 2014
6	Local Exhaust Ventilation System Manufacturer: Showa Denki Model: CFA-215SD	85,392,524 VND	Delivery: Dec. 2014
7	Planetary Mixer (small type) Manufacturer: Inoue MFG Model: PLM-5	679,302,953 VND	Delivery: Aug. 2015
8	Fineness of Grind Gauge 25µm Manufacturer: Tester Sangyo Model: PI-901	Unknown	Delivery: Aug. 2015
9	Ink Drying Time Tester Manufacturer: Toyo Seiki Seisakusyo Model: No.460	142,716,185 VND	Delivery: Aug. 2015
10	Drying Oven Manufacturer: Isuzu Seisakusyo Model: Cosmos VNT-111	Unknown	Delivery: Dec. 2014

Procured under the budget of "Experts' Hand-carry Equipment"

Nr	Item	Price	Dates
1	Personal Computer (Note PC) Manufacturer: Acer Model: Aspire E 14	9,990,000 VND	Delivery: Jan. 2015 Handover: Nov.2017

2	Personal Computer (Note PC) Manufacturer: Acer Model: Aspire E 14	9,990,000 VND	Delivery: Jan.2015 Handover: Nov.2017
3	Personal Computer (Note PC) Manufacturer: Acer Model: Aspire E 14	9,690,000 VND	Delivery: Mar. 2015 Handover: Nov.2017
4	Laser Printer Manufacturer: Canon Model: LBP-2900	3,136,364 VND	Delivery: Jan. 2015 Handover: Nov.2017
5	Inkjet Printer Manufacturer: Canon Model: PIXMA E560	2,827,273 VND	Delivery: Jan. 2015 Handover: Nov.2017
6	Inkjet Printer Manufacturer: Canon Model: PIXMA E560	2,827,273 VND	Delivery: Mar. 2015 Handover: Nov.2017
7	Digital Projector Manufacturer: Benq Model: MS506P	6,799,000 VND	Delivery: Dec. 2016 Handover: Nov.2017
8	High Speed Document Scanner Manufacturer: HP Model: Scanjet Pro 3000 s2	8,790,000 VND	Delivery: Feb. 2017 Handover: Nov.2017
9	Digital Camera (macrophotography) Manufacturer: Ricoh Model: WG-5 GPS	7,490,000 VND	Delivery: Mar. 2017 Handover: Nov.2017

2.6.2. Reference literatures financed by JICA

Nr	Item	Price	Dates
1	"Moneymakers"	1,377,000 VND	Delivery: Mar. 2017 Handover: Nov.2017
2	"Introduction to Security Printing"	1,688,000 VND	Delivery: Mar. 2017 Handover: Nov.2017
3	"The Printing Ink Manual"	5,283,000 VND	Delivery: Jun. 2017 Handover: Nov.2017
4	"Special Effect Pigments"	8,796,000 VND	Delivery: Feb. 2017 Handover: Nov.2017
5	"High Performance Pigments"	5,398,000 VND	Delivery: Mar. 2017 Handover: Nov.2017
6	"Pantone Solid Chips" (color patches) (macrophotography)	13,162,000VND	Delivery: Jul. 2017 Handover: Nov.2017
7	27 ink related ISO standards	11,960,000 VND	Delivery: Apr. 2017 Handover: Nov.2017

2.7. Equipment procured by Vietnamese side

2.7.1. Equipment procured by NBPP

Nr	Item	Price	Dates
1	Fade-o-meter Manufacturer: Suga Test Instruments Model: GX 75	1,671,151,596 VND	Delivery: Jul.2016
2	Three-roll mill Manufacturer: Inoue Mfg. Model: S-9×20inch	1,938,748,404 VND	Delivery: Jul.2016
3	Standard light booth Manufacturer: X-Rite Model: Judge QC Color Viewing Booth (dual daylight)	Unknown	Delivery: Jan.2017
4	IGT Orange Proofer Manufacturer: IGT testing systems Model: OP	1,657,278,080 VND	Delivery: Mar.2017
5	Spectrophotometer Manufacturer: Datacolor Model: MF-45IR		
6	CCM (Computer Color Matching) software Manufacturer: Datacolor Model: Match Pigment		

2.8. Operation cost (JICA financed portion)

Unit: Vietnamese Dong

Period	Amount
Japanese Fiscal Year 2014 (November 2014 – March 2015)	140,184,675 VND
Japanese Fiscal Year 2015 (April 2015 – March 2015)	1,074,774,715 VND
Japanese Fiscal Year 2016 (April 2016 – March 2017)	617,566,660 VND
Japanese Fiscal Year 2017 (April 2017 – November 2017)	290,588,663 VND
Grand total	2,123,114,713 VND

Note ; The amount excludes cost for dispatches of long-term and short-term experts and training in Japan. The breakdown of this operation cost is shown as 2.8.1. below.

2.8.1. Main expenditure

(1) Project assistants

- Assistant 1 (Vietnamese ↔ English)
Period; July 2015 – April 2016
- Assistant 2 (Vietnamese ↔ Japanese)
Period; January 2015 – November 2017

(2) Business trips (Vietnam ↔ Japan);

- Accompany with the Training and Dialogue Programs in Japan.
Total of 3 times; November 2015, October 2016, October 2017
- Study tour of NPBJ Research Institute for planning NBPP R&D facility.
August 2015
- Study tour of NPBJ Tokyo Plant Prepress department by the request of NH09 project (SBV).
May 2016
- Coordination meetings with NPBJ and other institutions.
Total of 4 times; March 2015, March 2016, July 2016, May 2017

(3) Books (Price indicated if exceeds 50,000 JPY)

- "Moneymakers"; Delivered March 2017
- "Introduction to Security Printing"; Delivered March 2017
- "The Printing Ink Manual"; Delivered June 2017
- "Special Effect Pigments"; Delivered February 2017
- "High Performance Pigments"; Delivered March 2017
- "Pantone Solid Chips" (color patches); Delivered July 2017,

Price 13,162,000 VND

- 27 ink related ISO standards; Delivered April 2017

(4) Office equipment & Technical equipment (Price indicated if exceeds 50,000 JPY)

- Personal Computer (Note PC); Delivered January 2015,

Price 9,990,000 VND

- Personal Computer (Note PC); Delivered January 2015,

Price 9,990,000 VND

- Personal Computer (Note PC); Delivered March 2015,

Price 9,690,000 VND

- Inkjet Printer

- Digital Projector

- High Speed Document Scanner

- Digital Camera (macrophotography)

(5) Office Stationery

3. Project activities

Activity record (actual vs. plan) is shown in the Table 3.0.1. Activity details are mentioned after the table.

Table 3.0.1. Activity record (actual versus plan)

Inputs				Plan	2014				2015				2016				2017			
Expert				Actual	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV		
	Long Term Expert : Chief Advisor / Ink Production			Plan																
				Actual																
	Short Term Expert			Plan																
				Actual																
Equipment				Plan	2014				2015				2016				2017			
	Necessary Equipment			Actual																
				Plan																
				Actual																
Training in Japan				Plan	2014				2015				2016				2017			
	Training for Counterpart Personnel			Actual																
				Plan																
				Actual																
In-country/Third country Training				Plan	2014				2015				2016				2017			
	Seminar/Training for Counterpart Personnel in Vietnam			Actual																
				Plan																
				Actual																
Activities				Plan	2014				2015				2016				2017			
Sub-Activities				Actual	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV		
Output 1: Master Plan (MP) for ink production is developed																				
	1.1 Review challenges and external issues on ink production			Plan																
				Actual																
	1.2 Classify challenges and goals of future plan of ink production, and develop a draft M/P (including road map)			Plan																
				Actual																
	1.3 Review the details of managerial resources necessary for the implementation of the M/P			Plan																
				Actual																
	1.4 Conduct trainings and consultancy regarding implementation of MP and efficient plant operation and management as necessary			Plan																
				Actual																
	2.1 Review the necessary equipments for R&D activity, and develop a program for the procurement of equipments			Plan																
				Actual																
	2.2 Review the distribution channel of raw materials necessary for ink production in Vietnam			Plan																
				Actual																
	2.3 Review the R&D facilities and its capacities in SBV			Plan																
				Actual																
	2.4 Conduct trainings of ink production and printing test using SBV's equipment			Plan																
				Actual																
	2.5 Conduct trainings of ink production using NPB's equipment in Japan			Plan																
				Actual																
	2.6 Research published information on technology of intaglio ink in the world and search for cooperative varnish makers			Plan																
				Actual																

3.1. Activities for developing the Master Plan

Activities in regard to develop the MP for ink production were as follows.

3.1.1. Review challenges and external issues on ink production

In January 2015, JICA expert and the project members reviewed challenges and external issues on the current situation of ink production in NBPP through conducting the SWOT analysis (Analysis for Strength, Weakness, Opportunity, Threat).

As a result, it was pointed out as weak points that there was no information on the raw materials suppliers, no experiences on R&D, and no R&D policies in NBPP.

As a basic idea, it was confirmed that 1) NBPP will manufacture inks by milling from pigments and varnishes, 2) those varnishes will not be manufacture in-house and will purchase from the external suppliers.

Table 3.1.1. Table of SWOT analysis result (Feb. 2015)

	Strength	Weakness
Internal factors	1) Support by SBV 2) Experience in banknote printing 3) Hard working staff	1) Lack of material resources 2) Policy to R&D 3) Lack of equipment 4) Inexperience in ink production 5) Budget
	Opportunity	Threat
External factors	1) Strong partnership with JICA & NPB 2) Guidance from expert 3) To get know-how about ink production 4) To achieve project's goal	1) Dependence on foreign country, material, resources, etc. 2) Lack of leeway to research & experiment

3.1.2. Classify challenges and goals of future plan of ink production, and develop a draft MP (including road map)

Until May 2016, JICA expert and project members had consultations on challenges and goals of future plan of ink production. Then the draft MP were submitted to the Project Manager in November 2016.

(A) Classify challenges of future plan of ink production

In case this type of the large-scale project which has many factors related to achieve the final goal (“Vision”), it is effective to settle intermediate targets (“Milestones”) and to make a rough plan (“Master Plan”).

The final goal was changed in October 2016 from the original "Establishing the ink production plant" to "In-house intaglio ink manufacturing by milling raw materials" at the request from the NBPP. In this case the raw materials are pigments, varnishes and additives.

It should be noted that it is necessary to progress step by step with acquiring know-how since there needs extensive knowledge and understandings in a wide range of areas to start the ink manufacturing.

Type of ink manufacturing and its difficulty level are as shown in Table 3.1.2. In the MP, the ink manufacturing in NBPP is recommended to start by mixing base inks and acquire necessary know-how, then proceed to the milling from pigments.

Table 3.1.2. Type of ink manufacturing and its difficulty level

Type of ink mfg.	Needs of know-how						Difficulty level
	Pigment	Varnish	Additive	Design	Process	QC	
RTU*1 ink [Current]	Unnecessary						Easy ↓ ↓ ↓ ↓ ↓ Difficult
Mixing Base Inks	Necessary	Unnecessary		Necessary			
Milling from pigment	Necessary						

Note *1; RTU = Ready To Use

In addition, type of ink applied and its difficulty level are as shown in Table 3.1.3. It is recommended in the MP to start from studying offset inks to acquire necessary know-how, then proceed to study intaglio inks.

Table 3.1.3. Type of ink applied and its difficulty level

Appli-cation	Varnish	Check items and their influence on the product						Difficulty level
		Wip-ing	Set-off	Sub-strate	MR*2	AIF*3	Cost	
Offset	General	No	Small	Large	Small	No	Small	Easy ↓ ↓ Difficult
Intaglio	Special	Large						

Note *2; MR = Machine Readability, *3; AIF = Automatic Ink Feeding

(B) Classify goals of future plan of ink production

By considering the ink application, type of ink manufacturing and those difficulty levels, and the scale of manufacturing volume, the goals of future plan of ink production were classified. As a result, the long-term activities were divided into six phases (see Table 3.1.4.) and set the intermediate targets (milestones) until the final goal, the end of 2030 when NBPP can manufacture intaglio ink by milling raw materials*4.

*Note *4; Raw materials = Pigments, Varnishes and Additives*

Table 3.1.4. Term of each phase and description (Mar. 2016)

Phase	Term	Description
1 st	2014 - 17	Phase of this JICA technical cooperation project
2 nd	2018	Phase of offset ink manufacturing
3 rd	2019 - 20	Phase of offset ink / numbering ink manufacturing for all denominations
4 th	2021	Phase of making plan for ink manufacturing plant
5 th	2022 - 25	Phase of construction of ink manufacturing plant
6 th	2026 - 30	Phase of intaglio ink manufacturing in pilot scale by milling raw materials

(C) Develop a draft MP

The issues to be solved to achieve each milestone of the six phases were clarified. And the concrete measures to solve those issues were proposed and then a draft MP was created. In addition, a roadmap for the MP which lists all activities in an easy-to-understand manner was prepared.

3.1.3. Review the details of managerial resources necessary for the implementation of the MP

(A) Review the implementation framework of each phase of the MP

The organization scheme to promote activities in each phase was discussed and they were added to the MP.

(B) Consider the necessary machines for the next phase

As for the 2nd and 3rd phases after this project completion, it was proposed to introduce 3 machines of three-roll mill of 9-inch diameter since the offset ink and number ink will be manufactured in-house. In addition, for the R&D of intaglio ink, it was also proposed the introduction of 1 machine of three-roll mill of 12-inch diameter.

(C) Consider the work room for the next phase

In order to have a work room suitable for the next phase, NBPP prepared an

ink manufacturing room of approximately 240 m² in the current premise. (May 2017)

On November 8, 2017, the inauguration ceremony was held in the room with all relevant participants gathered.

(D) Consider the necessary equipment for ink manufacturing and R&D activities

Based on the MP and the “Proposal on R&D facilities of the State Bank of Viet Nam” which submitted in September 2015, the equipment necessary for ink manufacturing and R&D activities was studied and the “List of equipment and instruments for R&D and production” was submitted in November 2016.

CA explained that what kind of investigations to be used these devices in the lecture. (March 2017)

At the Research Institute of NPBJ in the final training program in Japan, some of these devices were explained to program attendees (6 out of 8 training team members) how to use them in R&D activities. (October 2017) This training was useful for considering future R&D of NBPP.

3.1.4. Conduct trainings and consultancy regarding implementation of MP and efficient plant operation and management as necessary

(A) Conduct training and consultancy regarding efficient plant operation and management

Since NBPP wants to implement more efficient and effective plant management in constructing a new printing plant, holding the training workshop regarding plant management was requested.

Therefore, 2 short-term experts from NPBJ were dispatched to NBPP and the training workshop was conducted in January 2016. In the workshop, presentations entitled “Maintenance activities by plant management staffs in NPBJ” and “Autonomous maintenance activities by the printers in NPBJ” were explained. Then exchange of opinions with NBPP officials was conducted.

A total of 83 NBPP officials participated in this training workshop, and there were more than 50 questions and answers. This indicates high level of interest.

Based on experience of this activity, NBPP has issued “Manual for maintenance of equipment of National banknote printing plant” in October 2017.

(B) Conduct consultancy regarding implementation of MP; Holding explanatory meeting

The MP developed in this project shall be approved within the State Bank of Viet Nam. This MP is a mid- to long-term basis with a wide range of contents, including enhance of R&D, establish of new plant, procurement of equipment

and raw materials, so the other departments than NBPP such as manpower planning and budget planning departments are related.

Therefore, after consultation with the Project Manager, NBPP held an explanation and consultation meeting on June 2017 inviting representatives of NBPP, NH09, SBV (Issue and Vault, Finance and Accounting, and ICD), JICA expert and JICA Vietnam Office.

(C) Conduct consultancy regarding implementation of MP; Making the HRD (human resource development) program

In advancing the MP after this project completion, the human resource development is important. The experts cultivated in this project shall play a key role to foster next generation of human resources.

Lecturers with knowledge and capacities are indispensable for human resource development, and the HRD program and educational material are also essential, so the following activities were carried out.

1) Develop a HRD program

In order to promote human resources development efficiently in a short period of time, it is necessary to clarify the capacity requirements for job duties, to evaluate individual capacities by skill-map, and to systematically develop the deficient abilities.

(1) R&D personnel, (2) ink manufacturing engineers, and (3) quality control personnel (ink / raw materials) are needed to be trained. These human resources are divided into Beginner, Intermediate and Expert, according to the level of capacity requirements. The teaching content is summarized in lectures, practical trainings, and OJT as a HRD program.

2) Prepare education materials

The information introduced in the technical guidance of this project has been written with tables and figures as much as possible. By doing this, it becomes education material that the trained experts themselves will be able to look back after the project completion, and to train new engineers.

Additionally, in order for the project members to obtain more sophisticated knowledge as necessary after the project, books written in English regarding printing inks, anti-counterfeit technology and ISO documents of quality control of ink / raw materials were purchased. These can also be useful as education materials. Furthermore, book with solid color patches were purchased as practical training material in developing color matching capacities.

3.2. Activities for the capacity improvement

Activities in regard to improve the capacity of experimental printing-ink production were as follows.

3.2.1. Review the necessary equipment for R&D activity, and develop a program for the procurement of equipment

In NBPP, since some offset inks have been manufactured in-house by mixing base inks, they own a small three-roll mill (7-inch diameter) and principal ink quality control equipment. However, it was not enough to manufacture experimental inks, including intaglio ink, from raw materials and also not enough to promote ink related R&D activities. Therefore, documents on necessary equipment were prepared and then procurement was proceeded.

JICA procured equipment for weighing, mixing and quality inspection in July and August 2015. Then NBPP introduced three-roll mill (9-inch diameter) in August 2016, light fastness tester (Fade-o-meter) in August 2016, standard light source in January 2017, CCM system in March 2017.

In particular, the CCM system is important for efficiently promoting the ink formulation designing in ink R&D, and the spectrophotometer which is a part of CCM is also useful for quality control of ink and the incoming raw materials.

3.2.2. Review the distribution channel of raw materials necessary for ink production in Vietnam

In order to manufacture printing ink over a long period of time, stable supply of the raw materials, such as varnish, pigment and additives, is essential.

In Vietnam, there is an organization called VPIA (Vietnam Paint & Printing Ink Association), and many of the member companies are raw material suppliers. However, since it was not known whether there were suppliers who manufacture pigments, the pigment manufacturing situation in Vietnam was investigated.

CA contacted DIC and Clariant, which are counted among the world's three largest manufacturers of colored pigments. Then following information was obtained as common views between the two companies.

1) There are no accurate figures on domestic pigment production volume or import volume in Vietnam.

2) There are no domestic pigment manufacturers. So, all the colored pigments in Vietnam are 100% imported.

3) Some suppliers import powder pigments and sell them as master batch or pigment paste.

Therefore, the procurement of pigment in Vietnam is about which manufacturer's imported pigments to buy. So, it was decided to summarize the

results of investigating import agencies. Since NBPP is fundamentally procured by public tender, the necessary pigments were compiled in a list, with candidate pigments which are the same chemical structure but from other suppliers.

(September 2017)

Samples of those candidate pigments were delivered and the evaluation method was instructed. (October 2017)

For the varnishes and additives, the materials investigated in the project period were summarized in a list. In this case, there are almost no equivalent products as varnishes and additives except for driers, so the other companies' products were not surveyed.

In the MP, ink manufacturing by mixing base inks is planned before starting ink manufacturing by milling raw materials. Therefore, as suppliers of base inks, Sicpa and Gleitsmann Security Inks (GSI) which have proven in the banknote ink industry were investigated. Both companies sell base inks for offset and intaglio, but base inks for intaglio is currently possible to purchase only from GSI.

3.2.3. Review the R&D facilities and its capacities in SBV (NBPP)

Future ink R&D activities were consulted with the project members in February 2015. The results were summarized in Table 3.2.1 and scheduled time were shown in the MP.

In August 2015, tours of NPBJ Research Institute and NPBJ Tokyo Plant were conducted. Then requirements of the future R&D facilities such as ink manufacturing room, analysis room, hazardous/explosive materials store room, drainage treatment were proposed in September 2015. A list of equipment necessary for R&D activities was finished in November 2016, then was attached to the MP.

Table 3.2.1. Ink R&D activities planned in the MP

Classification	Activities	Schedule
Ink manufacturing	Research on Offset/Numbering ink	2018 - 2020
	Improvement of ink quality	2022 -
	Research on intaglio ink manufacturing process	2019 - 2020
	Research on intaglio ink formulation (milling raw materials)	2022 -
	Research on UV over-coating technology	2019 - 2020
Quality Control	Research on quality control method	2018
	Research on measuring instruments	2018
Security	R&D of anti-counterfeit ink	2026 -

3.2.4. Conduct trainings of ink production and printing test using SBV's

equipment

3.2.5. Conduct trainings of ink production using NPB's equipment in Japan

To develop the training team members' capacity necessary to be trained, local guidance (technical guidance and print trial guidance) by long-term experts, trainings in Japan, training workshops in Vietnam, and corresponding exercises by NPB Tokyo plant were combined. The guidance categories are as shown in Table 3.2.2.

For each training in Japan, program attendees were fixed and dispatched for the future ink manufacturing plans.

Table 3.2.2. Guidance categories

Required capacity	By CA	Training in Japan			In-country training			Corresponding exercise	
		1st	2nd	3rd	1st	2nd	3rd	Prior	Latter
Ink manufacturing		■	■	■	■			■	
Color matching	■		■	■			■		■
Ink QC	■						■		
Raw materials QC	■			■					
Ink formulating	■	■	■						
R&D conducting	■					■			

(A) Ink manufacturing and Color matching capacity development

Capacity development of ink manufacturing and ink color matching were carried out by full cooperation of the NPB Tokyo plant. Practical instructions at the training in Japan, training workshop in Vietnam by dispatching short-term experts were conducted. In addition, corresponding exercises to review and confirm the capacities acquisition situation were conducted. The outline is shown in Table 3.2.3.

In addition, together with the training team members, manuals regarding the operation and maintenance of the three-roll mill, and ink color matching were prepared. 2 study sessions were held with using manuals as education material, and training team members also attempted to establish knowledge by becoming a lecturer. These education materials can also be used for future human resource development.

In the 3rd training in Japan, the study tour of the offset ink manufacturing process of DIC Graphics' Tokyo plant was conducted. This urged members to understand a series of tasks from weighing to manufacturing, quality control, finishing and filling. By observing the work place layout and actual work of the machinery and equipment at the workplace, we can make use of it in the future

construction of an ink manufacturing plant.

Since the degree of acquisition of ink production technology by the training team members was high, it became highly advanced teaching contents beyond the project purpose, " The SBV is able to manufacture experimental printing ink", and finally, guidance on the large scale ink production was conducted.

Table 3.2.3. Guidance on teaching ink manufacturing and ink color matching capacities

Classification	Description
Training in Japan	1 st (2015/11); Safe handling of three roll mill 2 nd (2016/10); Ink color matching capacity 3 rd (2017/10); Guidance on large scale production
In-country training [by Short-term experts]	1 st (2015/7); - Preparation work for ink manufacturing - Handling of protectors - Safe handling of three-roll mill 3 rd (2017/2); - Guidance on ink color matching - Guidance on the maintenance of three-roll mill
Corresponding exercise	Seven times for the purpose of review of the teaching content of NPBJ Tokyo plant and evaluation of acquisition level. If failure the exercise, resubmission was needed. 2015/7 - 2016/3: Exercises regarding the basics of ink manufacturing 2016/4 - 2017/10; Exercises regarding ink color matching Developing a three-roll mill operation manual was also instructed.
Study session	2 study sessions regarding three-roll mill operating and color matching were conducted to share knowledge through explaining the manuals edited by full-time training team members.

(B) Ink QC and Raw materials QC capacity development

Capacity development of ink QC and raw materials QC were carried out by technical guidance by long-term experts, trainings in Japan and training workshops in Vietnam by short-term experts from NPBJ Tokyo plant. The outline is shown in Table 3.2.4.

19 lectures and practical instruction by a long-term expert were conducted from December 2016. Various quality inspection methods and their purposes, pass/fail judgment method were instructed from April 2017 with reference to ISO documents and various literatures, then 22 manuals were developed with the

training team members. These manuals can be used as education materials for future human resource development and can also be utilized as manufacturing standards or quality standards. In addition, study sessions were held using these manuals. 8 study sessions lectured by the training team members were conducted to establish knowledge.

Regarding capacity development of raw materials QC, practical instructions on incoming raw materials inspection methods at the 3rd training in Japan were conducted with the cooperation of the NPBJ Tokyo plant. These instructions were prepared after related lectures in Vietnam by a long-term expert, so that the degree of understanding was deeper.

Table 3.2.4. Guidance on ink QC and raw materials QC

Classification	Description
Training in Japan	3 rd (2017/10); - Guidance on incoming raw materials inspection methods
In-country training [by Short-term experts]	3 rd (2017/2); - Guidance on ink drawdown by spatula - Guidance on the fineness of grind
Lecture	19 lectures on ink QC and raw materials QC were conducted.
Study session	8 study sessions conducted to share knowledge through explaining the ink QC manuals edited by each of training team member (full-time and part-time).

(C) Ink formulating capacity development

Capacity development of ink formulating was carried out by technical guidance by a long-term expert, training in Japan and training workshop in Vietnam by short-term expert from NPBJ Research Institute. The outline is shown in Table 3.2.5.

At the NPBJ Research Institute in the 1st training in Japan, effects of raw materials (varnish) on the offset ink properties were taught. (October 2015) According to NBPP's request, UV-cured offset ink and its varnish were taught in the 2nd training in Japan. (October 2016)

Through 5 lectures and practical instructions by a long-term expert, luminescent features and machine-readable features which are important anti-counterfeit technology of the security ink were taught. (January - March 2017) Finally, this information was assembled as an ink formulation design manual and a study session lectured by the project member were conducted. (August 2017)

Table 3.2.5. Guidance on ink formulating

Classification	Description
Training in Japan	1 st (2015/11); Effects of varnish on the offset ink properties 2 nd (2016/10); UV offset ink and its varnish
Lecture	5 theoretical and interactive exercises on ink formulating were conducted.
Study session	A study session regarding ink designing was conducted to share knowledge using the ink formulation manual edited by a member.

(D) R&D conducting capacity development

Capacity development of R&D conducting was carried out mainly by print trials, lectures and technical guidance by long-term experts. 7 lectures regarding basics of printing ink were conducted between March and May 2015. 12 lectures and practical instruction were conducted from December 2016. Through print trials, proceeding the experiment, data collection method, evaluation method of ink, print and printability, planning the print trial, reporting the result were instructed. The outline is shown in Table 3.2.6.

The main objective of print trials is to establish the basic formulation of experimental offset ink manufactured by milling raw materials, but in addition to this, offset ink manufactured by mixing base inks was also tested for the smooth implementation of the MP.

Because of fixing the same denomination of print trial by NBPP, more effective activities became possible by improving the print results step by step through experiments, considerations and modifications. Based on the results of print trials, knowledge such as the target tack value of offset ink, the necessity of additives (waxes) was obtained. This can be utilized for future ink R&D activities after the project completion.

Since NBPP intended to start manufacturing offset ink as soon as possible by mixing base inks, lecture on the selection of base inks, ink formulating with base inks and precautions on handling base inks was carried out by a long-term expert.

Table 3.2.6. Guidance on R&D conducting

Classification	Description
In-country training [by Short-term experts]	2 nd (2016/8); - Guidance on implementation method of test printing - Guidance on evaluation methods for trial inks
Lecture	12 lectures on ink R&D were conducted.

Print trial	<p>Followings were learned through conducting 5 print trials for experimental offset ink.</p> <ul style="list-style-type: none"> - Build a basic ink formulation and target tack value - Evaluation methods for print quality and printability - Evaluation methods for fluorescent ink and machine readable ink - Tutorial on writing a research report - Ideal procedure for the print trial
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3.2.6. Research published information on technology of intaglio ink in the world and search for cooperative varnish makers

Since the intaglio ink is one of the highly secured core technologies of Bank of Japan's notes, there exists a difficulty in disclosing information about the intaglio ink technology of NPB (See 1.3.2. (F) for reference).

Therefore, investigation on information disclosed regarding intaglio ink of the world was carried out, then a lecture on intaglio ink characteristics and the security features of intaglio printing was conducted by a short-term expert. (August 2016)

Manufacturing, color matching and quality control of intaglio ink are generally able to be dealt with capacity developed on offset ink, even though the raw materials used are partly different. However, ink formulating and R&D conducting of intaglio ink are difficult for NPB to give guidance because NPB does not have the world standard technology for intaglio ink. In addition, if it comes to NPB's technologies concerning intaglio ink used for Japanese banknote, it is difficult for NPB to cooperate due to the security matter of Japanese banknote.

In spite of the situation mentioned above, NBPP strongly requested technical guidance on intaglio ink, therefore the co-investigations with project members regarding intaglio base inks and candidate raw materials for intaglio ink were conducted through two print trials. (September and November 2017) As a result, useful knowledge was obtained in future R&D activities of intaglio ink.

In the 3rd training in Japan, the plant tour of the large scale intaglio ink manufacturing process at NPB Odawara Plant was conducted. In addition to this, the plant tour of the large scale offset ink manufacturing process at DIC Graphics Tokyo Plant was also conducted. The series of operations from weighing to milling, quality control, finishing and filling were explained in both tours. By comparing both of these manufacturing processes, NBPP can make use of this knowledge in future ink production plant construction.

Table 3.2.7. Guidance on intaglio ink

Classification	Description
Training in Japan	3 rd (2017/10); - Plant tour of the large scale intaglio ink manufacturing process
In-country training [by Short-term experts]	2 nd (2016/8); - Lecture on intaglio ink based on the published technical information (patents and literatures) in the world
Print trial	Followings were learned through conducting 2 print trials for experimental intaglio ink. - Fine tuning of GSI intaglio base inks - Evaluation methods for print quality, printability, ink set-off and blocking

4. Project outputs

4.1. Output 1; Master Plan (MP) for ink production is developed

MP for ink production was created by CA based on NBPP's request and then completed while confirming the details with the project members.

4.1.1. Indicator 1; Developing the MP

It should be noted that this MP is not intended only about the establishment of an ink production plant. Though the title of MP is "Master Plan for establishing the ink production plant", the content sets the final goal to "In-house intaglio ink manufacturing by milling raw materials", and sets also the activities required after the establishment of the ink plant.

As an indicator 1, following document and supplement materials are attached herewith.

[4.1.1] Master Plan for establishing the Ink Production Plant (Vn/Jp)

[4.1.2] Appendix 1-Phases and milestones (Large/Small classification) (Vn/Jp)

[4.1.3] Appendix 2-Phases and milestones (Detail) (Vn/Jp)

[4.1.4] Appendix 3; Road map (Vn/Jp)

4.1.2. Indicator 2; Agreement with SBV regarding various measures to implement the MP

NBPP held an explanation and consultation meeting on June 7, 2017 inviting representatives of NBPP, NH09, SBV, JICA expert and JICA Vietnam Office. NBPP finalized the draft MP and submitted to SBV on June 19, 2017. On September 20, MP was approved by the Deputy Governor of SBV.

In advancing the MP after this project completion, the HRD program is developed. In addition, as textbooks and practical training materials for the future HRD in NBPP, 52 materials prepared for lectures and study sessions were documented in Vietnamese.

As an indicator 2, following documents are attached herewith.

[4.1.5] Activities for preparation of the next phase (Vn/Jp)

[4.1.6] Proposal on R&D facilities of the SBV (Vn/Jp)

[4.1.7] Equipment required to conduct R&D activities according to the MP (Vn/Jp)

[4.1.8] List of equipment and instruments for R&D (study of printing ink) (En)

[4.1.9] List of equipment and instruments for R&D (study of anti-counterfeiting technologies) (En)

[4.1.10] List of equipment and instruments for production (En)

[4.1.11] Human resource development plan (Vn/Jp)

[4.1.12] Human resource development plan, Outline (Vn/Jp)

[4.1.13] List of education materials for human resource development activities
(En)

4.2. Output 2; The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop)

In order to manufacture banknote printing inks, it is necessary to obtain ink manufacturing related capacities and to develop inks suitable for Vietnamese banknotes. Based on the Result-Based Management recommended by JICA, objectively verifiable method of evaluating capacity improvement was considered by CA.

4.2.1. Indicator 1; 5 experts trained for ink production technology

There was no explanation about “experts trained for ink production technology” in any document of this project. Therefore, in consultation with NBPP, it should be defined and mutually agreed what capacities are required as experts and how to prove to be experts.

(A) Concept of five experts

Eight people are registered in this project as members of the training team, of which five are full-time. Two of full-time members are male and three are female.

As described in 1.3.2 (C), the capacities required to become experts on ink production technology are ink manufacturing, color matching, ink quality control and raw material quality control. There are so many items and areas to be gained in each capacity.

In addition, handling of three roll mills, which is the main equipment of ink production, involves manual labor and there is no choice but to develop male members in ink manufacturing capacity. On the other hand, in the field of quality control of ink and raw materials, feminine nicety and sensitivity are more effective.

Note 1: Actually in ink manufacturing, handling of three-roll mill with large roller diameter in large scale manufacturing requires brawn to handle a big shovel, so that females are rarely in charge of ink manufacturing.

Since it was considered difficult for all male and female members to obtain every capacity in the project period, CA proposed the following ideas to the Project Manager and agreed on 1 December 2016.

- 1) Train the roles divided to each member to become an expert team when clustered in group of five members.
- 2) Two male members would be trained to obtain ink manufacturing related capacities.
- 3) Three female members would be trained to obtain quality control capacities.
- 4) Five members would be trained to obtain ink color matching capacity.

Note 2; The reason of dividing capacities for male members and female members is the biological strength of each sex such as "ink manufacturing capacities" for male which requires powerful skills in handling the heavy three-roll mills.

(B) How to prove that five experts were trained

In technical cooperation, it is emphasized the concept of Result-Based Management, which means not "what had been done" but "what kind of effect had been brought". Since there is a need to evaluate objectively verifiable that the capacity has improved, not the amount and content of technical guidance implemented at the training, CA proposed the following indicators to the Project Manager and agreed on 10 August 2017.

- 1) Training Completion Report by National Printing Bureau, Japan
- 2) Capacity evaluation results on 5 experts by NBPP executives
- 3) Self-assessment results by 5 experts (questionnaire)

(C) Training Completion Report by National Printing Bureau, Japan

After the 3rd and final training in Japan conducted in October 2017, a report to certify that the training team members completed the training program of 3 years was submitted by the National Printing Bureau.

As an indicator 1, following documents are attached herewith.

[4.2.1] NPBJ Training Completion Report (En/Jp)

[4.2.2] NPBJ Training Completion Report, Table (En/Jp)

[4.2.3] NPBJ Training Completion Report, Outline (Jp)

In addition to this, although informal, all the members were handed over the certificate of completion by the ink department of NPBJ Tokyo Plant, which was responsible for guiding overall ink manufacturing capacities.

(D) Capacity evaluation results on 5 experts by NBPP executives

In order to objectively evaluate that five full-time members were trained as an expert team, capacity evaluation meetings involving 8 NBPP executives were conducted 3 times in the following manner.

Evaluation results are shown in Table 4.2.1. ~ Table 4.2.3. and Fig. 4.2.1.

1) The 1st capacity evaluation meeting

- Date

Monday, 6th November 2017, 10:30 – 15:30

Time	Activities
10:30–11:30	Overall description (purpose, evaluation method)
13:00–13:15	Proceedings description
13:15–15:00	Work implementation and Q&A
15:00–15:30	Summary of evaluation results by NBPP executives

- Place

Ink Room (newly opened)

- Evaluator

8 NBPP executives (listed below)

Name	Title
Mr. Nguyen Van Toan	Chairman of Board of Directors
Mr. Tran Van Tien	General Director
Mr. Pham Minh Quoc	Head of NH.09 (SBV)
Mr. Nguyen Van Long	Deputy Managing Director
Mr. Tran Huyen Cuong	Deputy Managing Director
Mr. Nguyen Tuan Khanh	Member of Board of Directors
Mr. Pham The Hung	Head of Technical Department
Mr. Tran Van Bao	Director General of Research and Technology Application Center

- Examinee

2 Full-time members (listed below)

Name	Checked capacities
Mr. Bach Duc Chinh	Ink manufacturing, Color matching
Ms. Ho My Thanh	Ink quality control

- Ink manufactured for capacity evaluation

2kg of Green colored fluorescent offset ink (excited at long-wave UV and emit in Green) for VND 200,000 was manufactured by three-roll mill in this meeting using Sicpa offset base inks.

This ink was selected by Project Manager on 31 October 2017. The reasons for this selection were (1) the difficulty level is high since it needs to match not only color but also fluorescent emitted color, (2) previously unmanufactured.

- Evaluation method

8 NBPP executives observed examinees on capacities listed in the table below. In addition, examinees were asked technical questions from

executives during the work. Then 8 NBPP executives evaluated examinees in five levels on each capacity and knowledge.

NOTE; 5 levels= Very poor (0)- Poor (1)- Fair (2)- Good (3)- Very Good (4)

- Evaluation results

With respect to the evaluation results of each capacity of 2 examinees, the evaluation values of the 8 NBPP executives were all “Good” or higher, and the average values are as shown in Table 4.2.1.

Table 4.2.1. 1st capacity evaluation meeting evaluation result

Ink manufacturing Capacities		Chinh	Thanh
Skill 1	Weigh materials based on recipe	3.9	---
Skill 2	Manufacture ink by three-roll mill safely (water supply, operation, stop, roller pressure adjustment)	3.7	---
Skill 3	Drawdown ink with spatula	3.7	---
Skill 4	Mixing dryer	3.9	---
Skill 5	Filling ink into the container	3.9	---
Skill 6	Clean up safely	3.7	---
Skill 7	Modify the ink recipe	3.9	---
Color matching Capacities			
Skill 1	Match color and density to specific ink	4.0	---
Skill 2	Match emission color and emission strength to specific fluorescent ink	3.9	---
Skill 3	Adjust the ink tack (target value \pm 5%)	3.7	---
Ink quality control Capacities			
Skill 1	Measure the fineness of grind of ink	---	3.7
Skill 2	Measure the tack value of ink	---	3.9
Skill 3	Measure the viscosity of ink	---	3.7
Skill 4	Drawdown ink by IGT tester at the same thickness of offset printing	---	3.9
Skill 5	Measure reflectance curve of the ink drawdown with a spectrophotometer	---	3.9
Skill 6	Drawdown ink with spatula	---	3.6
Skill 7	Check the presence of dryer by heat drying time	---	3.9

2) The 2nd capacity evaluation meeting

- Date

Tuesday, 7th November 2017, 9:00 – 11:30

Time	Activities
09:00–09:15	Proceedings description
09:15–11:00	Work implementation and Q&A
11:00–11:30	Summary of evaluation results by NBPP executives

- Place

Same as the 1st meeting

- Evaluator

Same as the 1st meeting

- Examinee

3 Full-time members (listed below)

Name	Checked capacities
Mr. Le Viet Ha	Ink manufacturing, Color matching
Ms. Nguyen Thi Thuy Ngoc	Ink quality control
Ms. Nguyen Thanh Tam	Ink quality control

- Ink manufactured for capacity evaluation

1.5kg of Light Blue colored offset ink was manufactured by milling raw materials with three-roll mill in this meeting.

This color (2717U from Pantone® solid patches) was selected by Project Manager on 31 October 2017. The reasons for this selection were (1) the difficulty level is high since light color needs severe color balance to match color, (2) ink color matching using color patches well reflects NPBJ technical guidance.

- Evaluation method

Same as the 1st meeting

- Evaluation results

With respect to the evaluation results of each capacity of 3 examinees, the evaluation values of the 8 NBPP executives were all “Good” or higher, and the average values are as shown in Table 4.2.2.

Table 4.2.2. 2nd capacity evaluation meeting evaluation result

Ink manufacturing Capacities		Ha	Ngoc	Tam
Skill 1	Weigh materials based on recipe	3.9	---	---
Skill 2	Manufacture ink by three-roll mill safely (water supply, operation, stop, roller pressure adjustment)	3.9	---	---
Skill 3	Drawdown ink with spatula	3.8	---	---
Skill 4	Mixing dryer	3.8	---	---
Skill 5	Filling ink into the container	3.7	---	---
Skill 6	Clean up safely	3.9	---	---
Skill 7	Modify the ink recipe	3.8	---	---
Color matching Capacities				
Skill 1	Match color and density to specific ink	3.8	---	---
Skill 2	Match emission color and emission strength to specific fluorescent ink	---	---	---
Skill 3	Adjust the ink tack (target value \pm 5%)	3.9	---	---
Ink quality control Capacities				

Skill 1	Measure the fineness of grind of ink	---	3.7	3.7
Skill 2	Measure the tack value of ink	---	3.9	3.9
Skill 3	Measure the viscosity of ink	---	3.7	3.9
Skill 4	Drawdown ink by IGT tester at the same thickness of offset printing	---	3.6	3.9
Skill 5	Measure reflectance curve of the ink drawdown with a spectrophotometer	---	3.9	3.8
Skill 6	Drawdown ink with spatula	---	3.3	3.6
Skill 7	Check the presence of dryer by heat drying time	---	3.9	3.6

3) The 3rd capacity evaluation meeting

- Date

Thursday, 9th November 2017, 9:00 – 11:30

Time	Activities
09:00–09:15	Proceedings description
09:15–11:00	Work implementation and Q&A
11:00–11:30	Summary of evaluation results by NBPP executives

- Place

Same as the 1st and 2nd meeting

- Evaluator

Same as the 1st and 2nd meeting

- Examinee

3 Full-time members (listed below)

Name	Checked capacities
Ms. Nguyen Thi Thuy Ngoc	Raw materials quality control
Ms. Ho My Thanh	Raw materials quality control
Ms. Nguyen Thanh Tam	Raw materials quality control

- Capacities to be evaluated

Of the contents guided in training in NPB Tokyo Plant conducted in October 2017, evaluation was carried out on 6 items which require measurement capacities. Since the other items were based on instruments and they do not require measurement capacities, they were omitted.

- Evaluation method

Same as the 1st and 2nd meeting

- Evaluation results

With respect to the evaluation results of each skill of 3 examinees, the evaluation values of the 8 NBPP executives were all “Good” or higher, and the average values are as shown in Table 4.2.3.

Table 4.2.3. 3rd capacity evaluation meeting evaluation result

Raw materials quality control Capacities	Ngoc	Tam	Thanh
--	------	-----	-------

Skill 1	Make a pigment paste using Hoover Muller	4.0	4.0	3.8
Skill 2	Compare the colors of test pigment with reference pigment	4.0	3.9	4.0
Skill 3	Compare the color strength of test pigment with reference pigment	3.9	4.0	3.9
Skill 4	Measure oil absorption value of pigment	3.9	3.9	4.0
Skill 5	Measure viscosity of varnish with Brookfield viscometer	4.0	---	---
Skill 6	Measure acid value of varnish	---	4.0	---

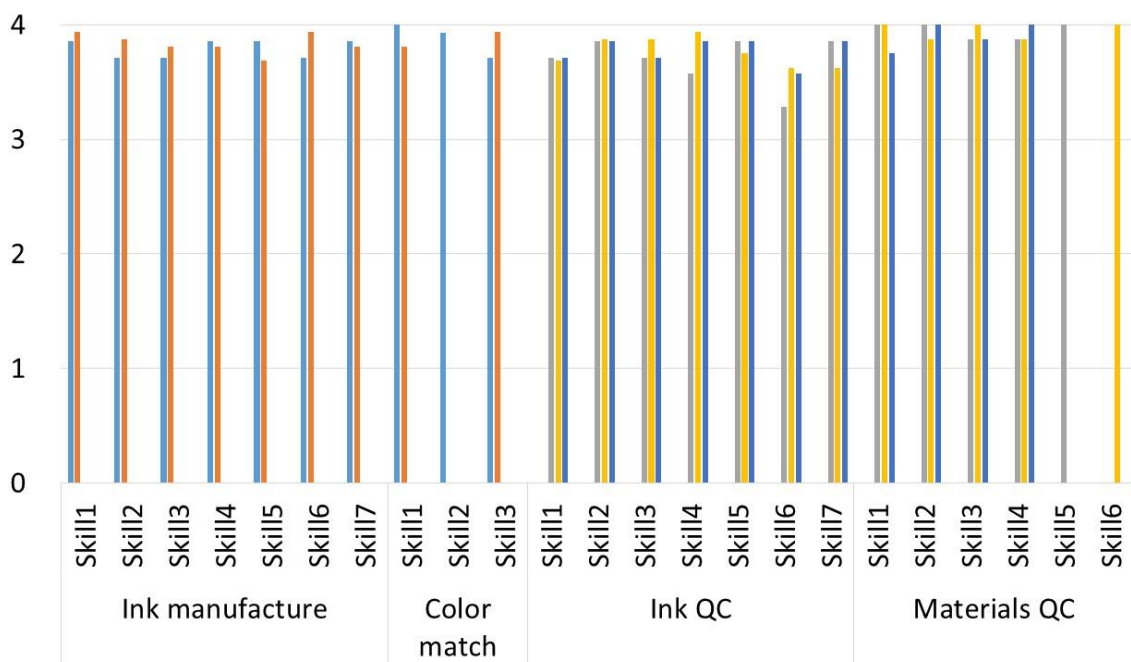
4) Summary of evaluation results

Regarding the overall results, ink manufacturing capacity and color matching capacity of 2 male members, quality control capacities on ink/raw materials of 3 female members are summarized in Figure 4.2.1.

The figure shows the average evaluation value of 8 NBPP executives into 5 levels on the vertical axis, each capacity evaluated on the horizontal axis, and **Mr. Chinh**, **Mr. Ha**, **Ms. Ngoc**, **Ms. Tam**, **Ms. Thanh**

For each capacity shared by 5 members, the evaluation values of the 8 NBPP executives were all between Good and Very Good.

This is understood that 8 NBPP executives confirmed that 5 full-time members were trained to be experts.



NOTE :

Figure 4.2.1. Result of capacity evaluation meeting (Summary)

(E) Self-assessment results by 5 experts (questionnaire)

For 5 full-time members, self-assessment of the acquisition levels of various capacities related to ink production by questionnaire was conducted. The results are as shown in Figure 4.2.2.

- Date

Friday, 10th November 2017

- Evaluation method

5 full-time members self-assessed each capacity in Table 4.2.4 in 5 levels. Since male members and female members shared each capacity, they have different evaluation items. However, with regard to ink color matching, all 5 members were guided commonly so that the color matching capacity was set as a common item.

NOTE; 5 levels= Very poor (0)- Poor (1)- Fair (2)- Good (3)- Very Good (4)

Table 4.2.4. Self-assessment in detail

Ink manufacturing Capacities		Male	Female
Skill 1	Weigh materials based on recipe	■	---
Skill 2	Manufacture ink by three-roll mill safely (water supply, operation, stop, roller pressure adjustment)	■	---
Skill 3	Drawdown ink with spatula	■	---
Skill 4	Mixing dryer	■	---
Skill 5	Filling ink into the container	■	---
Skill 6	Clean up safely	■	---
Skill 7	Modify the ink recipe	■	---
Color matching Capacities			
Skill 1	Match color and density to specific ink	■	■
Skill 2	Match emission color and emission strength to specific fluorescent ink	■	■
Skill 3	Adjust the ink tack (target value $\pm 5\%$)	■	■
Ink quality control Capacities			
Skill 1	Measure the fineness of grind of ink	---	■
Skill 2	Measure the tack value of ink	---	■
Skill 3	Measure the viscosity of ink	---	■
Skill 4	Drawdown ink by IGT tester at the same thickness of offset printing	---	■
Skill 5	Measure reflectance curve of the ink drawdown with a spectrophotometer	---	■
Skill 6	Drawdown ink with spatula	---	■
Skill 7	Check the presence of dryer by heat drying time	---	■
Raw materials quality control			
Skill 1	Make a pigment paste using Hoover Muller	---	■
Skill 2	Compare the colors of test pigment with reference pigment	---	■

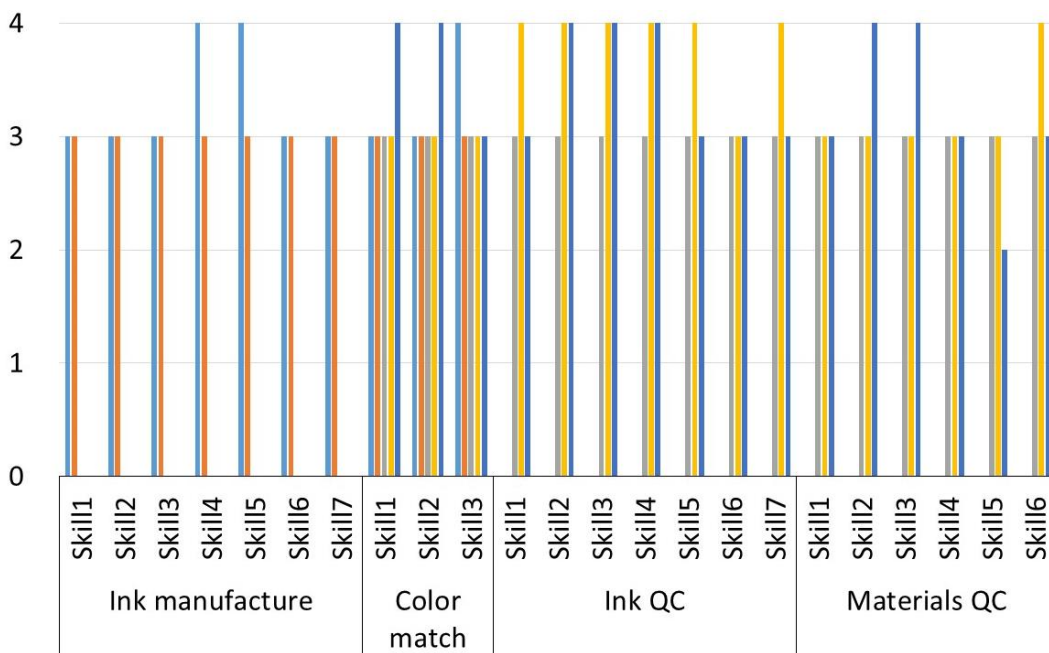
Skill 3	Compare the color strength of test pigment with reference pigment	---	■
Skill 4	Measure oil absorption value of pigment	---	■
Skill 5	Measure viscosity of varnish with Brookfield viscometer	---	■
Skill 6	Measure acid value of varnish	---	■

- Evaluation results

The overall results are summarized in Figure 4.2.2. The figure shows the self-assessment results of 5 levels on the vertical axis, each capacity evaluated on the horizontal axis, and the bar graph shows 5 members by color.

Though the self-assessment results were lower values than NBPP executives' evaluation, almost all capacities were rated as "Good".

One of the female members had rated her specific capacity as "Fair", but it can be improved by practice. There are many comments from 5 members that practice is necessary to obtain higher capacity. Since they are highly motivated to improve, further growth of the whole capacity can be expected. Regarding ink color matching capacity, although the evaluation of female members is only this survey, self-assessment results are higher than "Good". Moreover, color matching of inks made during corresponding exercises and print trials were shared by all full-time members. As a result, all 5 members can be proved that they have acquired color matching capacity.



NOTE : Mr. Chinh Mr. Ha Ms. Ngoc Ms. Tam Ms. Thanh

Figure 4.2.2. Result of self-assessment

4.2.2. Indicator 2; Acquisition of ink production technology for R&D activities

As described in Section 1.3.2 (C), the ink production technology for R&D activities is to acquire the ink formulating capacity and R&D conducting capacity.

As described above, in order to achieve the manufacture of banknote inks, it is necessary to develop inks suitable for Vietnamese banknotes along with acquiring ink manufacturing related capacities. Even if one acquires ink manufacturing related capacities, he can't start ink manufacturing unless raw materials and their formulations are fixed. In order to promote the development of inks in-house, ink formulating capacity is necessary.

Furthermore, in order to advance the R&D of ink, not only the table test in the laboratory but also the R&D conducting capacity to investigate the printability by conducting the print trial with actual printing machine are necessary.

Specifically, ink formulating capacity and R&D conducting capacity are defined as follows.

1) Ink formulating capacity

A capacity to select base inks or pigments, varnishes, additives and other raw materials, and to make a recipe for ink that meets the requirements of printability, resistance, specialty features (machine readable features, luminescence) etc.

Modern banknotes are often processed by machines, such as vending machines, ATMs of commercial banks, banknote sorting machines of central banks. Therefore, in addition to match colors seen by human eyes, match the properties (reflectance spectrum, UV light emission spectrum) seen by machinery's eye (various sensors) are necessary.

2) R&D conducting capacity

Capacities to find problems on promoting ink development (selection of raw materials, ink formulating), research of ink manufacturing method and quality control method, and to solve the problems through planning print trials and considering results.

Ink formulating capacity and R&D conducting capacity were acquired through print trials carried out during the project period, while evaluating the fitness of raw materials and the ink recipe to the Vietnamese banknote.

(A) Acquisition of ink formulating capacity

Reflectance spectrums of the offset inks created by training team members

at the 4th print trial (conducted on 14th June 2017) and the 5th print trial (conducted on 5th September 2017) are shown in Fig. 4.2.3. and Fig. 4.2.4.

The vertical axis of the spectrum is reflectance (%) and the horizontal axis is wavelength (nm). The horizontal axis from 400 nm to 700 nm is the range visible to the human eye, and the 700 nm or more is the infrared light region.

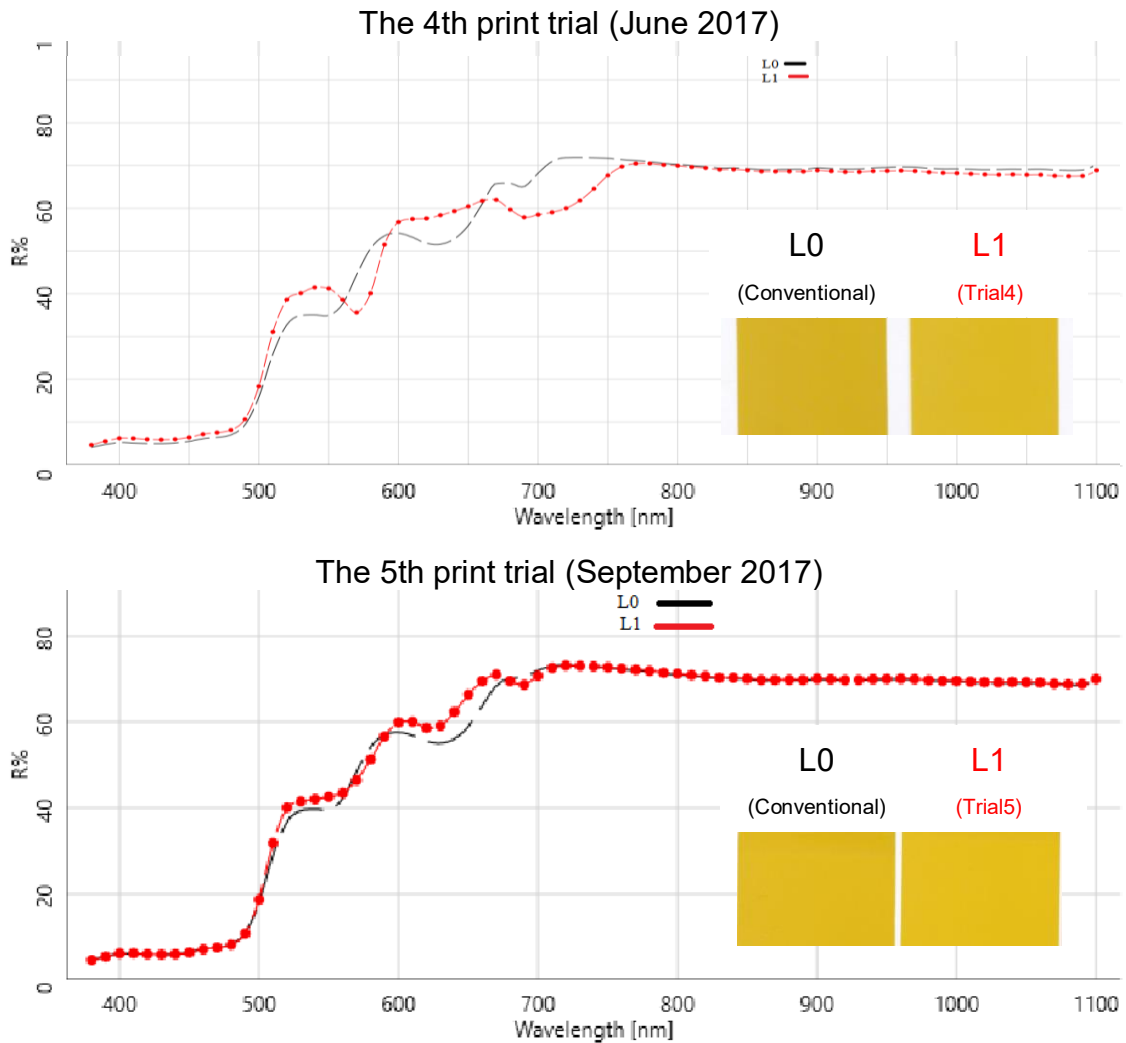


Fig. 4.2.3. Comparison of trial inks (Yellow ink)

Fig. 4.2.3 shows data on yellow ink. Although the colors in offset printing (1µm ink drawdown by IGT tester) shown on the right side are the same as seen by eyes, on both of 4th and 5th trials, reflectance spectrum of the trial ink is different in shape from the conventional ink in the 4th trial. If the spectrum is different, there is a possibility of being rejected when processed by optical sensors of vending machines or ATMs.

In order to match reflectance spectrum, it is necessary to formulate pigments of the same hue as conventional inks, and a high degree of capacity for ink formulating is required. In the 5th print trial, full-time training team

members selected pigments correctly, and they could match not only the visible color but also reflectance spectrum to the conventional ink. Therefore, full-time training team members had been proved to acquire ink formulating capacity.

Figure 4.2.4 shows data on violet ink. Though the reflectance spectrums were different between conventional ink and trial ink at the 4th trial, two spectrums were coincided at the 5th trial. Therefore, full-time training team members had also been proved to acquire ink formulating capacity.

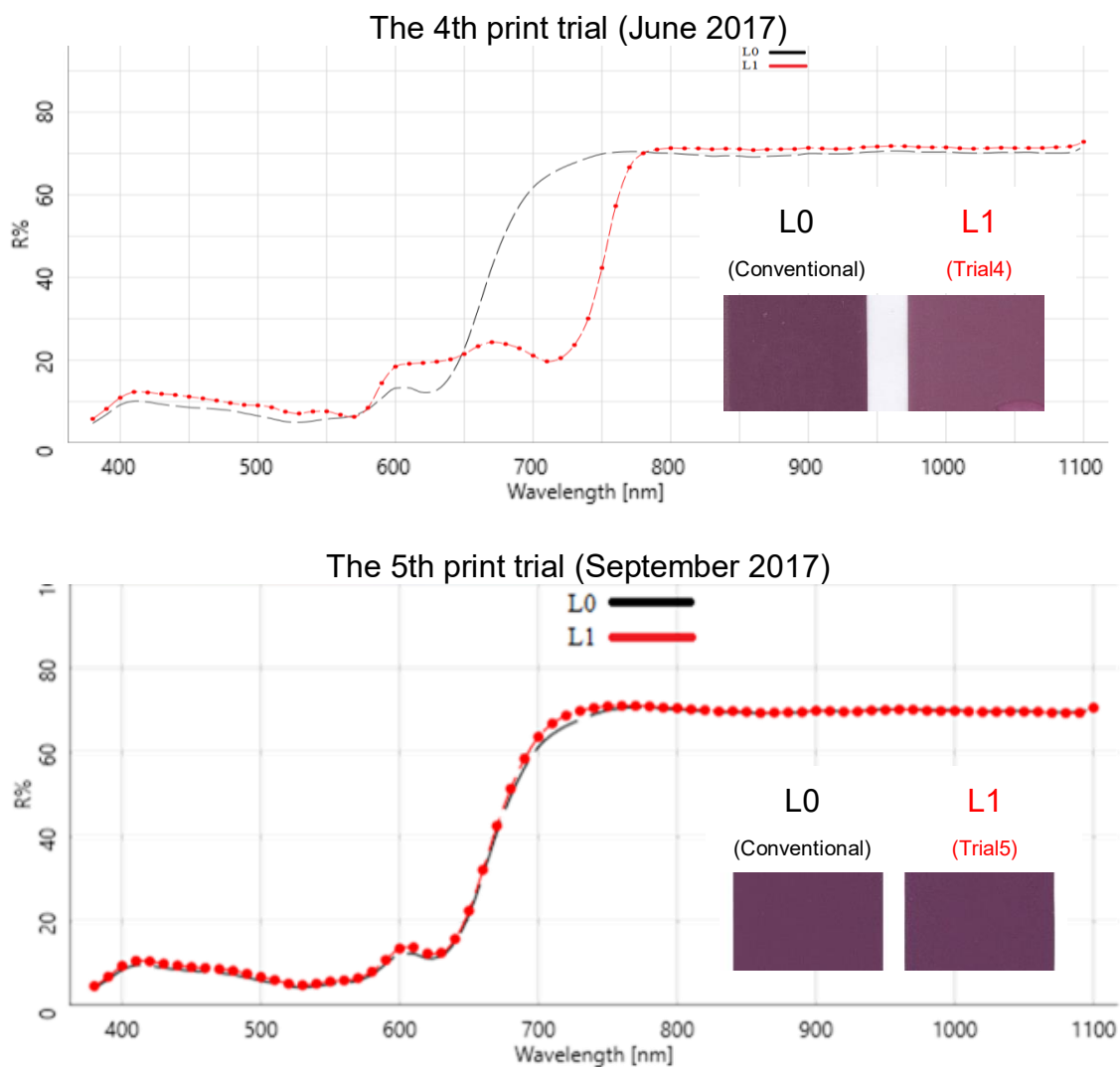


Fig. 4.2.4. Comparison of trial inks (Violet ink)

In addition to this, in the 5th trial, full-time training team members also worked on fluorescent offset ink used in current Vietnamese banknotes. As shown in Fig. 4.2.5, after matching the reflectance spectrum with conventional ink, they were able to match fluorescent emission color and emission strength along with selecting suitable luminescent materials. Therefore, full-time training team members had also been proved to acquire ink formulating capacity on

fluorescent property.

The print trial of offset ink was finished in the 5th trial conducted in September 2017, and the target tack value was decided to be $230 \pm 5\%$ for the future offset ink development.

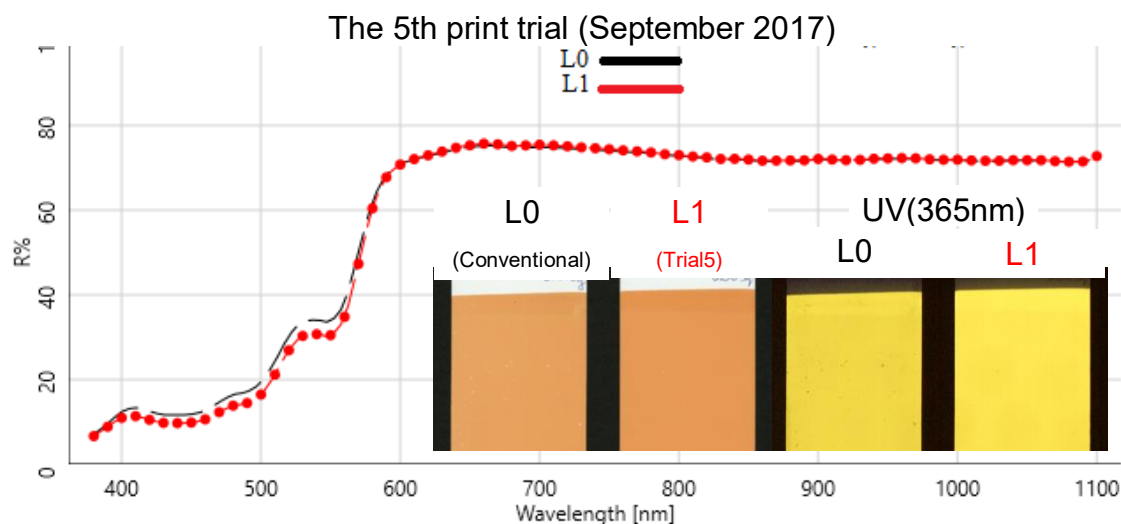


Fig. 4.2.5. Comparison of trial inks (Orange; Fluorescent Yellow)

(B) Acquisition of R&D conducting capacity

Through a total of 7 print trials, the guidance in regard to conduct print trial such as collecting data, evaluation methods for ink, prints and printability, preparing documents of experiment plan and result report were conducted by CA. In February 2017, lecture on how to conduct print trials was conducted using reference education materials.

Regarding the experiment planning and the result reporting, CA created templates so that the training team members could list all of the necessary information. Though CA made the report until the 4th print trial, from the 5th trial, training team members were able to create the experiment plan and the result report using templates. Full-time training team members had been proved to acquire R&D conducting capacity.

(C) Introduction of cooperative ink manufacturers and raw material suppliers

In order to facilitate ink R&D of NBPP after the project completion, cooperative ink manufacturers and raw material suppliers were investigated then compiled in a list (September 2017).

As an indicator 2, following documents are attached herewith.

[4.2.4] Suppliers list of ink related raw materials (En)

[4.2.5] List of raw materials suppliers in VPIA (Vietnam Paint & Printing Ink Association) (En)

4.2.3. Indicator 3; Summarizing basic requirements for ink production facility (including capacity to plan ink production workshop)

Ink manufacturing process can be divided into formulating, mixing, milling, mixing, quality inspection, finishing. In the 3rd training in Japan in October 2017, training attendees visited DIC Graphics Tokyo Plant to observe the large scale offset ink production and also visited NPBJ Odawara Plant to observe the large scale intaglio ink production.

These plant tours were helpful to confirm the points of attention at each ink manufacturing process and for the future ink production plant. And the basic requirements for ink production facility were summarized by CA. (November 2017)

As an indicator 3, following document is attached herewith.

[4.2.6] Basic requirements for ink production facility (Vn/Jp)

5. Operational issues and findings

5.1. Delay in project document approval

Although this project began on 29th November 2014, approval of the project document, which described the implementation organization of the project and the financial plan etc. was necessary inside the SBV (with prior consensus with other relevant ministries) for the actual project activity.

Without approval, since project itself and Project Managers do not exist, funds couldn't be contributed from NBPP and various raw materials for technical guidance couldn't be arranged. In addition, NBPP were unable to accept donated machineries, tools and raw materials purchase with JICA fund.

Project activities were limited until the project document was approved on 10th June 2015. Since NBPP's efforts made it possible to convene candidate project members prior to approval, the impact on activities related to MP developing was small, but the activities in regard to technical guidance were largely restricted. So it was not possible to conduct practical guidance until the 1st training workshop in Vietnam which held in July 2015. Without a delay in approval on the Project Document, technical guidance could be started early, so further enhanced project activities would have been possible.

In addition, if the complexity of Vietnamese Government's internal procedures was recognized as described above, started the project after approval of the project document, we think that waste of time and money was minimized.

5.2. Future activities NBPP needs to address

(A) Human Resource Development (HRD)

It is necessary to systematically recruit and develop personnel of R&D, ink manufacturing, quality control (ink and raw materials). HRD plan and educating materials have already been prepared within the project period.

(B) Ink R&D

Regarding ink manufacturing by mixing base inks, it can be realized at the planned time if necessary equipment, human resources and know-how are prepared.

Meanwhile, in addition to above mentioned integrant, selecting raw materials (especially varnishes) are indispensable for ink manufacturing by milling raw materials. Especially in intaglio inks, compared to offset inks which are used for commercial printing broadly, intaglio inks are used only for security printing, there is less information available, and the materials are special. Therefore, R&D of intaglio ink is the most difficult and it takes much time.

NBPP should continue manufacturing by mixing base inks until the varnishes that fit to the production of Vietnamese banknotes were found. If appropriate varnish materials can be found at an early stage, the period to the final goal can be shortened. It can be said that It depends on the progress of future R&D activities of NBPP whether intaglio ink manufacturing by milling raw materials as scheduled in 2030 in the MP will be delayed or be advanced.

5.3. Lessons learned for similar Capability Development Projects

In order to promoting HRD efficiently, "clear, mandatory capacities to be developed", "appropriate teaching materials", "curriculum" and "capacities evaluation method" are important except excellent lecturers. (See 3.1.4. (C) for reference.) Lessons learned from this project are described below.

(A) Clear, mandatory capacities to be developed

It is necessary to clarify the capacity requirements for job duties, to evaluate individual capacities by skill-map, and to systematically develop the deficient abilities. This will encourage to motivate himself, since it will become possible to understand what the acquired ability and the deficient ability are.

In improving capacity, because counterpart doesn't know much about the targeted technical field, it shall be explained what abilities are necessary and what activities needed to acquire them. If a large amount of guidance planning content presented and it seems to be a substantial effort, but the counterpart cannot understand them. Describe the capacities to be acquired stratify and explain in an easy-to-understand manner is essential.

(B) Appropriate teaching materials

Instead of a mere statement of theory, it is necessary to prepare teaching materials that are easy to understand and are able to understand the essence of capacities to be acquired. It is also important to document so that the counterparts can look back that information and deepen their understandings later. In addition, literature of the standard techniques of the world and in the industry are also helpful, but translation to the local language is necessary.

(C) Curriculum

A curriculum that can develop capacities systematically is needed according to the counterpart's acquisition level. Knowledge information such as the theory and the method should be guided in the lecture. Of those capacities that need intuition and tips, OJT is available for many opportunities to teach in real work, and practical work is available for less opportunities.

In addition, capacities that can be trained by on-site guidance when capacities of individual dispatching experts and facilities are prepared, and

capacities that cannot be trained by on-site guidance, should be clarified. Therefore, the HRD plan without exaggeration and without omission in the guidance contents can be made. The capacities that cannot be guided by a long-term expert should be guided by others in the short-term training such as domestic and overseas training. Then the tasks to review the training program should be submitted by long-term experts at a later date. This helps to confirm the counterpart's acquisition status of capacities by short-term experts, and also helps them to obtain a foothold of each capacity.

(D) Capacities evaluation method

It is also necessary to prepare how to objectively evaluate the acquired capacities in order to confirm whether the trainees were developed or not. Instead of evaluations by long-term experts who were directly in charge of technical guidance, an event (capacity evaluation meeting) should be needed that allows the counterparts to directly observe the knowledge and capacities of the trainees and evaluate them.

In this case, as before mentioned, because counterpart doesn't know much about the targeted technical field, it shall be explained in advance why those abilities are necessary. In the evaluation meeting, the trainees perform practical works on each capacity and answer questions on knowledge relates to the capacity. Therefore, counterpart can realize directly that the trainees were improved in ability. It also leads to improve the motivation of the trainees by participating in the capacity evaluation meeting.

Further, trainees themselves who are guided should be able to feel their own capacity improvement during the project period, so their improvement can be evaluated by questionnaire answers.

Although it may be difficult to plan in the preparatory period, it seems to be possible to prepare guidance contents and guidance plan efficiently by designing from the capacity evaluation meeting based on the predicted capacities to be finally acquired within the project period.

6. Revision records of PDM and PO

6.1. PDM

	Version of PDM	Date	Modifications
1	Original		
2	Version 2	Oct 2015	<p><u>Objectively Verifiable Indicators of the project purpose was set.</u></p> <p>- The number of time of test printing with experimental ink, which is the verifiable indicators of the project purpose, was set as "6 times".</p> <p><u>Activities 2-6 under Output 2 was added.</u></p> <p>- "Research published information on technology of intaglio ink in the world and search for cooperative varnish makers" was added as a new activity under Output 2.</p>

6.2. PO

	Version of PO	Date	Modifications
1	Original		
2	Version 2	Oct 2015	<p><u>Activities 2-6 under Output 2 was added.</u></p> <p>- "Research published information on technology of intaglio ink in the world and search for cooperative varnish makers" was added as a new activity under Output 2.</p>

PDM (Original)

Project Design Matrix

Project Title: The Project for Strengthening Capacity of the State Bank of Vietnam in Printing Ink Production

Implementing Agency: State Bank of Vietnam(SBV)


Target Group: NH 09, NBPP, Project Management Unit (PMU) of SBV, and related agencies in SBV

Period of Project: 3 years (From November, 2014 to November 2017)

Project Site: Hanoi

Model Site: All areas of Vietnam

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Improvement of the capacity of SBV in the field of banknote printing through improved capacity of banknote printing-ink production	Printing of higher quality banknotes	-Annual report of SBV -Questionnaire Survey (if necessary)	-Counterpart personnels and budget are allocated appropriately for smooth implementation of MP -Cost of material of ink production will not be increased drastically. -Materials of ink production are stably procured. -Technologies which are acquired during the project are maintained by SBV.
Project Purpose The SBV can access the ink-production technology and be able to manufacture for experimental printing.	(1) Establishment of PMU in charge of implementation of the Master Plan (MP) (2) Conducting test printing with experimental ink for ●● times	-Annual report of SBV -Project Report -Questionnaire Survey (if necessary)	-Experiments are conducted on schedule. -Test print papers, and other materials in the production plan of the NBPP are procured on schedule. -SBV assigns counterpart personnels and budget for the implementation of MP
Outputs 1. Master Plan (MP) for ink production is developed	-Developing the MP -Agreement with SBV regarding various measures to implement the MP	MP approved by SBV	-Necessary counterpart personnels and budget are assigned for smooth implementation of MP.
2. The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop)	-5 experts trained for ink production technology -Acquisition of ink production technology for R&D activities -Summarizing basic requirements for ink production facility	Project Report	-Budget is secured for smooth procurement of necessary equipment that are required for experimental ink production

Activities	Inputs		Pre-Conditions
1. Master Plan (MP) for ink production is developed	The Japanese Side	The Vietnamese Side	
1.1 Review challenges and external issues on ink production 1.2 Classify challenges and goals of future plan of ink production, and develop a draft M/P (including road map) 1.3 Review the details of managerial resources necessary for the implementation of the M/P 1.4 Conduct trainings and consultancy regarding implementation of MP and efficient plant operation and management as necessary	<Personnel for the Project> -Dispatch of long-term expert(s) Chief Advisor/Ink Production -Dispatch of short-term expert(s) <Training Course> -Necessary trainings are provided in Vietnam, Japan or third countries based on the framework and the action plan of the project	<Personnel for the Project> -Necessary administrative staff for smooth implementation of the project. -A task force on the study of masterplan -A task force on the ink-making -A task force (which is needed temporarily) on the printing experiment -A task force on the ink plant architecting	
2. The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop) 2.1 Review the necessary equipments for R&D activity, and develop a program for the procurement of equipments 2.2 Review the distribution channel of raw materials necessary for ink production in Vietnam 2.3 Review the R&D facilities and its capacities in SBV 2.4 Conduct trainings of ink production and printing test using SBV's equipment 2.5 Conduct trainings of ink production using NPB's equipment in Japan	<Equipment> - Equipment, upon necessity <Supporting Costs> -Cost for the activities of the project including tools, seminars and training courses.	<Building and Facilities> -Office rooms for Japanese Experts -Conference rooms for workshops and seminars <Administrative and Operational Costs> -All expense (excluding international communication fee) necessary to maintain the office room for Japanese experts -Cost for activities of counterparts and task force members including salaries and travel allowance, cost for seminars, training courses including allowance for trainees, if necessary.	 <Issues and countermeasures>

Revised PDM as of November 2015 (Version 2)

Project Design Matrix

Project Title: The Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production

Implementing Agency: State Bank of Viet Nam (SBV)

Target Group: NH 09, NBPP, Project Management Unit (PMU) of the SBV, and related agencies in the SBV

Period of Project: 3 years (From November, 2014 to November 2017)

Project Site: Ha Noi

Model Site: All areas of Viet Nam

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Improvement of the capacity of the SBV in the field of banknote printing through improved capacity of banknote printing-ink production	Printing of higher quality banknotes	-Annual report of the SBV -Questionnaire Survey (if necessary)	-Counterpart personnels and budget are allocated appropriately for smooth implementation of MP -Cost of material of ink production will not be increased drastically. -Materials of ink production are stably procured. -Technologies which are acquired during the project are maintained by the SBV.
Project Purpose The SBV can access the ink-production technology and be able to manufacture for experimental printing.	(1) Establishment of PMU in charge of implementation of the Master Plan (MP) (2) Conducting test printing with experimental ink for six (6) times	-Annual report of the SBV -Project Report -Questionnaire Survey (if necessary)	-Experiments are conducted on schedule. -Test print papers, and other materials in the production plan of the NBPP are procured on schedule. - The SBV assigns counterpart personnels and budget for the implementation of MP
Outputs 1. Master Plan (MP) for ink production is developed	-Developing the MP -Agreement with SBV regarding various measures to implement the MP	MP approved by SBV	-Necessary counterpart personnels and budget are assigned for smooth implementation of MP.
2. The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop)	-5 experts trained for ink production technology -Acquisition of ink production technology for R&D activities -Summarizing basic requirements for ink production facility	Project Report	-Budget is secured for smooth procurement of necessary equipment that are required for experimental ink production

Activities	Inputs		Pre-Conditions
	The Japanese Side	The Vietnamese Side	
1. Master Plan (MP) for ink production is developed 1.1 Review challenges and external issues on ink production 1.2 Classify challenges and goals of future plan of ink production, and develop a draft M/P (including road map) 1.3 Review the details of managerial resources necessary for the implementation of the M/P 1.4 Conduct trainings and consultancy regarding implementation of MP and efficient plant operation and management as necessary	<Personnel for the Project> -Dispatch of long-term expert(s) -Chief Advisor/Ink Production -Dispatch of short-term expert(s) <Training Course> -Necessary trainings are provided in Vietnam, Japan or third countries based on the framework and the action plan of the project	<Personnel for the Project> -Necessary administrative staff for smooth implementation of the project. -A task force on the study of masterplan -A task force on the ink-making -A task force (which is needed temporarily) on the printing experiment -A task force on the ink plant architecting	
2. The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop) 2.1 Review the necessary equipments for R&D activity, and develop a program for the procurement of equipments 2.2 Review the distribution channel of raw materials necessary for ink production in Vietnam 2.3 Review the R&D facilities and its capacities in the SBV 2.4 Conduct trainings of ink production and printing test using the SBV's equipment 2.5 Conduct trainings of ink production using NPB's equipment in Japan 2.6 Research published information on technology of intaglio ink in the world and search for cooperative varnish makers	<Equipment> - Equipment, upon necessity <Supporting Costs> -Cost for the activities of the project including tools, seminars and training courses.	<Building and Facilities> -Office rooms for Japanese Experts -Conference rooms for workshops and seminars <Administrative and Operational Costs> -All expense (excluding international communication fee) necessary to maintain the office room for Japanese experts -Cost for activities of counterparts and task force members including salaries and travel allowance, cost for seminars, training courses including allowance for trainees, if necessary.	<Issues and countermeasures>

PO (Original)

Tentative Plan of Operation

Version 0

Dated 9 Sept 2014

Project Title: the Project of Strengthening Capacity of the State Bank of Vietnam in Printing Ink Production

Monitoring

Inputs	Year	2014				2015				2016				2017				Remarks	Issue	Solution
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV			
Expert																				
Chief Advisor/Ink Production	Plan																			
	Actual																			
Short-term Experts	Plan																			
	Actual																			
	Plan																			
	Actual																			
	Plan																			
	Actual																			
Equipment																				
Necessary Equipment	Plan																			
	Actual																			
Training in Japan																				
Training for Counterpart Personnel	Plan																			
	Actual																			
In-country/Third country Training																				
Seminar/Training for Counterpart Personnel in Vietnam	Plan																			
	Actual																			
Activities																				
Sub-Activities																				
Output 1: Master Plan (MP) for ink production is developed																				
1.1 Review challenges and external issues on ink production	○																			
	Plan																			
	Actual																			
1.2 Classify challenges and goals of future plan	○																			
	Plan																			
	Actual																			
1.3 Review the details of managerial resources	○																			
	Plan																			
	Actual																			
1.4 Conduct trainings and consultancy regarding implementation of MP	○																			
	Plan																			
	Actual																			
Output 2: The capacity of experimental printing-ink production is improved (including capacity to plan ink production workshop)																				
2.1 Review the necessary equipments for R&D activity	○																			
	Plan																			
	Actual																			
2.2 Review the distribution channel of raw materials	○																			
	Plan																			
	Actual																			
2.3 Review the R&D facilities	○																			
	Plan																			
	Actual																			
2.4 Conduct trainings using SBV's equipments	○																			
	Plan																			
	Actual																			
2.5 Conduct trainings using NPB's equipments in Japan	○																			
	Plan																			
	Actual																			
Duration / Phasing																				
	Plan																			
	Actual																			
Monitoring Plan																				
	Year																			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV			
Monitoring																				
Joint Coordination Committee	Plan																			
	Actual																			
Set-up the Detailed Plan of Operation	Plan																			
	Actual																			
Submission of Monitoring Sheet	Plan																			
	Actual																			
Monitoring Mission from Japan	Plan																			
	Actual																			
Joint Monitoring	Plan																			
	Actual																			
Post Monitoring	Plan																			
	Actual																			
Reports/Documents																				
Training Materials	Plan																			
	Actual																			
Project Completion Report	Plan																			
	Actual																			

Note
 ● not meetings
 ▲ submit reports
 ■ activities

Revised PO as of November 2015 (Version 2)

Tentative Plan of Operation

Project Title: the Project for Strengthening Capacity of the State Bank of Viet Nam in Printing Ink Production													Monitoring								
Inputs	Year	2014				2015				2016				2017				Remarks	Issue	Solution	
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV				
Expert	Chief Advisor/Ink Production	Plan																			
		Actual																			
	Short-term Experts	Plan																			
		Actual																			
		Plan																			
		Actual																			
Equipment	Necessary Equipment	Plan																			
		Actual																			
Training in Japan	Training for Counterpart Personnel	Plan																			
		Actual																			
In-country/Third country Training	Seminar/Training for Counterpart Personnel in Viet Nam	Plan																			
		Actual																			
Activities	Sub-Activities	Year	2014				2015				2016				2017				Responsible Organization Japan GOV	Achievements	Issue & Countermeasures
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV				
Output 1: Master Plan (MP) for ink production is developed																					
1.1	Review challenges and external issues on ink production	Plan																			
		Actual																			
1.2	Classify challenges and goals of future plan	Plan																			
		Actual																			
1.3	Review the details of managerial resources	Plan																			
		Actual																			
1.4	Conduct trainings and consultancy regarding implementation of MP	Plan																			
		Actual																			
Output 2: The capacity of experimental printing-ink production is improved(including capacity to plan ink production workshop)																					
2.1	Review the necessary equipments for R&D activity	Plan																			
		Actual																			
2.2	Review the distribution channel of raw materials	Plan																			
		Actual																			
2.3	Review the R&D facilities	Plan																			
		Actual																			
2.4	Conduct trainings using the SBV's equipments	Plan																			
		Actual																			
2.5	Conduct trainings using the NPB's equipments in Japan	Plan																			
		Actual																			
2.6	Research published information on technology of intaglio ink in the world and search for cooperative varnish makers	Plan																			
		Actual																			
Duration / Phasing		Plan																			
		Actual																			
Monitoring Plan																					
Monitoring	Joint Coordination Committee	Plan																			
		Actual																			
Set-up the Detailed Plan of Operation	Plan																				
	Actual																				
Submission of Monitoring Sheet	Plan																				
	Actual																				
Monitoring Mission from Japan	Plan																				
	Actual																				
Joint Monitoring	Plan																				
	Actual																				
Post Monitoring	Plan																				
	Actual																				
Reports/Documents		Plan																			
Training Materials	Plan																				
	Actual																				
Project Completion Report	Plan																				
	Actual																				

- Note
- hold meetings
 - ▲ submit reports
 - activities

7. JCC and related meeting proceedings

7.1. JCC meetings

JCC meetings were held three times during the Project period as follows.

	Date	Discussion Subjects
1st	7 October 2015	1. Project's performance and achievements (Report on the 1st year's activity) 2. Project work plan in 2015 and 2016 (Plan of the rest of 2015 and 2016) 3. Revised Project Design Matrix and Revised Plan of Operation
2nd	18 November 2016	1. Project's performance and achievements (Report on the 2nd year's activity) 2. Master Plan for establishing the Ink Production Plant 3. Project work plan in 2016 and 2017 (Plan of the rest of 2016 and 2017)
3rd	14 November 2017	1. Report on the final year activity 2. Project outputs 3. NBPP work plan after the project completion 4. Evaluation of the Project

Participants list, agenda, confirmations and understandings of each meeting are described hereafter.

7.1.1. The 1st JCC

(A) Date

Wednesday, 7th October 2015

(B) Venue

Conference room, SBV, 49 Ly Thai To, Hoan Kiem, Hanoi

(C) Participants

Vietnamese side:

Name	Title	
Mr. Dao Minh Tu	Deputy Governor	SBV
Mr. Nguyen Van Toan	Chairman of Board of Directors	NBPP
Ms. Dao Thuy Hang	Deputy Director General of ICD	SBV
Ms. Le Van Quynh	Deputy Chief of Issue and Vault Department	SBV
Mr. Pham Minh Quoc	Head of NH.09	SBV
Mr. Nguyen Van Long	Deputy Head of NH.09	SBV
Ms. Khuong Thanh Ha	Head of Bilateral Division – ICD	SBV
Ms. Tran Viet Lien	Deputy Head of Bilateral Division – ICD	SBV
Mr. Dang Minh Quang	Official of Bilateral Division – ICD	SBV

Japanese side:

Name	Title	
Mr. Mutsuya Mori	Chief Representative	JICA Vietnam
Mr. Naoki Kakioka	Senior Representative	JICA Vietnam
Ms. Yuko Naito	Representative	JICA Vietnam
Ms. Trieu Thi My Chau	Program Officer	JICA Vietnam
Mr. Kazuhiro Hiwatashi	Chief Advisor of the Project	
Ms. Quach Thi Thuy	Chief Advisor's Secretary	
Ms. Nguyen Thi Thuy Tien	Chief Advisor's Secretary	

Others:

Name	Title
Ms. Tran Thai Ha	Interpreter for the JCC

(D) Agenda

Time	Activities	Hosted by
15:00-15:15	Opening remarks	Mr. Dao Minh Tu Deputy Governor, SBV Mr. Mutsuya Mori Chief Representative, JICA Vietnam Office
15:15-16:00	Report on the Project's performance and achievements	NBPP
16:00-16:45	Project Work Plan for 2015 and projected for 2016	Mr. Kazuhiro Hiwatashi, Chief Advisor of the Project
16:45-17:15	Discussion on Work Plan	SBV JICA, Chief advisor
17:15-17:30	Closing remarks	Mr. Dao Minh Tu Deputy Governor, SBV Mr. Mutsuya Mori Chief Representative, JICA Vietnam Office

(E) Handouts

- List of Participants
- Report on the Project's performance and achievements (Report on 1st year's activity)
- Project work plan in 2015 and 2016 (Plan of the rest of 2015 and 2016)
- Revised Project Design Matrix
- Revised Plan of Operation

(F) Confirmations and understandings (quoted from M/M document)

- 1) The teams for implementing the Project was explained and confirmed.
- 2) The activities of the Project in the 1st year from commencement of the Project up to August 2015 was explained and confirmed.
- 3) The installed equipment from JICA was explained and confirmed.
- 4) The plans of trainings on experimental printing ink production which will be held at November 2015 in Japan was explained and confirmed.
- 5) The project activity plan in the 2nd year from the remaining period of 2015 to December 2016 was explained and confirmed.
- 6) The number of time of test printing with experimental ink, which is the verifiable indicators of the Project's, was confirmed to set as "6 times" and would be reflected in the Project Design Matrix.
- 7) SBV requested to add new activities on developing intaglio ink which is essential for printing banknote with intaglio printing machine.

The Japanese side explained about difficulties in developing intaglio under the Project as follows;

- There are 3 challenges to be solved to develop intaglio ink.
- The first challenge is the matter of "Wiping". Since intaglio ink is applied thickly on the plate, it is needed to wipe clearly. Additionally, intaglio ink on the wiping roll should be dispersed into the liquid of wiping uniformly.
- The second challenge is to prevent the off-set to another substrate after printing. The off-set to another substrate sometimes occurs in off-set printing. Since intaglio printing is higher and thicker than off-set printing, it is easier to occur off-set to another substrate.
- The third challenge is that since the varnish for intaglio ink is entirely different from off-set ink, it is needed to develop it newly. Therefore, it is essential to make a lot of trial varnish with cooperative varnish maker which the SBV will find in the future.

In addition to the difficulties above, NPB cannot cooperate in technical assistance concerning intaglio ink due to security matter of Japanese banknote as one of the reasons.

The second reason is that the SBV's the intaglio ink which is global standard ink is entirely different from the intaglio ink of the NPB in the structure of wiping part, liquid of wiping and surface temperature of plate cylinder. Thus, the NPB doesn't have any knowledge for general intaglio ink.

With the abovementioned issues, the Japanese side proposed to add a new activity related to developing intaglio ink as activity under Output 2 in

the PDM;

<Proposed activities by the Japanese side>

New activity No. 2-6 under Output 2

“2-6. Research published information on technology of intaglio ink in the world and search for cooperative varnish markers.”

For the above proposed activities, the NPBJ would cooperate with SBV on proposing how to search the information for intaglio ink, and would introduce the cooperative varnish makers in Japan. The Japanese side also explained that any further activity beyond the above proposed one requires careful consultation and consideration between SBV and the Japanese side on the possibility of cooperation.

The SBV agreed to add the abovementioned proposed activity No.2-6 to the PDM.

8) All the parties agreed to revised PDM reflecting the discussion above.

7.1.2. The 2nd JCC

(A) Date

Friday, 18th November 2016

(B) Venue

Conference room, SBV, 49 Ly Thai To, Hoan Kiem, Hanoi

(C) Participants

Vietnamese side:

Name	Title	
Mr. Dao Minh Tu	Deputy Governor	SBV
Mr. Nguyen Van Toan	Chairman of Board of Directors	NBPP
Ms. Hoang Thi Phuong Hanh	Deputy Director General of ICD	SBV
Ms. Le Van Quynh	Deputy Chief of Issue and Vault Department	SBV
Mr. Pham Minh Quoc	Head of NH.09	SBV
Mr. Nguyen Van Long	Deputy Head of NH.09	SBV
Ms. Tran Viet Lien	Deputy Head of Bilateral Division – ICD	SBV
Mr. Dang Minh Quang	Official of Bilateral Division – ICD	SBV
Mr. Nguyen Tuan Nam	Secretary of Deputy governor	SBV
Mr. Bach Duc Chinh	Member of the Project	NBPP

Japanese side:

Name	Title	
Mr. Akito Takahashi	Senior Representative	JICA Vietnam
Mr. Takenari Kajiuura	The Second Secretary	Embassy of Japan

Ms. Yuko Naito	Representative	JICA Vietnam
Ms. Trieu Thi My Chau	Program Officer	JICA Vietnam
Mr. Kazuhiro Hiwatashi	Chief Advisor of the Project	
Mr. Hiroshi Iwasaki	Chief Advisor of the Project	
Ms. Nguyen Thi Thuy Tien	Chief Advisor's Secretary	

Others:

Name	Title
Ms. Nghiem Hong Van	Interpreter for the JCC

(D) Agenda

Time	Activities	Hosted by
10:05-10:15	Opening remarks	Mr. Dao Minh Tu Deputy Governor, SBV Mr. Akito Takahashi Senior Representative, JICA Vietnam Office
10:15-10:40	Report on the Project's performance and achievements	Mr. Nguyen Van Toan Chairman of Board of Directors, NBPP
10:40-11:05	Summary of Master Plan for establishing the Ink Production Plant	Mr. Kazuhiro Hiwatashi, Chief Advisor of the Project
11:05-11:20	Project work plan in the 3rd year	Mr. Hiroshi Iwasaki Chief Advisor of the Project
11:20-11:35	Discussion on Work Plan	SBV, JICA Vietnam, Embassy of Japan, Chief advisor
11:35-12:00	Closing remarks	Mr. Dao Minh Tu Deputy Governor, SBV Mr. Akito Takahashi Senior Representative, JICA Vietnam Office

(E) Handouts

- List of Participants
- Report on the Project's performance and achievements (Report on 2nd year's activity)
- Summary of Master Plan for establishing the Ink Production Plant
- Project work plan in 2016 and 2017 (Plan of the rest of 2016 and 2017)

(F) Confirmations and understandings (quoted from M/M document)

- 1) The performance and achievements of the Project in the 2nd year from

commencement of the Project up to 11th November 2016 was explained and confirmed.

- 2) The summary of drafted Master Plan for establishing the Ink Production Plant was explained and confirmed. SBV requested to hold another meeting to explain details of the drafted Master Plan in December 2016. SBV stated to aim for an approval by the executives of SBV in January 2017 in consideration of the explained contents.
- 3) The project activity plan in the 3rd year from the remaining period of 2016 to November 2017 was explained and confirmed.

7.1.3. The 3rd JCC

(A) Date

Tuesday, 14th November 2017

(B) Venue

Conference room, SBV, 49 Ly Thai To, Hoan Kiem, Hanoi

(C) Participants

Vietnamese side:

Name	Title	
Mr. Dao Minh Tu	Deputy Governor	SBV
Mr. Nguyen Van Toan	Chairman of Board of Directors	NBPP
Mr. Pham Bao Lam	Director General of Issue and Vault Department	SBV
Ms. Dao Thuy Hang	Deputy Director General of ICD	SBV
Ms. Pham Thi Minh Nghia	Deputy Director General of Accounting and Finance Department	SBV
Mr. Pham Minh Quoc	Head of NH.09	SBV
Mr. Nguyen Van Long	Deputy Head of NH.09	SBV
Mr. Tran Van Tien	General Director of NBPP	NBPP
Mr. Dang Van Toi	Deputy Manager of SBV Office	SBV
Ms. Tran Viet Lien	Deputy Head of Bilateral Division – ICD	SBV
Mr. Dang Minh Quang	Official of Bilateral Division – ICD	SBV
Mr. Nguyen Tuan Nam	Secretary of Deputy governor	SBV
Mr. Tran Van Bao	Director General of Research and Technology Application Center	NBPP
Mr. Bach Duc Chinh	Member of the Project	NBPP
Mr. Le Viet Ha	Member of the Project	NBPP
Ms. Nguyen Thi Thuy Ngoc	Member of the Project	NBPP
Ms. Ho My Thanh	Member of the Project	NBPP
Ms. Nguyen Thanh Tam	Member of the Project	NBPP

Japanese side:

Name	Title	
Mr. Akito Takahashi	Senior Representative	JICA Vietnam
Mr. Takenari Kajiura	The Second Secretary	Embassy of Japan
Ms. Yuko Naito	Representative	JICA Vietnam
Ms. Trieu Thi My Chau	Program Officer	JICA Vietnam
Mr. Hiroshi Iwasaki	Chief Advisor of the Project	
Ms. Nguyen Thi Thuy Tien	Chief Advisor's Secretary	

Others:

Name	Title
Mr. Pham Le Huy	Interpreter for the JCC

(D) Agenda

Time	Activities	Hosted by
09:05-09:30	Opening remarks	Mr. Dao Minh Tu Deputy Governor, SBV Mr. Akito Takahashi Senior Representative, JICA Vietnam Office
09:30-10:40	Report on the final year activity, Project outputs	Mr. Hiroshi Iwasaki Chief Advisor of the Project
10:40-11:15	NBPP work plan after the project completion	Mr. Nguyen Van Toan Chairman of Board of Directors, NBPP
11:15-12:05	Evaluation of the Project Closing remarks	Mr. Takenari Kajiura The Second Secretary, Embassy of Japan Mr. Akito Takahashi Senior Representative, JICA Vietnam Office Mr. Dao Minh Tu Deputy Governor, SBV

(E) Handouts

- List of Participants
- Report of the final year activities
- Project Outputs
- NBPP work plan after the project completion
- Master Plan - The Road map
- Project Completion Report (Contents only)

(F) Confirmations and understandings (quoted from M/M document)

- 1) Report on the final year activity and the Project outputs was explained and confirmed.
- 2) NBPP work plan on ink production and R&D activity after the project completion based on the approved Master Plan was explained and confirmed.
- 3) Reviewing the results of this three-year Project as listed below, both sides realized that the Project was completed successfully by the enormous efforts of the relevant sides.
 - The Project achieved the Project Purpose and gained outcomes higher-than expected. This was proved by achieving all 7 indicators set to verify the Project's Purpose and Output.
 - The Project was completed as scheduled timeline.
 - The Project effectively used limited project resources.
- 4) SBV will develop activities to execute the Master Plan utilizing its own resources and wish to receive continuous technical supports if required.

7.2. MP explanatory meeting

To promote an approval by SBV on MP, explanatory meeting was held.

(A) Date

Wednesday, 7th June 2017

(B) Venue

3F Conference room, NBPP, 30 Pham Van Dong, Cau Giay, Hanoi

(C) Participants

Vietnamese side:

Name	Title	
Mr. Nguyen Van Toan	Chairman of Board of Directors	NBPP
Mr. Tran Van Tien	General Director	NBPP
Mr. Nguyen Tuan Khanh	Member of Board of Directors	NBPP
Mr. Nguyen Van Long	Deputy Managing Director	NBPP
Mr. Pham The Hung	Head of Technical Department	NBPP
Mr. Tran Duy Dung	Deputy Head of Technical Department	NBPP
Mr. Pham Minh Quoc	Head of NH.09	SBV
Mr. Nguyen Hong Phong	Head of Technical Department, NH.09	SBV
Mr. Dang Minh Quang	Official of Bilateral Division – ICD	SBV
Ms. Pham Thi Minh Nghia	Deputy Head of Accounting and Finance Department	SBV
Mr. Le Anh Xuan	Head of Division - Accounting and Finance Department	SBV
Mr. Tong Trinh Toan	Deputy Chief of Department of Cash	SBV

	Issue and Vault	
Ms. Dinh Thuy An	Official of Department of Cash Issue and Vault	SBV
Mr. Bui Viet Hung	Office Manager	NBPP
Mr. Bach Duc Chinh	Member of the Project	NBPP
Ms. Nguyen Thi Thuy Ngoc	Member of the Project	NBPP
Ms. Ho My Thanh	Member of the Project	NBPP

Japanese side:

Name	Title	
Mr. Akito Takahashi	Senior Representative	JICA Vietnam
Ms. Yuko Naito	Representative	JICA Vietnam
Ms. Trieu Thi My Chau	Program Officer	JICA Vietnam
Mr. Hiroshi Iwasaki	Chief Advisor of the Project	
Ms. Nguyen Thi Thuy Tien	Chief Advisor's Secretary	

(D) Agenda

Time	Activities	Hosted by
09:05-09:20	Opening remarks	Mr. Nguyen Van Toan Chairman of Board of Directors, NBPP Mr. Akito Takahashi Senior Representative, JICA Vietnam Office
09:20-10:20	Summary of the Master Plan for ink manufacturing plant	Mr. Hiroshi Iwasaki Chief Advisor of the Project
10:20-11:25	Discussion on the Master Plan	SBV, NBPP, JICA, Chief advisor
11:25-11:30	Closing remarks	Mr. Nguyen Van Toan Chairman of Board of Directors, NBPP

(E) Handouts

- Summary of the Master Plan for ink manufacturing plant (Vn/Jp)
- Master Plan for establishing the Ink Production Plant (Vn/Jp)
- Appendix 1; The result of SWOT analysis to ink making in SBV (Vn/En)
- Appendix 2; Phases and milestones (Large/Small classification) (Vn/Jp)
- Appendix 3; Phases and milestones (Detail) (Vn/Jp)
- Appendix 4; Reference chart of phases and milestones (Vn/Jp)
- Activities for preparation of the next phase (Vn/Jp)

(F) Confirmations and understandings (quoted from M/M document)

- 1) The contents of draft Master Plan were confirmed by leaders from related departments of SBV (Issue and Vault, Finance and Accounting, NH09 and ICD (International Corporation Department)).
- 2) Approval process in detail for the Master Plan was confirmed among SBV, NBPP and JICA.

Master Plan revised by NBPP will be submitted to the deputy governor of SBV by June 15, 2017. And it is expected to be approved by November 2017.

- 3) In the opinion of SBV-ICD, SBV will establish PMU in charge of implementation of the Master Plan. Outline of PMU will be reflected into the draft Master Plan before submitting the draft to deputy governor in June 2017.