

No.

平成2年度

帰国研修員フォローアップチーム報告書
—陶磁器開発・活用技術集団研修コース—

平成3年3月

国際協力事業団
名古屋国際研修センター

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序 文

国際協力事業団は、集団研修コースの帰国研修員に対するアフターケアの一環としてフォローアップ調査団を派遣している。本報告書は、名古屋国際研修センターが工業技術院名古屋工業技術試験所、多治見市陶磁器意匠研究所、安達学園中京短期大学比較陶器研究所をはじめ、関係各機関の協力を得て実施してきた陶磁器開発・活用技術集団研修コース及びその前身に当たる釉・着彩集団研修コースのフォローアップ調査団が平成2年12月4日から同年2月22日までシンガポール、スリランカ及びマレーシアを訪問、調査した結果を取りまとめたものである。

釉着彩コースは昭和49年度から昭和63年度まで毎年実施され、平成元年度に陶磁器開発・活用技術集団研修コースとしてプログラムを改編し再出発した。釉着彩コースは昭和58年度にタイル製造技術集団研修コースと合同でビルマ、バングラデシュの帰国研修員を対象にフォローアップ調査団を派遣している。本報告書が前回同様、広く関係者に利用され、今後の研修コースの改善に役立てば幸いである。

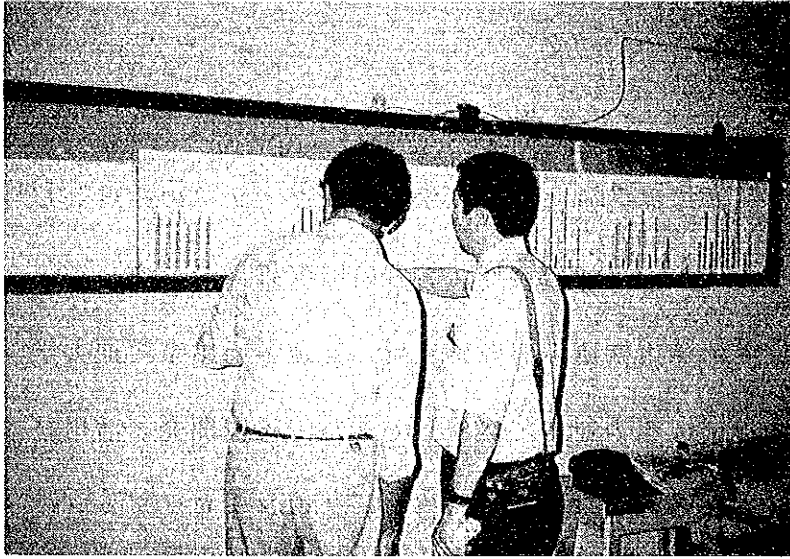
最後に、本調査にあたり、ご協力を頂いた帰国研修員、帰国研修員所属機関、各国政府機関及び日本大使館に対しここに感謝の意を表する。

平成3年3月

国際協力事業団
名古屋国際研修センター
所長 寺神戸 曠



1132721{0}



ランカ窯業公社Piliyandala工場
(スリランカ)

Ipohの製陶工場 (マレーシア)



セミナー風景 (マレーシア)

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I. チームの概要

1. 目的

本チームは釉着彩集団研修コース（昭和63年までに15回実施）及び陶磁器開発・活用技術集団研修コース（平成2年度までに2回実施）に参加した帰国研修員の所属機関及び関係機関を訪問し、以下の事項を実施する。

- (1) 帰国研修員に対し我が国で習得した技術の現地における適用度の測定評価。
- (2) 窯業分野に関する当該国の一般事情、技術水準及び今後の我が国の研修に対するニーズの把握。
- (3) セミナーを通じての当該分野に関する我が国の最新技術情報の提供及び当該国における技術水準向上のための技術指導。
- (4) 対象機関の概要調査及び研修員の動向調査。
- (5) 今後の我が国のフォローアップ事業に対するニーズの把握。
- (6) 当該分野に関する英文による所見（助言、勧告等）の当該訪問機関への提出。
- (7) 当該研修コース及びフォローアップ事業に対する助言、勧告。
- (8) 巡回指導に係る報告書の作成。

以上の事項につき指導、調査することにより、今後の研修員受入事業並びにフォローアップ事業の向上改善に資する。

2. 団員構成

氏名	担当業務	所属先
植田哲哉	総括・技術指導	工業技術院名古屋工業技術試験所セラミックス応用部応用技術課課長
山本隆一	技術指導	国際協力事業団名古屋国際研修センター窯業分野集団研修コース研修指導者
森本康裕	業務調整	国際協力事業団名古屋国際研修センター研修課

3. 調査日程

- (1) 全体期間 平成2年12月4日から同年12月22日まで

月	日	曜日	調 査 団 行 程
12	4	火	名古屋 (12:00) 発 SQ089⇒シンガポール(19:40) 着
	5	水	JICA事務所訪問 日本大使館訪問 Public Service Division, Ministry of Finance訪問
	6	木	Ministry of Education*訪問
	7	金	Temasek Polytechnics* 訪問 Nanyang Academy of Fine Arts (南洋芸術学院) 訪問 調査団主催懇親会
	8	土	JETRO シンガポール・センター 訪問 JICA事務所報告 シンガポール (21:30) 発 SQ402⇒コロンボ(22:35) 着
	9	日	書類整理
	10	月	JICA事務所訪問 日本大使館訪問
	11	火	Lanka Ceramic Limited (LCL), Piliyandala* 工場訪問 LCL, Ceramics Research & Development Centre (CRDC) 訪問 Hand Crafted Ceramic Centre, Sri Lanka Administrative Service 訪問
	12	水	LCL, Negonbo工場訪問 Midaya Ceramic Ltd. 訪問
	13	木	セミナー開催・調査団主催懇親会
	14	金	コロンボ (9:30) 発 UL302⇒シンガポール経由 MH610⇒クアラルンプール(18:05) 着
	15	土	Malaysia Handicraft Development Corporation (MHDC)* 訪問 JICA事務所訪問 Public Services Department表敬
	16	日	書類整理
	17	月	日本大使館訪問 Standard & Industrial Research Institute of Malaysia(SIRIM)* 訪問 Mara Institute of Technology(ITM)*訪問
	18	火	セミナー開催・調査団主催懇親会 Manpower Department, Ministry of Human Resources* 訪問
	19	水	クアラルンプール (7:30) 発 MH132⇒Ipoh(08:00) 着 MHDC Handicraft Center in Kuala Kangsar 訪問 Perak Ceramic Park造成地訪問
	20	木	製陶工場3社訪問 Ipoh(18:25) 発 MH147⇒クアラルンプール(18:55) 着
	21	金	報告書作成・JICA事務所報告
	22	土	クアラルンプール(9:00) 発 MH1086 ⇒名古屋(16:00) 着

* : 帰国研修員所属先

4. 主要面談者 (敬称略)

シンガポール

在シンガポール日本大使館	一等書記官	山田 秀樹
ジェトロ・シンガポール・センター	所 長	田口 直弘
国際協力事業団シンガポール事務所	所 長	星 達雄
	副 参 事	石田 幸男

Ministry of Finance, Public Service Division

Assistant Director, Training Mr. Lee Kat Kan (李克簡)

日本担当官 Ms. Ong Poh Chin

Ministry of Education, Curriculum Planning Division, Art Unit

Curriculum Inspector Mr. Wong Kian Ping (黄建斌) (帰国研修員・釉着彩・1975年度)

Temasek Polytechnic, School of Design

Teaching Associate Mr. Jaafar bin Abdul Latiff (帰国研修員・釉着彩・1975年度)

Nanyang Academy of Fine Arts 南洋芸術学院

President Dr. Gwee Yee-Hean (魏維賢)

Head, Fine Art Department Mr. Foo Chee San (符致珊) (帰国研修員・1963年度)

スリランカ

在スリランカ日本大使館 二等書記官 神崎 義雄

国際協力事業団スリランカ事務所 副 参 事 新納 宏

Lanka Ceramic Limited

Chairman/Managing Director Mr. Tissa Jayaweera

General Manager Mr. N.C.W. Attanayake (帰国研修員・窯業開発セミナー・1979年度)

Deputy General Manager Mr. D. Bandula Senarath

Deputy General Manager (Technical) Mr. W.D. Weerasinghe

Factory Manager Mr. Harry Makawita

Sri Lanka Administrative Service

Deputy Director, Small Industries Mr. D.A.D. Jayawardena

Hand Crafted Ceramics Centre Mr. Katsuya Fukuyama (青年海外協力隊隊員)

日光陶器株式会社 社 長 山田 常和

Midaya Ceramic Company Ltd.

Chairman/Managing Director Mr. Dayasiri Warnakulasooriya

マレーシア

在マレーシア日本大使館 二等書記官 伊藤 友孝
国際協力事業団マレーシア事務所 次 長 西本 隆司
参 事 酒井 康雄
マレーシア工業開発庁 (MIDA) アドバイザー 早瀬 紘一 (JICA専門家)
ファインセラミックス (特性解析) 研究プロジェクト
専 門 家 早川 順四郎 (プロジェクトリーダー)
専 門 家 平川 伸明

Public Service Department, Training & Career Development Division

Deputy Director Mr. Azizan Ayob
Assistant Director Mr. Mohd. Nadzir Don
(JICA研修事業担当)

Malaysian Handicraft Development Corporation (MHDC)

Director-General Mr. Sulaiman bin Othman (帰国研修員・窯業開発セミナー・1975年度)
Director of Development Mr. Abdullah bin Haji Abdul Rahman (帰国研修員・釉着彩・1977年度)

MHDC Handicraft Center in Kuala Kangsar

Development Officer for Ceramic Mr. Muhammad Rusli Abdullah

Mara Institute of Technology, School of Art & Design

Dean, Senior Lecturer Mr. Dzul Haimi B. Md. Zain
Course Tutor Mr. Kamaruddin Kamsah (帰国研修員・釉着彩・1981年度)
Lecturer Ms. Han Rabeah Kamarun Kamurun (帰国研修員・窯業技術・1974年度)
Laboratory Assistant Mr. Hamdan bin Mohd (帰国研修員・陶磁器開発活用技術・1990年度)

Standards and Industrial Research Institute of Malaysia (SIRIM)

Head, Corporate Liaison Ms. Jayamalar Savarimuthu
Head, Corporate Affairs Unit Dr. Hamzah Kassim
Head, Advanced Ceramics Unit Mr. Ramli Salleh
Assistant Research Officer, Mr. Zainal bin Zakaria (帰国研修員・陶磁器開発活用技術・1989年度)

Ministry of Human Resources, Manpower Department

Director-General Mr. Asnan bin Pi'i
Tender Officer Mr. Nor Azman bin Ahmad (帰国研修員・釉着彩・1988年度)

II. 調査

1. 調査事項 (T/R)

項目	調査事項	対象 ¹⁾	調査方法
1. 候補者の募集・選考等について	1. 全般的な選考プロセス 2. 募集要項 (G I) の配布先 3. 候補者選考基準 4. 当該国内外の研修との比較 5. 本コースに対する評価・要望	<input type="radio"/> <input type="checkbox"/> <input type="radio"/> <input type="radio"/> <input type="checkbox"/> <input type="radio"/> <input type="radio"/> <input type="checkbox"/>	面接 及び 質問票 ²⁾
2. 技術水準等について	1. 当該国の技術水準の把握 2. ニーズの把握 3. その他の問題点の把握	<input type="checkbox"/> <input type="triangle"/> <input type="radio"/> <input type="checkbox"/> <input type="triangle"/> <input type="radio"/> <input type="checkbox"/> <input type="triangle"/>	面接 及び 視察
3. 研修員の動向及び研修成果の測定等について	1. 現在の仕事と職位 2. 日本で習得した知識の適用度、職場への移転 3. 適用上の障害 4. 研修コースの意義 5. 研修コースで最も役立っているもの 6. J I C A 事業に対する要望 7. 帰国研修員についての評価と定着度 8. J I C A アフターケア事業に対する要望	<input type="triangle"/> <input type="triangle"/> <input type="triangle"/> <input type="triangle"/> <input type="triangle"/> <input type="triangle"/> <input type="checkbox"/> <input type="checkbox"/>	質問票 ²⁾ 及び 面接
4. 英文所見 ³⁾	1. 派遣チームの目的と概要 2. 実施したセミナーの概要 3. 訪問した機関に対するコメント		

1) ○ : 技術協力窓口機関 □ : 帰国研修員所属機関 △ : 帰国研修員

2) 調査方法は、事前に質問票を J I C A 事務所を通して帰国研修員、帰国研修員所属機関及び技術協力窓口機関に配布し、記入を依頼した。調査団訪問時に、記入内容の補足と確認を行った。

3) J I C A 事務所を通して技術協力窓口及び帰国研修員所属先に提出した。

2. 質問票の集計
(1) 技術協力窓口機関 (研修事業)

窓口機関	シンガポール	スリランカ	マレーシア
G I 受領後の流れ	<p>人事院 Public Service Division (PSD), Ministry of Finance</p> <p>人事院から推薦依頼。(2日)</p> <p>↓</p> <p>関係省庁・関係公社 3～4週間以内に候補者と必要な情報を人事院に提出。</p> <p>↓</p> <p>人事院内で候補者を選考。²⁾ (5～7日)</p> <p>↓</p> <p>選考結果の通知とA2-37カード記入依頼。(1週間以内)</p>	<p>対外援助局 External Resources Department, Ministry of Finance & Planning</p> <p>対外援助局から推薦依頼 (3日)</p> <p>↓</p> <p>関係省庁 (7日)</p> <p>↓</p> <p>省庁内の関係部局、関係公社内部での候補者選考 (1ヵ月)</p> <p>↓</p> <p>関係省庁 (5日)</p> <p>↓</p> <p>対外援助局 (5日)</p>	<p>人事院 Training & Career Development Division, Public Service Department (PSD)</p> <p>人事院から推薦依頼。</p> <p>↓</p> <p>関係省庁、政府系公社での候補者選考、推薦。</p> <p>↓</p> <p>人事院での候補者選考。</p>
選考手続き変更の可能性	変更予定はない。	変更予定はない。	変更予定はない。
選考所要日数	50日。	2ヵ月。	2ヵ月以内。
G I 受領のタイミング	本コースのG I は候補者の選考に支障なく受領している。	応募締切日の2ヵ月前に送付されるならば問題ない。	時間的余裕を持って受領している。
窓口機関での人選基準	<p>①臨時契約でなく常勤であり、業務成績が優秀なもの。</p> <p>②コース参加に適した経歴を有するもの。</p> <p>③G I 記載資格要件に合ったもの。</p>	G I の基準に基づいて選考される。	<p>①G I 記載の資格要件。</p> <p>②人事院の選考基準。</p>
G I の内容の可否	問題はない。	問題はない。	明確に記載されている。
受入回答受領後出発までに要する時間と手続	2週間以内。 JICA事務所での研修に関するプリーフィングを受けると。人事院及び所屬先に出発日を通報すること。	2週間～1ヵ月。 研修員は所屬省庁と契約書に署名をすること。 研修員は首相府から許可を受けること。	2週間以内。 人事院からの承認書を受けること。 コースが3ヵ月以上の場合、健康診断書を提出すること。
帰国後の研修成果の確認	人事院及び所屬先に帰国日を通報する。 帰国後一ヵ月以内に研修に関する報告書を所屬長のコメントを添えて人事院に提出することになっている。	評価レポートを提出する。	コース修了後、人事院にレポートを提出する。 人事院所定の質問票に回答する。
他機関実施の研修との比較		陶磁器産業は小規模産業として成長すれば、失業問題解決の一助となりうると思われる。	陶磁器分野では国内の教育機関ではマラ工科大学が3年間のコースが、研究試験機関ではマレーシア標準工業研究所があるのみであり、本コースは有用と考える。
陶磁器分野のニーズ			マレーシアの陶磁器産業は経済発展のため最も重要な産業の一つであるが、国内向けばかりでなく輸出市場を目指した高品質の陶磁器を製造するには多くの問題を抱えている。JICAは最新の陶磁器製造技術に触れる機会を提供してほしい。

1) : 人事院は省庁、公社に対し候補者の推薦時に以下の提出を求めている。①研修が候補者の職務に有用である理由、②研修から得られるメリット、③候補者が選出された理由、④候補者の履歴、⑤候補者の職責、
⑥これまで同じ或は関連コースに派遣された職員のリスト。
2) : 研修のため職務を離れている公務員に対しても給与を支払うため、人事院は被推薦者の中に適当な候補者がいないと判断した場合、候補者を推薦しないこともある。

(2) 研修員所属機関

	スリランカ	マレーシア (1)	マレーシア (2)
所属先	ランカ・セラミック公社 Lanka Ceramic Limited (LCL)	マレーシア標準工業研究所 Standards & Industrial Research Institute of Malaysia (SIRIM)	マラ工科大学 Mara Institute of Technology
人選に要する日数	1ヵ月以内。	2～3週間。	1ヵ月～1.5ヵ月。
人選の手順		①SIRIM の各Unitからの推薦。②SIRIM のTraining Committee の承認。③人事院の承認。	①希望者は担当事務局を通して応募。②教務職員に対する研修・奨学金担当の委員会での審査。
選考の基準	①基本的資格要件と経験。 ②寮業の経験。 ③組織内での職位。	①試用期間を終えていること。 ②応募者にとって研修が有益と認められること。 ③応募者は以前に研修に参加していないこと。 ④Unitの長から強い推薦があること。	①経験年数。 ②教務職員としての職位。 ③専門分野。
人選時の十分な情報の有無	ある。	ある。	ある。
GI送付のタイミング	GIは受領していない。	適切な時期に受領している。	受領しているが、遅い。
受入回答後の所属先での対応	日本語の導入。	実施していない。	実施していない。
帰国後の報告	研修成果についての詳細なレポート。改善への提言。	研修に関するレポートを提出。	研修プログラム。経験、文化、教育への応用の可能性。
研修参加と人事評価の関連	関連する。	関連する。	ある程度関連する。
本研修コースへのコメント		本コースの期間、内容、レベルについては満足している。研修内容をより深く理解するため、理論に重点を置くべきである。	
研修成果の活用	ある程度活用されている。	大いに活用されている。	活用されている。
JICA77カケへの要望			アフターケアに関する情報が寄せられることを期待する。

(3) 帰国研修員

a. 調査対象内訳

	シンガポール	スリランカ	マレーシア	合計
対象者	6名	11名	5名	22名
調査票回収者	3名	5名	5名	13名
うち面談者	2名	5名	5名	12名

b. 来日前に本コースの目的をどの程度認識していたか。

	シンガポール	スリランカ	マレーシア	合計
85%以上	1名	5名	3名	9名
75%程度	1名			1名
50%程度			1名	1名
25%程度	1名		1名	2名

c. 本コースは当初の期待にどの程度そっていたか。

	シンガポール	スリランカ	マレーシア	合計
85%以上	2名	5名	3名	10名
75%程度	1名		1名	2名
50%程度			1名	1名
25%程度				

c-1. 「設問c.」に対する補足意見

- ・期待していた研修内容をほぼ網羅していたが、期間が大変短かった。M
- ・以前に参加した研修員から研修内容を聞いて知っていた。M
- ・釉に関して多く理解することができた。M
- ・自分が教えている学校のコースに有用であった。S
- ・本コースの内容と授業の質に感銘を受けた。S
- ・より実践的であることを希望する。S
- ・有用な理論的、実践的知識を与えてくれた。L
- ・本コースは期待以上のものであった。L
- ・釉薬調合と施釉、陶器の改善に有用であった。L
- ・原料の粉碎時間の短縮、釉薬の質の改善と不良品の減少に役立った。L
- ・製品の質の向上させ、より高い職責を得た。L

(注) S:シンガポール M:マレーシア L:スリランカ

d. 帰国後、職務に関して改善されたか。

	シンガポール	スリランカ	マレーシア	合計
改善された	3名	5名	5名	13名
改善されず				0名

d-1. どんな点で改善されたか。

	シンガポール	スリランカ	マレーシア	合計
勤務条件		4名	4名	8名
職責の向上	3名	5名	4名	12名
将来の展望		5名	5名	10名
昇給		5名	1名	6名
新しい職務		2名	3名	5名
仕事の内容	2名	2名	3名	7名
専門家としての認知		5名	4名	9名
国際的人脈		3名	4名	7名

d-2. 「設問d-1.」に対する補足意見

- ・自分の仕事に自信を持てるようになった。陶磁器を専門とする多くの新しい友人を得た。M
- ・実用陶磁器について本コースで学んだように、より系統的に教えられるようになった。M
- ・自分の仕事をより深く理解できるようになった。また専門的に試験を行う自信を得た。M
- ・陶磁器センターの運営を改善でき、また2、3の生産体制を整備することができた。M
- ・現在の職務はシンガポールの中等学校の美術教育（陶磁器）を監督する立場にある。S
- ・大きなインスピレーションを与えてくれた。教授法を改善するアイデアを与えてくれた。陶磁器に関するより広い視点を与えてくれた。S
- ・シンガポールにおける美術教育（陶磁器）のカリキュラムを審査する職務にあるが、その職務実施に自信を与えてくれた。S
- ・研修から得られたものは、現在の日々の仕事に役立っている。L
- ・製造課長に昇進し、それに伴い昇給し、職責が拡大した。L
- ・研究開発所のパイロットプラント課に属し、食器、衛生陶器用の原料、釉、フリットの研究に従事している。L
- ・生産効率向上のための全体を見渡す視点をもてるようになった。L
- ・業務を改善できた。職務に関する専門知識が増えたことにより、より高い地位にもつくことができた。L

- ・釉及び製造技術の品質改善に関してより詳しく指導することができるようになった。L

e. 役に立った研修科目とその理由。

研修科目	理由
・釉薬・施釉・釉薬調合	<p>釉薬についてよりよく理解できた。S</p> <p>現在の職務である新しい釉薬、デザインの導入に役立っている。L</p> <p>現在の職務である釉の品質を向上させることができた。L</p> <p>高火度釉及び低火度釉の試験方法を導入できた。M</p> <p>現在の職務の釉担当部署の中でもっとも重要なものであるから。L</p> <p>品質の改善に役立った。L</p>
・釉薬調合・加飾技法	シルクスクリン印刷等最新の加飾技法に関する知識を得られた。S
・上絵付、下絵付	加飾技法について理解できた。S
・釉／加飾技法	現在の職務である中等学校の美術教育のカリキュラム作成に有用。S
・釉／スクリーン印刷	自分の職務に応用できる。M
・スクリーン印刷／石膏型	自分が教えている陶磁器の科目に応用できる。M
・スクリーン印刷／デザイン	現在スクリーン印刷／デザインを教えている。S
・加飾技法・デザイン	市場に新製品を送るためデザイン、加飾方法を変える必要があるため。L
・加飾技法	スクリーン印刷や他の最新の加飾技法を学ぶことができた。L
・加飾技法	化粧、上絵付、下絵付の技法を導入できた。M
・スクリーン印刷	大量生産に向いている。M
・陶磁器	開発方法及び製品の品質改善のための実用的知識を得られた。S
・製造技術	高い労働効率性が達成でき、生産性が向上した。L
・研究方法	釉の調合や試験方法はよりよい製品を作り出せる。M

f. 研修で得た知識を帰国後どの程度応用できたか。

	シンガポール	スリランカ	マレーシア	合計
85%以上	2名	5名	3名	10名
75%程度			1名	1名
50%程度				名
25%程度	1名		1名	2名

f-1. 「設問 f.」に対する補足意見

《応用できる科目について》

- ・釉や加飾技法の質を評価することができるようになった。S
- ・自分が教えている科目について自信を持てるようになった。S
- ・陶磁器作成について指導できるようになった。S
- ・釉薬調合、最新の加飾技法は応用できた。L
- ・品質の改善、原料の適切な使用法と自国の原料の使用が可能になった。工場では実施している従業員の指導に応用している。L
- ・施釉、成型、泥しょう（鋳込み成型）工場への見学は、有用であった。L
- ・日常の業務に応用できている。L
- ・素地の物性試験、釉調合、加飾技法は直接職務に関係しているので有用。M
- ・スクリーン印刷（理論）、石膏型（実習）。M
- ・釉、加飾技法。M

《応用できない科目について》

- ・実際の陶磁器製造技術は現在シンガポールでは教えてなく、カリキュラムの中に反映することは困難である。S
- ・釉について自分は教えていないため有用とはいえない。M
- ・シルクスクリン印刷は、所属先に実用化するだけのノウハウがないため応用できない。M

g. 習得した知識・情報を帰国後どの程度移転できたか。

	シンガポール	スリランカ	マレーシア	合計
85%以上		3名	3名	6名
75%程度	1名	1名	1名	3名
50%程度	1名	1名	1名	3名
25%程度	1名			1名

g-1. 「設問g.」に対する補足意見（移転できた場合、その方法。出来ない場合はその理由。）

- ・美術教員として、また現在シンガポールの初等中等学校の美術教育カリキュラムを作成するものとして、教員に対して移転できた。S
- ・友人、同僚、生徒に対してインフォーマルな指導、助言、意見交換を行うことにより移転できた。S
- ・教員を指導することによって。ただし直接生徒を指導する機会は余り多くなかった。S
- ・釉着彩コースの内容は、自分が現在教えている分野に余り関係がない。S
- ・正しい技法を従業員に対して指導することができた。L
- ・同僚に対し、研修で得た知識を説明し、助言している。L
- ・従業員に対して、特に釉調合、施釉、転写紙作成について移転している。L
- ・きめ細かい指導により品質改善の訓練をしている。L
- ・デザインは幅広い分野であり、日々新しいコンセプトが生み出されてる。製品の市場競争力は、製品のデザインと加飾による。したがって、売れる製品を作るには、技術力ばかりでなくデザインの優劣が大きなウエートを占めるため、研修の成果を直接市場競争力の向上に結びつけることは困難である。L
- ・同僚との討議を通して。M
- ・民間の中小企業や研究所からの研修員を指導している。M
- ・生徒、インストラクター、同僚の教員に対し日本で学んだ知識、技術を移転している。M
- ・日本で学んだ知識と経験を原料試験を講師や生徒に示すことによって。M
- ・釉薬の試験を通して。M

h. 本コース改善の提言・要望。

(i) 研修期間について

- ・研修では、陶芸家になるためには十二分な知識を学ぶことができる。S

- ・ 6ヵ月の研修期間は短すぎる。 S
- ・ 研修期間を12ヵ月にすれば、より深く学ぶことができるであろう。 S
- ・ 最低1ヵ月の個別研修を実施することが望ましい。 M

(ii) 加えてほしい科目について

- ・ 原型製作の技法等。 L
- ・ 泥しように関する理論、試験方法。 L
- ・ 転写紙。 L
- ・ 素地の製造。 L
- ・ 原料から最終製品まで全工程。 M
- ・ 低火度釉の調合。 M
- ・ 型製作。 M
- ・ QCに関する科目。 M
- ・ 原料、泥しよう。 M

i. 自分の職務遂行上、もっとも大きな問題点。(4項目以内で複数回答)

	ソコボル	スリランカ	マレーシア	合計
訓練された従業員の不足	2名	4名	4名	10名
自国内での研修制度不備	1名	1名	1名	3名
技術文献の不足		4名	2名	6名
外国人専門家の不足	1名	2名	2名	5名
施設、設備の不備		3名	2名	5名
研究施設の不足		1名	3名	4名
予算の不足		2名		2名
市場開発の問題			1名	1名
上司の補助	1名			1名
人事制度上の問題		2名		2名
輸送設備、制度の不備		1名		1名

i-1. 「設問 i.」に対する補足意見

- ・ 人材がいれば磁器や窯のメンテナンスに関する高いレベルのワークショップやセミナーが実施できる。 S
- ・ 自己啓発、自己研鑽の機会がない。全般的傾向として、グラフィックデザインを教えようとする者で国内で訓練を受けた者は少ない。 S
- ・ 現在自分の職務に関し特記すべき問題はない。 S
- ・ 訓練された型職人が不足している。 L
- ・ 外国人専門家が必要。 L
- ・ 技術情報と訓練された従業員が不足している。 L

- ・工場にある機械はみな旧式だが、資金不足のため新しい設備を購入することができない。また多くの部門で訓練された従業員が不足している。L
- ・訓練された従業員と設備が不足している。L
- ・マレーシア語の技術文献が不足している。M
- ・試験所の場所が狭く、試験機器は少なく基本的なものしかない。M
- ・市場競争力のある品質の高い製品を作ることが困難である。M

i - 2. 所属機関及び社会状況のうち障害となっているもの。

	シンガポール	スリランカ	マレーシア	合計
経済的状況		1名	2名	3名
マネジメントの不備	2名		2名	4名
人的資源の流出	2名	4名		6名
職場研修の不足	1名	2名	2名	5名
昇進制度の不備	1名	1名		2名
技術者の不足			1名	1名
品質管理			1名	1名

i - 3. 「設問 i - 2.」に対する補足意見

- ・高いレベル陶磁器を教えるには専門知識が不足している。袖調査に関してまだレベルが低い。S
- ・教員の移動が少なく、才能を持った新しい教員を引きつけることが困難。数少ない有能な者は、職場を離れる。自己研鑽、啓発する機会を与えられない等マネジメントに不備がある。良い仕事をして認められることが少ない。S
- ・教員に対して日本での陶磁器の研修の機会を提供されることを期待する。S
- ・スリランカでは多くの人材が海外に流出している。これに対応するため外国での人材育成、研修を期待したい。L
- ・陶磁器業界は世界市場を目指して拡大傾向にあり、これに対抗するため訓練された人材の需要がとても高い。L
- ・市場での競争力をつけるため最先端の技術を導入すべきと考える。L
- ・研究、製造技術に関する再研修や特定の限られた窯業技術に関する研修が必要である。M
- ・品質管理を行うためには技術スタッフと機材が不足している。M

j. 各国の陶磁器業界が直面している課題。

- ・シンガポールには大きさの十分な陶磁器産業がないこと。S
- ・市場性や経済効率性に左右されない陶磁器の授業を行うこと。優秀な人材に対する支持が欠けている。マネジメントが不備である。S
- ・燃料価格の上昇に伴う生産コストの上昇。品質の高い機器、顔料、フリットの

欠如。L

- ・最新のスクリーン印刷技法、顔料、化学薬品、機器等を導入すること。L
- ・旧式の機器が多いため生産効率が向上しないこと。品質の改善。L
- ・最新の製造技術の欠如。多種の顔料を用いて700℃～800℃の温度で多くの色彩を発色させること。L
- ・品質の改善。L
- ・訓練された人材を得ること。M
- ・製品のデザイン、加飾に独自性を出すこと。付加価値の高いデザインを開発すること。自国の粘土、原料を活用すること。M
- ・輸入原料が高いため、廉価な国産原料を活用すること。釉、加飾技法を研究開発すること。M
- ・全工程をカバーする生産ラインを確立すること。M

k. JICAに対する要望。

	シンガポール	スリランカ	マレーシア	合計
自分の再研修	3名	4名	2名	9名
部下の研修	3名	3名	3名	9名
JICA文献の供与	2名	2名	3名	7名
技術情報	3名	3名	3名	9名

k-1. 「設問k.」に対する補足意見

- ・既に技術を持った人材を対象に短期間で最新の窯業技術を学ぶための研修する機会を作ってほしい。S
- ・陶磁器製造の全工程をカバーする研修の機会を作ってほしい。M
- ・窯の設計、建設等特定分野の日本人専門家を要望する。M
- ・釉に関する日本人専門家。M
- ・専門家。M

アンケートに回答した帰国研修員
シンガポール

参加年度	氏名	現職	所属先住所等
1975	Mr. Wong Kian Ping	Specialist Inspector, Art Unit, Curriculum Planning Division, Ministry of Education	Ministry of Education Environment Building 7th story 40 Scotts road, Singapore
1975	Mr. Jaafar Bin Abdul Latiff	CertEd, Teaching Associate, School of Design, Temasek Polytechnic	Temasek Polytechnic, Stirling Road Campus, 501 Stirling Road Singapore 0314
1977	Mr. Gasper Anthony	Specialist Inspector, Art Unit, Curriculum Planning Division, Ministry of Education	Ministry of Education Environment Building 7th story 40 Scotts road, Singapore

スリランカ

1978	Mr. Eugene Callistus Alles	Pilot Plant division, Research Officer Piliyandala, Lanka Ceramic Limited	Lanka Ceramic Limited, Thumbowila, Piliyandala, Sri Lanka
1981	Mr. Warnakulasooriya Manuel Joseph Fernando	Production Manager, Sanitary Ware Dept. Negombo, Lanka Ceramic Limited	Lanka Ceramic Limited, Periyamulla, Negombo, Sri Lanka
1982	Mr. Kithsiri Asoka Warusahannadi	Assitant Production Manager, Glaze Preparation & Mould Making Dept. Piliyandala, Lanka Ceramic Limited	Lanka Ceramic Limited, Thumbowila, Piliyandala, Sri Lanka
1983	Mr. Ratnayake Mudiyanselage Somasri Ratnayake	Production Manager Designs & Decoration ,Piliyandala, Lanka Ceramic Limited	Lanka Ceramic Limited, Thumbowila, Piliyandala, Sri Lanka
1984	Mr. Kandage Don Sirisena Wijewardena	Senior Supervisor Glaze & Decoration, Piliyandala, Lanka Ceramic Limited	Lanka Ceramic Limited, Thumbowila, Piliyandala, Sri Lanka

マレーシア

1977	Mr. Abdullah bin Haji Abdul Rahman	Director of Development Malaysian Handicraft Development Corporation, Prime Minister's Department	11th Fl. Wisma Kraft Tangan No.9, Jalan Tun Perak, 50500, Kuala Lumpur
1981	Mr. Kamaruddin B. Kamsah	Senior Lecturer Mara Institute of Technology School of Art & Design	Ceramics Department, Mara Institute of Technology, School of Art & Design, 40450 Shah Alam, Selangor
1988	Mr. Nor Azman bin Ahmad	Tender Officer, Manpower Department, Ministry of Human Resources	6th Fl. Block B, Jalan Tamanleal, Pusat Bandar Damansara, 50540 Kuala Lumpur
1989	Mr. Zainal bin Zakaria	Assistant Research Officer, Standard & Industrial Research Institute of Malaysia	P.O. Box 35, No.14, Jln. 17/19 Sec.17 40000 Shah Alam, Selangor
1990	Mr. Hamdan bin Mohd	Laboratory Assistant Mara Institute of Technology School of Art & Design	Ceramics Department, Mara Institute of Technology, School of Art & Design, 40450 Shah Alam, Selangor

3. 各国の窯業事情

(1) シンガポールにおける窯業

シンガポールの帰国研修員はすべて文部省に属しており、学校教員であるものが多い。しかもその人たちは美術工芸畑の人であって、必ずしも陶芸畑ではない。工芸の一部として陶芸を学んでいるものであり、学校の課程でも陶磁器の専門というより美術課程の一部として陶磁器があるという形になっている。したがって工業としての窯業とは余り関連がなく、ことに技術的な取り扱いはまったくなされていない。調査団が訪問したNanyang Academy of Fine Artsには実際に陶磁器を作っているMr. Chua Soo Khim が講師として教鞭をとっているが、陶芸的試験の域を出ない。

a. 国立博物館

ここには古い陶磁器が数多く陳列されていた。とはいえ、この国の歴史自体はあまり古くなく1819年にRafflesが開いた時は街の形態をなしていなかった。従って古いものといっても中国からの伝来品が多く、明、清時代以後のものである。この博物館で陶磁器作りの啓蒙用のビデオが一日何回か定期的に上映され、そのなかでMr. Chuaの工場が紹介されている。

b. Mr. Chua の工場見学

創始者は1936年に中国南部より移住し、この地に1938年に窯 (dragon kiln) を築いて操業を開始した。国立博物館で "To Fire of Clay" というビデオ (約15分) が上映されており、その中でこの工場の陶器の作り方が紹介されている。現在は創始者の子息であるMr. Chua Soo Khim が跡を嗣いで操業しており、当日は彼の説明で工場を見て回った。工場は Gi sheet の屋根で覆った小屋で、その下に窯や製品、原材料が置かれている。別棟では製土、成形、施釉作業が行われている。

原料は地元の土に珪砂を混合 (10~15%) して作っている。原料を混ぜて水に浸しておく窪みがあり、そこで土を湿らせ混ぜてから、土練機にかける。土練機は二段になっており、一段目はミンチのように、径 5cm 位の円柱状で練土が10数本押しだされる。二段目に入った土はさらに練られて20~25cm の円柱として押し出されるが、それが下方に曲がってしまっている。土置き場の練土 (長さ50~70cm) は円柱形のまんなか付近から曲がったような形で積み重ねられている。押し出し時の羽根の調整の関係のようである。土練機の能力は約2 t/時間。

成形は手作り (throwing)、紐作り (coiling)、機械ロクロ (外ごて (jiggering) と内ごて (jollyng)) 等である。作業場には内ごて用の石膏型が外側が赤さびで褐色になったまま積み上げられている。紐作りはロクロの上に乗せないで、人が器物の周りを回って作る。この部分もビデオに紹介されている。見学当日は大皿の仕上げが行われていた。また製作は内ごてで大きな鉢 (植木鉢) が作られていた。

石膏はタイ国製である「SIAM GYPSUM PLASTER」の袋が見受けられた。釉の原料は「釜戸長石」、「borax」 「zircon」等、主として日本からの輸入品であるが、最近では円高になったので一部中国より輸入していたが品質が悪かった。日本の商社としては伊勢久、日陶産業等が進出しているようである。

ここには小さな試験用のガス炉 (オーストラリア製) とシンガポールにただ1基という dragon kilnがある。Mr. Chuaの話では dragon kilnと snake kilnとは異なるものであるということである。dragon kilnは横からも加熱するが、snake kilnは端の部分からのみ加熱し、down draftになっていて煙突が高い。当日はちょうど窯の冷却も終わって窯出しをしている最中であつた。窯内温度は80℃位。ここでは日本と同様に窯の神様がお祭りしてあつた。窯の焚き方は正面で18時間、その後、横から8時間、合計26時間、冷却には3日間かける。結晶釉を作っているので冷却はゆっくり行う。焼成温度は1300℃、燃料は木材、一回に6トンの廃材を使用する。窯の向こう側に廃材のようなものが山のように積んであつた。製品の収縮率は18%、時には15%位の時もある。釉が素地を伴って大きなめくれを作っていた。この場合はシリカ10%でそれが生じ、15%になると止まる。要するに素地にシリカを加えると素地の膨張係数が大きくなるこ

とで釉のはげが防止できる。そうしない場合は釉の膨張係数が大きいと釉のめくれが生ずる。結晶釉はやや厚めに塗っているので、この現象が起こる。植木鉢等は比較的釉層が薄く、釉流れを起こしていない。

製品はオランダを中心にヨーロッパ8ヶ国に輸出している（輸出割合は不明）。Mr. Chuaが講師をしているNanyang Academy of Fine Artsの生徒たちが作品をここの dragon kilnで焼いている。（彼らの作品には風変わりなものが多い。）

c. 明園

この会社も国立博物館見学の際、館内で展示、絵付け作業を実演していたもので、Ms. Mary Lee という女性の係員に紹介されて見学することになった。ここの経営は以前は中国系の香港の業者であったが、現在はシンガポール人の手に移っているとのことであった。ここは観光的な作品を展示即売する工場であり、外国人旅行者が訪れていた。工場内には、いろいろな製品が展示されており、それぞれに価格が表示され、内部で写真を撮ることも許されていた。

ロクロ成形も行っていたが、入口付近には石膏型が山のように積まれており、泥漿攪拌タンクなども備えてあり、鑄込み形成の説明もできる展示がなされていた。絵付け作業は数名の男女の作業員が行っていたが、手の込んだ絵柄は10年程度経験のある職人が、簡単な絵柄は経験1～2年の職人が描いている。また絵付けの分業も行われている。ここにある陳列品は多種多様で染め付け、青磁、釉裏紅、辰砂、天目、五彩等の壺や皿等の装飾品が多いが、ティーセット等の食器類も作っている。製品は明と清時代の写し物がほとんどである。

d. その他

JETROの資料では、シンガポールには窯業関係の日系企業が2社進出している。日本製品の輸入はMeiko Building Material Supplierを通して行われている。シンガポールでは日本フリット(株)が製造した珐瑯タイルが大きなビルの外装に使用された例もある。一般に国内の陶磁器生産量はあまり大きくなく、シンガポールの性格からして、貨物の中継基地としての発展をしており、輸出入の量が増えている。国内の店頭では、ノリタケ(株)はもちろんではあるが、前畑陶器(株)などの製品もみられた。

(2) スリランカの陶磁器

4年前に窯業開発セミナー・フォローアップ調査団として、コロomboにあるセイロン窯業公社の展示即売所であったShow Room & Tourist Shopを訪れた時は主として同公社のPiliyandala やNegombo の工場で作られた硬質陶器製品が大きな面積を占めていた。今回はセイロン窯業公社（現ランカ窯業公社）の製品はまったく片隅に追い遣られ、ノリタケの製品が全面に押し出されていた。展示されていたランカ窯業公社の硬質陶器製品はcup & saucer 1セットでRs. 27（約90円）と大変安いものであった。調査団の訪問時にはセール期間中ということで多くの客が出入りしていたが、中には両腕いっぱいに買い物を抱えた主婦らしい人もいた。

コロombo市内のみたところでは、セイロン窯業公社時代から技術協力を得ていたLanka Porcelain の進出が目覚ましかった。前回と違って今回はホテルでもいい食器はLanka Porcelain(ノリタケとセイロン窯業公社の合併)の製品を使用するところが増しており、スリランカの陶磁器産業にかかる意気込みが変わってきたことを気付かせた。

もともとスリランカは社会主義国であり、窯業生産の主体はセイロン窯業公社であった。しかし近年の国営企業の民営化の波によって、セイロン窯業公社の一部はランカ窯業公社となり、その傘下にPiliyandala やNegombo の2工場とカオリンの精製工場が組み込まれた。残りはセイロン窯業公社のままである。

a. ランカ窯業公社Piliyandala 工場

この工場の第一印象は前回（4年前）に訪れたときよりも、工場の様子が改善されていることであった。

床はきれいで、作業場も割合整然として（ことに成形部門）、前回あった不良品の山はまったく消えていた。不良品はなくなっていないが、片隅からかたづけられ、トラックで運び出していた。見学前のマネージャーの説明でも生産の利益の棒グラフが示されたが、工場内の各職場ごとにそれがあり、管理部門には特性要因図もあった。これはQC活動が活発に行われるようになったため、見学の後、第一回スリランカ品質管理大会（1990年8月）でこの工場のQCサークルが第一位を受賞したときのプレゼンテーションの様様をビデオで見た。この大会にはランカ窯業公社から2つのQCグループが参加した。ノリタケで勉強したという社長が就任し、QCサークル活動が導入されたようである。しかし技術者によるSQCはまだ十分行われていないようである。新しい社長の指導力は随所に現れていた。例えば生産性を高めるため、インセンティブを与え、収益率の増加を従業員の給与に直接反映させることで、従業員の努力を要請していた。

この工場の成形工程は改善されていた。新しいローラーマシンと乾燥設備等を導入している。しかし工場建物の広さの割りに品物の流れは旧態依然で、例えば素焼きから施釉工程への輸送にはまだ改善の余地がある。しかし作業員の行動はインセンティブのためか、良好な作業態度となっている。

b. ランカ窯業公社Negombo 工場

工場の入口は綺麗に整備され、ことに研究室の前には植えこみに花が植えられ、工場環境として改善されている。この工場では従業員の作業態度はPiliyandala 工場に比べると十分教育されているとはいえない。工場内は綺麗に整頓されており、前回訪問時に工事中だった碍子の製造工程ではきちんと仕事をしていた。

c. Midaya Ceramic Company Ltd.

Midaya Ceramic Company Ltd. の社長、Dayasiri氏は、愛知県瀬戸市で7年間陶磁器を勉強し、瀬戸市の日光陶器株式会社の技術指導を得て会社を設立した。また2番目に設立した会社は日光陶器との合併で運営されている。調査団の訪問時には、日光陶器の山田社長も来られており、工場内を案内して頂いた。

この工場は4年前の調査団訪問時に比べ目を見はるべき発展を遂げていた。ここでの製品の中心はノベルティーで主に北米に向けて日光陶器の販売ルートで輸出している。価格は日光陶器の製品（瀬戸市で製造）と同じ価格で販売し、利益の20%を技術指導料と販売マージンとして日光陶器に支払っている。

d. Hand Crafted Ceramics Centreとその周辺の陶器工場

在スリランカ日本大使館の書記官の助言もあり同センターを訪問した。同センターは、青年海外協力隊の福山隊員の配属先であり、ここでは福山隊員を含めて4代にわたる協力隊の隊員が活動して業績を残している。1200℃から1300℃で焼成できる地元の原料があるので、主として炆器を中心とした工芸陶器的なものの試作が随分行われ、試作品として残されている。その一部は製品として中小企業庁関係の展示場へと出荷されている。

このセンターは作業場に一連の製造工程を持っており、地元の人々を傭って陶器を生産している。こうした運営体制で重要な問題になるのは、センターの目的をどのように設定するかということであろう。センターの目的は二つの方向に絞り込むことが考えられる。

第一の目的は、同センターに一連の陶器の生産工程があることから、陶器の製造技術を訓練し普及させることといえる。しかし地元の製陶業者が製造している製品（素焼きの台所用品）とセンターでの訓練の内容（製造技術）とが適合していないところに問題がある。センターで地元の人を訓練しても直接周辺の製陶業者には役に立たず、失業者の救済にしかかかっていない。

第二の目的は、陶器の生産設備があり、製品のデザインも研究され、釉薬などの加飾についても技能的なものが蓄積されているという点から、ノベルティ、装飾品などを作って一般に販売することであろう。さらに進んで観光客用のお土産として売ることを考えてもよい。まずは近くにある寺院での店開きを考えてみてはどうであろう。

第一の方向はセンターを設立したときの方向性が問題となる。地元製陶業者のレベルアップという目的で協力隊員が投入され、地元原料を使って作った素地に輸入材料により加飾するという一方で、一応この目的に沿った解決をしている。しかしそれを民間に移転するという面が全く考えられていない状態のように見える。センター設立の思想と現場の人との考え方の食い違いではなかろうか。第二の方向については、センターのみでは出来ないことであるが、センターがイニシアティブをとってどんどん外へ出ることを考えるべきではなかろうか。作った製品は自然に消費者に届き、消費されるという今までの社会主義的考え方からではとても不十分である。積極的に市場に委ねることを考えるべきであろう。

センターの近くの製陶工場を見学した。手回しのロクロで作り上げる。製品は台所用品の他に、小型の花器と貯金箱を作っていた。製品には赤い化粧土を施し、これを乾燥して焼成する。窯は丈の低い煉瓦を積み上げた5㎡程の囲いの中に、炎の走る煙道を取付けた上に生の製品を積み上げて上から藁や枯れ草などをかぶせて火をつける。ここで作られる製品は無釉の台所用品であるため、たとえセンターで施釉製品を開発しても、その技術は地元の人々には移転されることない。製陶業の盛んなこの地域に設置されたこのセンターで、地域の人々の指向と全く合わない製品を作って、わずかな雇用の機会のみを提供する形になっている。また陶器の生産を目的とするならば、もっと販売拡大のための努力が必要である。

(3) マレーシアの窯業事情

マレーシアには窯業原料は比較的豊富に存在する。長石質がないという通説もあるが、ある報告ではペグマタイト系の原料の賦存が認められ、それが利用できそうだとのことである。JICAによる調査もその辺まで踏み込んだ調査をしていない。現在までに日系の企業がかなり進出しているようであるが、今回の調査団の行動範囲ではこれに関連する情報を収集する機会をもたなかった。クアラルンプールから北へ約350kmに位置するIpohは古い陶業地であり、この地域での現況を視察することができた。Ipohの製陶業は、中国系の人達を中心で、主として dragon kiln による焼成を行なって生産している。

a. Standard and Industrial Research Institute of Malaysia (SIRIM)

1990年SIRIMに Ceramic Technology Section から再編され Ceramic Technology Center (CTC) が設立された。現在新しい研究棟が建設中で完成の暁にはそこに入ることになっている。CTC は大きくわけて Conventional Ceramic Unit と Advanced Ceramic Unit に分けられる。Advanced Ceramic Unit は、科学技術庁・無機材質研究所 (NIRIM) を日本側の協力機関として日・アセアン科学技術協力「ファインセラミックス (特性解析) 研究」プロジェクトを実施しており、長期専門家が派遣されている。同 Unit には新しい機材が次々と入荷設置されている。各 unit の人員は5名ずつで、CTC 全体としては現在10名である。タイル製造技術集団研修コースの帰国研修員は Advanced Ceramic Unit に転属させられていた。また陶磁器コースの帰国研修員 Zainal 氏も近々 Handicraft centre のデザイン部門に異動するとのことであった。Zainal 氏は日本で学んだ釉薬の試験やスクリーン印刷などを小規模ながらやっていた。このように人数的に規模が小さくなる傾向にあり、なかなか人材は確保出来ない模様である。Advanced Ceramic Unit へ供与された機材の多くは当然ながら conventional ceramics にも大いに利用できるものであり、これを使用して十分な研究成果をあげることを希望する。

b. Mara Institute of Technology, School of Arts & Design (ITM)

訪問時は学校はすでに冬期休暇に入っていて、全体としてがらんとした状態であった。学生の実習室と School's Art Gallery を見学した。美術学部であるので工学としての窯業の研究に必要な機材等はほとんどなく、学生の実習に必要な電動ロクロ、石膏ロクロ、押し出し土練機、泥漿攪拌機等が備えられていた。

教員のほとんどが、アメリカの大学に留学して、美術系大学院を卒業するか、あるいは英国の大学に留学している。(ITM 美術学部では資格が diploma までなので、外国へ留学して、BFA または MFA を修得しているようだ。MFA の方が多い。) 学校には美術学部の他にデザイン学部があり、陶磁器、染色、織物、工業デ

ザイン、グラフィックデザイン、写真、金工等のコースがある。

School's Art Gallery では学生と教員の作品が展示されていたが、陶磁器には機能的でデザインの優れた作品は少なく、抽象的なオブジェに造形的に優れたものが多かった。

c. Manpower Department, Ministry of Human Resources

労働省として窯業分野のプロジェクトを検討しており、帰国研修員の Azman氏はManpower Department で assistant としてプロジェクトに従事している。このあたり各省庁でばらばらに窯業行政をやっている感がある。

d. Handicraft Development Corporation (手工芸開発公社)

マレーシア政府は手工業に力を入れているようである。同公社の製品は伝統的な彫模様のある無釉土器は完成されたもので、改善の余地があまりないが、新しく開発された、施釉陶器に上絵したものは発展の可能性の高いものである。上絵（花柄が多い）は原色を使った大胆な絵柄で国内だけでなく輸出の可能性も高いと思われるが、絵付けの良さに比例して形状と仕上がりが劣る。蓋もの場合は蓋の嵌め合わせをきちんとすれば卓上用品としてすばらしいものになると思われる。手工芸開発公社は、日本の商社の指導を受けて開発しているそうであり、そのためかパッケージに木箱やプラスチックを使った凝ったものがあった。各地にある同公社の手工芸センターのうち調査団は、Kuala Kangsar にあるセンターを訪問した。同センターの研修生は卒業後、従業員としてセンターに残り、生産現場で働くものもいる。センターでは、広いゆったりした建物の中で、いろいろな成形方法による実習を行っていた。休暇中の ITMの学生が数名、このセンターで実習していた。釉薬の試験も行なわれており、テストピースが沢山置いてあった。焼成管理はオルトンコーンが使用されていた。焼成炉は比較的新しいガス焼成炉で断熱材としていわゆるセラミックファイバーブランケットが用いられていた。調査団に同行していた Ipoh の陶業者の一人が紐作りの成形を飛入りで指導していたが、研修生がそれを写真に収めていた。このことから十分な実技を指導しうるインストラクターがいないように見受けられた。

e. Kampong の協同工業組合 (Sayong, Karyaransa)

この組合は、手工芸開発公社のKuala Kangsar の手工芸センターが技術・運営指導を行っている。ここでは石膏型による押し型を中心に花瓶、壺類を多く生産していた。薪だきの1㎡に満たない単独窯、1㎡程度のシャトル窯等を用いて生産していた。乾燥は天日乾燥である。土は地元の赤土。成形乾燥したものを石等で磨きをかける。販売ルートは Handicraft Centreを通すか自分たちのルートで売る。黒陶は800℃くらいで焼く。それ以上の温度になると色は消える。パームオイルを塗り磨きをかけて、焼成後に燻をかけてやると黒くなる（日本の燻と同様の方法）。また水洩れ防止になる。自然の黒の着色以外に、焼いてから黒のペイントで塗る場合もある。

f. Ipohの陶業地

MIDA (Malaysia Industrial Development Agency) の早川氏 (JICA専門家) の紹介により Ipoh地区の陶磁器工場を見学することが出来た。

f-1. Sin Lee Seng氏の工場

植木鉢を製造し、使用している設備機材は、power shovel、screw feeder、belt conveyor、roll mill、deairing kneader。以上のラインで土を練って作っている。機械は全部マレーシア製であり、十分作業に耐えられるものができている。成形は湿式プレスで、金型及び土練機から出た練土の輪切りに十分すぎるほどの油を塗っている。上型がプレス中に回転している。下型にはかなり疵がついていた。また下型は3つの部分を継ぎ合わせて作られており、継ぎ目の仕上げが余り良くないので、成形品に出っ張りがあつた。このため

本来なら型から抜きっぱなしで良いところを、仕上げに手をかける必要性が出てくる。乾燥は自然乾燥で、焼成はdragon kiln で1300℃。焙り-1日、焼き-2日、冷まし-4日。別にオーストラリア製ガス炉も使用し、ペーパー・ライザーは使用せずに50kg位のガスボンベを水槽の中に10本並べて、水槽の下からガスを焚き、水槽の水を暖めて使用している。釉薬には海泥（黒いヘドロ状のもの）を使う。これに珪砂を混ぜる。

製品の欠陥は、(1) 鉄粉と思われる黒い粒（屋根のG Iシートの状況は不明）。原料堆積あるいはパワーシャベルについても注意が必要である。（鉄粉が現れていたのはこの工場のみで、他の2工場では見られなかった。）(2) 石はぜのような形で素地をともなって釉がめくれている。（業者はこれを石灰の粒子によるものと説明。）(3) 釉の上にブツブツが出ている。（別の工場で、これは釉中の珪砂によることが判明した。）

f-2. Bang Soon Hen氏の工場

陶管と植木鉢を製造しており、陶管の成形は押し出し切り。他はf-1. の工場と同じ。陶管の欠陥は、(1) 曲がり、(2) 口径の歪みである。この2点は乾燥の方法が主な原因で、風通しの良い場所、並べた端の部分等並べ方にも問題がある。これを口径の部分についていえば、片乾きになっているため焼成後記憶現象として出てくる。現に沢山並べられた端のものは曲がって傾いているのが見られた。

f-3. Khor Swee Koo氏の工場

植木鉢を製造し、他はf-1. とf-2. の工場とほぼ同様である。一部の大型鉢はプレス成形後に、口を切り、紐作りで再度口を作り、タタキ技法で形を整えている。製品はすべて輸出し、輸出先は主にヨーロッパ、シンガポールである。大型ガス炉2基はオーナーであるKhor Swee Koo氏がオーストラリアの窯をもとに設計して作ったものである。欠点として、くっつきとか、釉剥げが見られる。取り扱いの不注意が目立つ。これはdragon kiln による作業の複雑さに起因していると思われる。

f-1. の工場原料をつぶさに調べたが木片(lignite) の粒が入っており、またやや硬い団粒のような部分は赤褐色を帯びており、力を入れて潰すと簡単に碎ける。しかし土練機で練ったくらいでは簡単には碎けない。石灰の粒子が入っているとして、どこから来たのか、かなり大きい塊でなければ、このような欠点はない。化学分析ではCaO が0.5%という僅かな量であるからである。業者の意向として、精製することを考えているようであるが、粗陶器用に大量に安く使うことが条件の原料では、普通精製することはない。石灰の粒子が入っていない部分を選んで使うか、石灰の粒子の入っているものを上手に使うことを考えるべきである。

g. MIDA Perak 州支部

MIDAのPerak州支部では当地方の窯業の概況について説明を受けた。

当地にはTeam Work なる株式会社があり、日本人を交え、日本からの投資の窓口、手続き代行等の業務を行っている。

Ipohには40社程の小さな陶業者があり、この陶業者の組合で工業団地(ceramic park)を作る計画が進行中である。現在、当地ではカオリン、粘土を精製しないで使っているが、組合を母体として、500t/日の能力を持つ製土工場を建設する計画を持っている。

Perak州政府及び州知事は陶磁器産業の育成に力を入れており、州内で産出した陶磁器原料を州外への持ち出しを禁止している。

SIRIMもPerak州に支部(ceramic centre)を作る予定とのことである。

III. セミナーの実施

1. 概要

(1) スリランカ

開催日時：12月13日(木) 9:30～12:30

場 所：Hotel Lanka Oberoi, Function Room

講演者①：植田哲哉

題 目：加飾技法

内 容：a. 加飾技法に関する概論。

b. 各論－化粧、練り込み、彫りと印花、絵付、線引き機、絵付工程の欠点、釉薬についてスライド写真を使用して具体例を説明。(2. 講演原稿参照)

講演者②：山本隆一

題 目：日本における窯業生産

内 容：a. 4年前に訪問したセイロン窯業公社と現在のランカ窯業公社との比較。

b. 品質管理と4S(あるいは5S)。(2. 講演原稿参照)

参加者：所属先・氏名・職位

Lanka Ceramic Limited

Mr. Tissa Jayaweera	Chairman/Managing Director
Mr. N.C.W. Attanayake	General Manager
Mr. D. Bandula Senarath	Deputy General Manager
Mr. W.D. Weerasinghe	Deputy General Manager (Technical)
Mr. Harry Makawita	Factory Manager
Mr. E. Callistus Alles	Pilot Plant division, Research Officer,
Mr. W.M.J. Fernando	Production Manager, Sanitary Ware Dept.
Mr. W.H. Kithsiri Asoka	Ass. Production Manager, Glaze Preparation & Mould Making
Mr. R.M.S. Ratnayake	Production Manager, Designs & Decoration
Mr. K.D. Sirisena W.	Senior Supervisor Glaze & Decoration,
Mr. B.K. Perera	Production Manager
Mr. C.P. Kumarasiri	Production Manager
Mr. K.H. Chandradasa	Ass. Production Manager,
Mr. T.R. Kamalasuriya	Ass. Factory Manager,
Mr. Piyasiri Perera	Senior Supervisor
Mr. A.S. de Silva	General Manager, Raw Manager

Dept. of External Resources, Ministry of Finance

Ms. R.V. Nanayakkara Deputy Director.

在スリランカ日本大使館

神崎 義雄

二等書記官

国際協力事業団スリランカ事務所

新納 宏

副参事

(2) マレーシア

開催日時：12月18日(火) 9:00~12:30

場 所：Hotel Holiday Inn, Shah Alam

講演者①：植田哲哉

題目、内容は上記スリランカと同様。

講演者②：山本隆一

題 目：日本における窯業の発展

内 容：a. 日本の窯業の発展を特性要因図をもとに、次の6つの要因に分けて説明。

b. 教育、研究開発、中小企業の近代化、国の行政施策、大企業の貢献、協同組合組織。(2. 講演原稿参照)

参加者：所属先・氏名・職位

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Mr. Hamdan bin Mohd Laboratory Assistant

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Ms. Siti Zaleha Saad Lecturer

Mr. Abdul Manan Mohd Johan Instructor

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平川 伸明 //

2. 講演原稿

(1) 題目：『加飾技法』("Decoration Techniques") 講演者：植田哲哉

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1. Various Decoration Techniques

1-1 Variety of Japanese Pottery

Pottery and porcelain are indispensable for our daily life. We use various kinds of ceramic wares; there are different types of bodies, namely bone china, porcelain, stoneware, and different shapes and kinds of Japanese and western tableware. Besides, decoration applied to these tableware is varied. In case of Japanese tableware, many factors such as materials, shapes, patterns and seasons are concerned to variety of products thus each household keeps more tableware in Japan than in the West. Moreover, various kinds of western tableware have also been spread among Japanese households these days and tableware is popular gift, then a great amount of tableware is stocked in shelves and storage.

Japan has been noted for ceramic production in the world. She has developed through her own traditional techniques and foreign techniques from China and Korea. Besides, western technology was introduced and mass production technology has been established in modern age. Recently, research and development in the field of fine ceramics (advanced ceramics) is also distinguished. Japanese pottery and porcelain are characterized by combination of advanced scientific technology and traditional techniques and it is one of the reasons why various ceramic wares are produced in Japan.

1-2 Various Decoration Techniques

We can see the same tendency in decoration techniques. Various decoration techniques are applied to ceramic products ranging from traditional engobe technique and carving to advanced printing technology. Decoration is necessary to increase additional value to products.

Printing technology is generally applied to tableware and novelties made by mass production for decoration. Engraving decoration is applied with gypsum mold of forming for mass production. Traditional decoration techniques are utilized for small production.

There are many production centers that have long history in ceramics in Japan and characteristic decoration techniques depend upon regions. For instance, "Shiro Satsuma" ware is decorated ware in Kagoshima*¹ which is drawn "akigusa (autumn plants)" pattern and "Satsuma"*² fowl pattern with western colors and gold over crackle ware. "Arita's"*³ "Nigoshide (unique white body)" and "Some Nishiki (red overglaze decoration)" are so outstanding that other production centers admire their characteristics. "Shino" ware which has tender tone of glaze has appeared its beauty by local raw materials in

*1 KAGOSHIMA/*2 SATSUMA/*3 ARITA See the appendix.

"Mino"*⁴ and proper firing technique. In "Tokoname"*⁵, fine engraved design is applied on Japanese teapot of "Shudei (iron red clay)" ware and flower pot. "Kutani"*⁶ ware is colorful ceramic ware applied overglaze decoration by Japanese colors in "Kutani".

Decoration techniques are classified as follows:

- Engobes....."Hakeme (brushing)", "Kohiki", "Gohonde" (techniques combining engobe and glaze), "Sumi-nagashi (marbling by slip)", "Itchin-mori (slip trailing)", "Yubi-gaki (finger drawing)"
- "Nerikomi"....."Nerikomi (clay marbling mosaic)", "Uzurade (feathering)", "Ichimatsu (checker)
- Engraving and Stamping....."Kushime (combing)", "Tobi-ganna (jumping scratch)", "Shizumi-bori (engraving)", "Uki-bori (embossment)", "Sen-bori (line engraving)", "Kakiotoshi (sgraffito)", "Inka (stamping)", "Roller-mon (rolling pattern)", "Zogan (inlay)", "Mentori (facetting)", relief, "Sukashi-bori and Hotarude (pierced carving and rice china)", "Nunome (cloth texture)", sand blast, application of forming machines
- "Etsuke" Decoration...underglaze decoration, overglaze decoration, inglaze decoration, application of printing machine, lining machine
- Glazes.....colored glazes, crystalline glazes, dripping, double glaze, spraying, crackle glazes

Other different techniques such as smoking firing, discoloration under kiln atmosphere used natural ash and lacquer ware of ceramic body are applied.

2. Engobes

Engobes have been widely used not only in Orient but in the West since long time ago. Engobe is another word of slips.

Engobes are effective of (1) covering low quality colored body, (2) smoothing rough surface of bodies for application of decoration, (3) prevention of glazes' pin holes, (4) prevention of water leak of porous body and (5) making vivid shade of glazes. Engobes have been utilized not only for practical purposes but for decorative effects and applied even for mass production these days.

2-1 Raw Materials and Application of Engobes

"Shirae-tsuchi (white clay)", a kind of kaolin with low plasticity, has been used for engobe preparation. Other raw materials such as "Amakusa"*⁷ pottery stone, kaolin, "Gairome" clay, "Kibushi" clay, "Roseki (pyrophyllite)", silica stone and feldspar are also used.

*4 MINO/*5 TOKONAME/*6 KUTANI/*7 AMAKUSA..... See the appendix.

Engobes are applied by pouring, dipping, spraying and brushing. Colored engobe mixed with pigment and metal oxides are also prepared.

2-2 Decoration Techniques of Engobes

2-2-1 "Hakeme (Brushing)"

(1) "Suji-hakeme (Rice-ear Pattern)"

Engobe is applied with brush ("Migo-fude"-bunch of ears of rice) and coarse brushing is marked on the piece. Long brush is also used for this technique.

(2) "Doro-hakeme (Slip Application by Brush)"

Engobe is applied with a brush to the whole vessel (bowl).

(3) "Doro-uchi (Hitting Pattern)"

Green ware is placed on potter's wheel and engobe is applied with brush turning the wheel. Pattern on the ware looks like waves and flat brush or dabber brush are originally used for the application.

2-2-2 "Kohiki and Gohonde (Combination of Engobe and Glaze)"

A coarse body of high iron content is dipped in engobe slip, transparent glaze is applied on and fired ware's surface looks like sprayed white powder. This technique is called "Kohikide". If ceramic ware covered with kaolinitic engobe is fired by neutral through weak reduction flame, pastel pink spots appear on the surface. It is "Gohonde". "Amamoride" of which surface seems stains on white wall is popular design among masters of ceremonial tea.

2-2-3 "Suminagashi and Uzurade (Marbling by Slip and Feathering)"

A few drops of colored engobe are put in thick engobe of different color and the engobe container is shaken. As a result, two engobes-mixed pattern is obtained and it is transferred to the body by dipping. This is "Suminagashi (Marbling)". Another engobe technique is also called "Suminagashi", that is; the first engobe is applied directly on the body and another engobe is dropped on it before the first one is dry. The body covered with two engobes is shaken hard and wood grained design shows up right after the application of the engobe.

"Uzurade (Feathering)" is applied as follows; the first engobe is entirely applied and another engobe of different color is put by slip trailing to make stripes on the piece. Then, applied wet engobe is dragged with feather, bamboo tool or needle at right angle of these stripes and quail's feather pattern is obtained. This technique is called "Uzurade (feathering)".

2-2-4 "Itchin-mori (Slip Trailing)"

Squeezable bag applied a metal cap on the tip is used for slip trailers. Thick engobe is extruded from the trailer and line work is drawn.

2-3 Prevention of Engobe Defects

2-3-1 Pinholes

Following conditions tend to cause pinholes; (1) Surface of the body is rough. (2) Engobe is applied on a biscuit body. (3) Engobe is applied very thick. Glue from seaweed is generally mixed with engobe to smooth the surface and pinholes hardly occur. Instead, 0.5-1.0% of unhydrated sodium carbonate and 1.0% of sodium silicate or borax are added. In the case engobe is applied thick, application should be divided. Since bubbles in engobe slip may cause pinholes, it is preferable to age engobe slip.

2-3-2 Cracks and Peeling

There are various causes of the above defects. (1) The body is too dry. (A little wet body is better.) (2) Once application for thick engobe (It is better to apply thick engobe slip a few times.) (3) Dry shrinkage of the engobe is big. (Mixing ratio of clay materials such as "Gairome" clay and "Shirae-tsuchi (white clay)" should be reduced.) (4) Low stickiness of engobe (Increase clay materials.) (5) Bonding of body and engobe is not enough. (Increase feldspar, limestone or lime glaze.)

3. "Nerikomi (Clay Marbling)"

3-1 "Nerikomide (Clay Marbling Mosaic)"

To obtain clay mosaic, a few different colored bodies are formed by throwing or slab forming.

3-2 "Uzurade (Feathering)"

Two different colored bodies are prepared in slab state with "tatara (bat)" board respectively and these slabs to attach them firmly. Body slip should be applied between slabs to attach them firmly. Piled slabs are pressed and cut with wooden knife of 5-10mm of thickness. Cut slabs are laid horizontally and piled with "tatara" board, then quail's feather pattern is obtained.

3-3 "Ichimatsude (Checker)"

Procedures of "Ichimatsude" are same as "Uzurade" until the first piling of slabs. Piled slabs are cut vertically and cut slabs are laid and piled sliding one block by one block. Then, piled slabs are cut vertically again. Finally checker pattern is obtained.

3-4 Prevention of "Nerikomi" Defects

Cracks may occur between piled bodies. In order to prevent cracks, (1) reduce difference of firing shrinkage of bodies and (2) apply muddy slip on each slab before piling and press slabs well during piling. Aging of piled slabs is also effective.

4. Engraving and Stamping

4-1 "Kushime (Combing)"

When green body is scratched with a comb, lines are marked on the body. Bamboo or metal model tools are used as a comb.

4-2 "Tobi-ganna (Jumping Scratch)"

Formed piece is placed on the potter's wheel and wavy marks are trimmed by "kanna (metal trimming tool)" while the wheel is turning. "Kanna" jumps on the piece due to the force of rotation. Long elastic trimming tool is good for unique wavy design.

4-3 "Shizumi-bori and Uki-bori (Engraving and Embossment)"

In case of "Shizumi-bori", patterns are engraved and for "Uki-bori", vice versa. When transparent glaze is applied on the surface, glaze on the engraved portion becomes thick and glaze has light and shade as a result.

4-4 "Kakiotoshi (Sgraffito)"

First, engobe is applied on green body and a pattern is drawn on it. Background of the pattern is scraped off. Engobe can be applied double for this technique.

4-5 "Inka (Stamping)"

Sticks like finger tip are prepared from gypsum, wood or clay and some design is engraved on them. They are stamps (seals). The design is transferred by stamping on green bodies. Traditional patterns such as "kikugata (chrysanthemum)", "yotsume (four squares)", and "karakusa (arabesque)" are generally applied. "Inka" was named after flower's seal because flower patterns are commonly used for this technique.

"Mishimade" is combined technique of "Inka" and inlay, namely engobe is filled into stamped patterns.

4-6 "Roller-mon" (Rolling Pattern)

Rollers look like spools and patterns are engraved on rollers. By rolling them, continuous pattern is sealed on green bodies.

4-7 "Zogan (Inlay)"

Colored slip of which color is different from body's is filled and pressed into engraved or sealed pattern and excess slip is cleaned to make flat surface.

4-8 "Mentori (Facetting)"

Thick and leather-soft ware is shaped by cutting off with a pallet (spatula).

4-9 Relief

Another clay body is attached to the green ware and a pattern is embossed by carving the attached body. Or a pattern is made by pressing an attachment (body) to a mold and put it on the green ware later.

4-10 "Sukashi-bori and Hotarude (Pierced Carving and Rice China)"

For "Sukashi-bori" technique, a pattern is carved out of the body and it is applied to decorated wares such as incense burner. "Hotarude" is applied technique of "Sukashi-bori". Feldspar rich glaze is filled in carved holes and the ware is fired. The glaze melts and fills space of carved holes during firing.

4-11 "Nunome (Cloth Texturing)"

In case of hand pressing, cloth is placed between gypsum mold and a plastic body for smooth demolding and cloth pattern is marked on the body. Formerly, linen mosquito net was used for cloth texturing. And engobe is rubbed on the cloth.

4-12 Sand Blast Technique

For sand blast, abrasive is sprayed through nozzle supplying compressive air to the piece. In case of pottery, glass beads are blasted on the piece and carved or engraved design is obtained. First of all, resin mold is casted corresponding to the shape of the piece and a pattern is cut off. Abrasive is blasted on the piece covered with the resin mold and the pattern is engraved. Pierced carving ("Sukashi-bori") is also obtainable by taking longer time. This technique is generally applied on biscuit ware, however, glaze ware is sometimes used.

4-13 Application of Forming Machines

Characteristic pattern can be made on wares formed by jiggering machine, dry press or extruder. Engraved or relief pattern is obtained setting gypsum mold or metal die with the pattern by jiggering or dry pressing. In case of extrusion, various line work is marked by engraving inside of the nozzle of the extruder.

5. "Etsuke(Picture)" Decoration - Decoration with Colors or Pigments

"Etsuke" decoration is the most common among decoration techniques. Traditional techniques are applied to "etsuke" decoration. These days printing technology has been improved to produce transfer paper printed in multi-colors and its reproductivity is so high that the transfer paper almost seems hand painting with different tint.

5-1 Underglaze Decoration

In case of underglaze decoration, decoration is applied on the body and the glaze covers the decoration. Then the decorated ware proceeds to glaze firing. Since decoration is applied under the glaze, this process is called underglaze decoration.

One of typical underglaze decoration is (1) "Sometsuke(blue and white decoration)". Colors are prepared from zaffre or cobalt oxide. (2) "Tetsue(iron picture)". This decoration is also called "Sabie(rusty picture)". Color sources are iron containing clay or rock such as "Oniita" and iron oxide. (3) "Yuriko" design applies copper as coloring element. It used to be unstable for coloration, however, it has become stable due to improvement of kilns that are easily controlled firing atmosphere. (4) There are some high temperature underglaze colors although the number of colors is limited. (5) "Nukie(wax resist)". After the design is painted on in wax or rubber emulsion, color of zaffre or iron oxide is brushed or dabbed on the piece. Wherever there is wax or rubber emulsion the color will be repelled and so after the piece is fired and the wax has burnt away, the design that was brushed in wax shows the color of the body while the surrounding area has the color of the color (stain). This technique is applied to Japanese ink for calligraphy. After fine design is drawn in Japanese ink, color is thinly brushed on the design. Due to organic glue(glue from seaweed) in Japanese ink, the color is repelled and the design that was brushed in Japanese ink shows the color of the body. These days water soluble or oil type-water repellent agent is used for wax resist technique.

5-2 Overglaze Decoration

"Etsuke" is applied on the glaze ware for this technique. Since overglaze colors are fired at 700-800°C, they are abundant in color variation while the number of underglaze colors is limited due to high temperature-firing. There are two types of

overglaze colors; Japanese and western colors. (1) Japanese colors are mixtures of "Shiratama(frit)", silica stone and coloring elements such as rouge(Fe_2O_3), copper, cobalt and manganese. After firing of the mixture, it turns into transparent colored glass. To obtain deep color, color should be painted thick. However, red color should be applied as thin as possible like painting colors to make it transparent, otherwise the red color does not seem aesthetic. (2) Pigments and flux are mixed to prepare western colors. Western colors are not required to paint thick because non-transparent and deep color shows up without thick application. Western colors show various colors like painting colors, however, coloration of Japanese colors is limited to red, yellow, blue, green, brown, etc.

5-3 Inglaze Decoration

Although application of inglaze decoration is same as overglaze decoration, appearance and effect after firing are different. Since decorated ware is fired at 1100-1200 °C that is higher than firing temperature of overglaze decoration, inglaze colors melt into glaze and fired wares prove high resistance like underglazed wares. Besides, inglaze colors variation is wider than that of underglaze so inglaze decorated wares have become very popular in the market these days.

5-4 Application of Printing Techniques

5-4-1 Transfer Paper

Designs for tableware and novelties made by mass production are applied by transfer paper. In Japan, transfer paper used to be imported from Europe in the late 19th century but it started to be printed domestically in the early 20th century and widely spread in the market. Material of transfer paper has been paper but plastics(vinyl) has also been used these days.

5-4-2 Transfer Paper Printing(Indirect Printing)

(1) Copper Plate Printing----Fine linework can be reproduced by this technique and it is generally applied for underglaze decoration of blue and white decoration.

(2) Lithography and Zinc Plate Printing----This technique is mainly used for overglaze decoration. It is suitable for colorful and fine and complicated design fired at low temperature. Since it is a kind of planographic printing, color cannot be applied thick.

(3) Screen Printing----This is relatively new technique that has become popular since late 1950's. Thickness of color can be changed by replacing opening of the screen. It is applicable to wide printed area and substituted for spraying and lacquer painting. Colorful design is available and both under- and overglaze decoration are applied.

5-4-3 Direct Printing

(1) Screen Printing-----A design is printed directly to a piece through screen. This technique is mainly applied to underglaze decoration.

(2) Electrostatic Printing-----Powder color is adsorbed by static electricity. This technique has rarely been used these days.

5-4-4 Pad Press Printing

A design printed by screen printing or copper plate printing is transferred to silicon rubber of which shape fits the shape of a piece to be printed and the silicon rubber is pressed to the piece to transfer the design on the piece. It is possible to print designs on three dimensional objects thus this technique is widespread in tableware industry. Recently, a pad printer that prints both sides of a piece at once was invented.

5-5 Lining Machine

Lining machine draws line on plates or cups. It can draw plural lines or curves with different width at the same time.

5-6 Prevention of Decoration Defects

5-6-1 Unevenness of Tint

(1) Be sure to check printed color (tint) on transfer paper. (2) Keep transfer paper in cool and dark room with low humidity. Old transfer paper has low adhesive strength and may cause uneven color. (3) Reduce difference of temperature inside a kiln during firing. It is preferable to make certain space between loaded wares and keep constant amount of loaded wares on a kiln car. (4) In case of spraying or painting, color should be applied uniformly. (5) In case of copper plate printing, transfer paper should be pressed uniformly and apply suitable amount of water. (6) Adjust melting temperature of used colors.

5-6-2 Slipped Decoration on Transfer Paper

(1) Rubber stamp or combination of copper plate printing and brushing is misplaced. (2) Transferred designs or gold lines are misplaced from proper position. (3) Overprinted design is partly misplaced.

These defects can be solved by careful work and skill but are found often in cheap products.

5-6-3 Crawling and Blistering

(1) Overglaze colors tend to have bigger thermal expansion than bodies' thus crawling may occur. To prevent crawling, flux of which thermal expansion is small and surface tension is big should be mixed with overglaze colors. In case of thick application of

Japanese colors, this point should be considered. (2) Apply overglaze colors thinly. (3) Choose high quality paper for transfer paper printing. (4) To prevent blisters in colors, dry applied colors thoroughly and heat up gradually. It is important to burn out varnish and glue during firing.

5-6-4 Wrinkles

(1) Old or humid transfer paper causes wrinkles. (2) When transfer paper is applied, be sure to press and wash it well. (3) Choose high quality varnish for transfer paper and coat the paper by varnish uniformly. (4) Bodies should be cleaned up and keep out moisture and oil.

5-6-5 Discoloration

(1) Gases produced from colors may cause discoloration. Loading position and amount should be considered at loading into kilns. (2) Underglaze colors may be decomposed depending upon composition of glazes, thus it is necessary to undertake properties of base glazes. (3) If liquid gold changes its color, do not heat the temperature so high or apply it thick. (4) Lack of gloss is caused by low firing temperature, humid atmosphere inside a kiln and lack of degassing.

6. Glazes

6-1 Base Glazes

(1) Transparent Glazes-----Transparent glazes are glossy, smooth on the surface and transparent. Underglaze decoration shows clear through these glazes. It is the most common and basic glaze system.

(2) Mat Glazes-----Mat glazes are not transparent nor glossy. These glazes are often applied to western craftwares and not so common among mass produced wares. Kaolin glaze hardly gets dirty, however its appearance does not seem well due to lack of melting. Magnesia glaze has fine texture, is a little glossy and hardly gets dirty. Barium glaze has wide range of firing temperature to produce mat appearance but over firing causes bloating. Zinc glaze has narrow range of firing temperature but is suitable for pastel colors.

(3) Opaque Glazes ①-----Opaque glazes show glossy and non-transparent due to crystals formed in glass phase. Majolica tin glaze is typical opaque glaze. Low temperature opaque glazes are graceful and conceal color of colored bodies.

(4) Opaque Glazes ②-----This opaque glaze is composed of two phases of immiscible liquid. Although it seems same as the former opaque glaze by naked eyes, texture of this opaque glaze is different. Japanese traditional glazes such as "Shira Hagi"*⁸ glaze and "Nukajiro" glaze are typical opaque glazes in this category.

6-2 Colored Glazes

Colored glazes are prepared by mixing base glazes and metal oxides or pigments. Iron is the most common coloring element that can produce almost any color such as red, yellow, green, blue, brown and black changing glaze compositions and firing conditions. The following is iron glaze systems; "Tetsu-aka" glaze*^a, "Shuhan" glaze*^b, "Tessha" glaze*^c, "Irabo" glaze*^d, "Ki-Zeto"*⁹ glaze*^e, celadon glaze*^f, "Soba" glaze*^g, "Kaki" glaze*^h and "Tenmoku" glaze*ⁱ. The second commonest glaze is copper glazes. Copper produces red, green, blue and purple color, namely traditional glazes such as copper red glaze, chun yao glaze*^j, apple green glaze, "Oribe" glaze*^k, copper celadon glaze and Turkish blue glaze are commonly prepared. Other coloring elements are chromium, manganese, cobalt, nickel, antimony, uranium, gold and silver. Using raw materials containing these metal compounds, various color tones are produced due to the effects of minor composition of metals. Since more than two kinds of metal oxides are mixed and calcined to prepare pigments, coloration of these pigments is very stable for colored glazes. However,

*⁸ HAGI/*⁹ KI-ZETO (yellow Seto) See the appendix. *^a ~ *^k See the appendix II.

discoloration may occur depending upon properties of base glazes. Pigments are widely used for low-medium temperature glazes applied to tiles and novelties.

6-3 Crystalline Glazes

Crystalline glazes form crystals in or on the glaze and firing conditions of glaze compositions differ appearance and texture of crystalline glazes. "Yohen Tenmoku"*¹ tea bowl which is a national treasure was applied crystalline glaze. There is a variety of crystals ranging from big round zinc crystals with diameter of bigger than 10cm to fine and shining aventurine crystals. There are two ways of glaze formation. First, during cooling process of firing, nucleation occurs in the glaze, then crystalline grain growth follows. Another formation of crystalline glazes are as follows; Bubbles appear while a glaze is boiled and metal compounds gather around the bubbles. After firing, the glaze becomes smooth because bubbles are disappearing but the metal compounds remain as crystalline spots. Zinc, titanium, manganese, cobalt "Tessha", "Soba", aventurine, molybdenum and "Yuteki Tenmoku"*^m are good examples of crystalline glazes.

6-4 Decoration by Glazing

(1) Dripping and Spotted Application-----After the application of a glaze to hollow wares, another glaze is dripped to make a design. Glazing tools are a squeezable bag, a bamboo cylinder and a dipper. This technique is often found in craftwares such as bottles and jars. For spotted application, different colored glaze is brushed on glazed pieces instead of dripping.

(2) Double Glazes-----Another glaze is applied on glazed pieces. This technique is often utilized to chun glaze and "Namako" glaze.

(3) Separate Application-----Different glazes are applied separately. In case of "Oribe" ware, transparent and green glazes are separately applied on the same ware and a design is put on the transparent glazed area.

(4) Spraying-----Different colored glazes or pigments are sprayed on glazed pieces in order to make different shades or stencils can be put on the piece and spray a glaze for reproducing a design on the piece.

6-5 Crackle Glazes

A crackle in a glaze is the result of crazing caused by difference of shrinkage between a body and a glaze. Crackles produce natural designs. Chinese crackle ware called

*1/ *mSee the appendix II.

"Kaihen" is very beautiful ceramics. To raise decorativeness of a crackle, "Sumiire" technique is applied. Crackle pieces are soaked in Japanese ink or persimmon juice ("shibu-jiru") to put color in crackles. A crackle is originally a defect of glazes, however, it can be decorative.

6-6 Prevention of Glaze Defects

6-6-1 Crazeing

The following is countermeasures of crazeing;

(1) Check up glaze compositions and raw materials of glaze preparation. (2) Employ suitable firing conditions. (Low firing temperature or short firing time may cause crazeing.) (3) In the case cooling is not appropriate during glost firing, cool down rapidly from maximum to biscuit firing temperature to produce tension on the glaze and apply slow cooling afterwards. (4) In the case crazeing occurs during decoration firing, adjust cooling rate same as that of glost firing. (5) Apply glazes thinly.

Theoretically, crazeing is caused by incompatibility of thermal expansion between a body and a glaze and it is safe against crazeing to make smaller thermal expansion of glaze than body's. Actually, the matter of intermediate layer between a body and a glaze is involved in crazeing, thus solutions should be changed corresponding to types of bodies; porcelain, earthenware and stoneware.

Following countermeasures are generally put in practice; Reduce silica or alumina content in a glaze. Add zircon. Increase silica content in a body. Add magnesia materials. Firing temperature and particle size of same raw materials also change thermal expansion.

6-6-2 Stripped Glazes

(1) In the case body's thermal expansion is much bigger than glaze's, silica in the body is reduced or silica in the glaze is added. A part of silica in the body is substituted by feldspar. (2) Lower biscuit firing temperature when it is too high.

6-6-3 Crawling

(1) Adjust thermal expansion of glaze to that of body. (2) Do not put glaze too thick. (3) Take care of concentration of glaze slip. If it is too watery, water moves to the body causing crawling. The glaze slip is so thick that adhesion of a body and a glaze is not suitable. (4) In the case casted body contains too much electrolyte, adhesion of a body and a glaze becomes worse. (5) Do not touch bodies with oily hands. (6) Clean up dust of the body before glazing. (7) Do not grind glazes too much. (8) After glazing, dry the wares completely. (9) Do not leave glazed wares for a long time, otherwise soluble salts are dissolved.

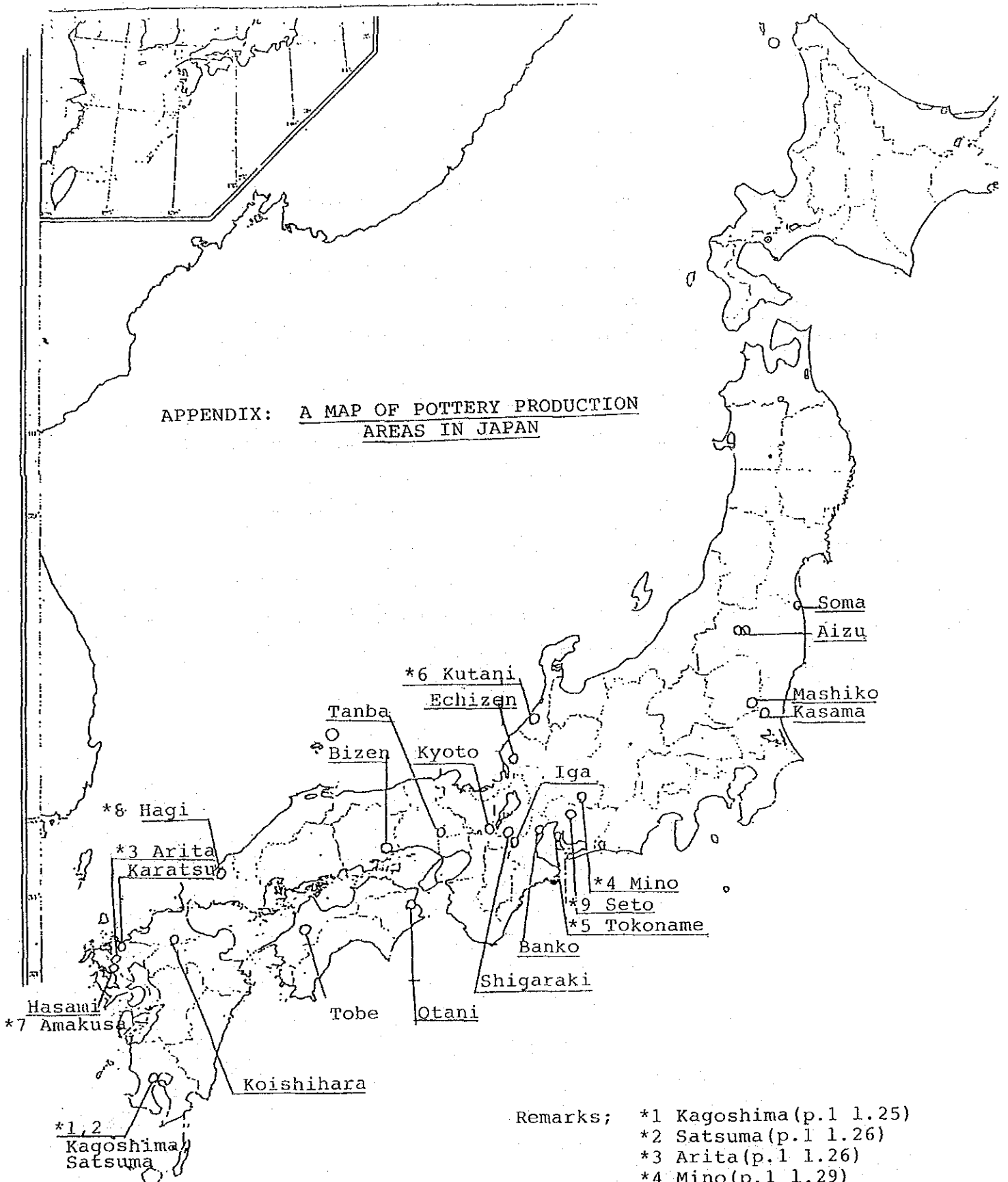
High surface tension may cause crawling so adjustment of raw material composition can prevent crawling as follows: (1) In the case glaze slip is too viscous due to clay materials like kaolin, a part of raw materials is preferably calcined. (2) Although limestone lowers viscosity of glazes at lower than 1000 °C, the viscosity goes up when limestone content is more than 10-15%. (3) Magnesia increases viscosity of glazes but its effect is not so big as limestone. (4) Zinc flower increases viscosity of glazes at higher than 900 °C. (5) Boric acid lowers viscosity of glazes at higher than 700 °C. Zircon increases viscosity of glazes. (6) Titania hardly influences on viscosity of glazes. (7) A little amount of alumina lowers viscosity. (8) Viscosity of the following glazes becomes lower in the following order; potash, soda, and lithia. (9) Iron oxide lowers viscosity.

6-6-4 Pinholes and Egg Shell Finishing

These defects are mainly caused by bodies. Next major cause is firing conditions. Glazes rarely cause pinholes. The following is considerable causes of pinholes related to glazes: (1) too long glazing time (2) too much clay materials in a glaze (3) too thick glaze (4) too much opacifiers such as zircon and bone ash (5) remaining bubbles in a glaze.

It is necessary to inspect every manufacturing process---raw materials, forming, finishing, drying and firing for prevention of glaze defects.

APPENDIX: A MAP OF POTTERY PRODUCTION AREAS IN JAPAN



- Remarks;
- *1 Kagoshima (p.1 1.25)
 - *2 Satsuma (p.1 1.26)
 - *3 Arita (p.1 1.26)
 - *4 Mino (p.1 1.29)
 - *5 Tokoname (p.1 1.30)
 - *6 Kutani (p.2 1.1)
 - *7 Amakusa (p.3 1.2)
 - *8 Hagi (p.11 1.16)
 - *9 Seto (p.11 1.22)

Appendix II

- *a: Tetsu-aka glaze --- iron red glaze
- *b: Shuhan glaze --- iron red glaze with dark-brown spots
- *c: Tessha glaze --- iron glaze with golden colored crystalline pattern
- *d: Irabo glaze --- yellow-green to brown mottled mat glaze
- *e: Ki-zeto glaze --- yellow Seto glaze: light yellow colored glaze
- *f: Celadon glaze(Seiji glaze) --- green celadon glaze
- *g: Soba glaze --- greenish-yellow glaze resembling the color of Soba, Japanese buckwheat noodle
- *h: Kaki glaze --- persimmon-colored glaze
- *i: Tenmoku glaze --- black to brown colored glaze which contains a much higher percentage of iron than either of yellow or amber glaze
- *j: chun yao glaze --- lavender colored glaze w/o underglaze copper red color
- *k: Oribe glaze, Ao Oribe glaze --- copper green glaze
- *l: Yohen tenmoku glaze --- kiln change tenmoku (appearance of glaze changes in the kiln during firing. This glaze also contains higher amount of iron compound.
- *m: Yuteki Tenmoku --- spottled tenmoku

(2) 題目:『日本における窯業生産』("CERAMIC PRODUCTION IN JAPAN") 講演者: 山本隆一

Good morning ladies and gentlemen!

We are very appreciate for your kind guidance of your factories in Piliyandala and Negombo. For this lecture, I have a concept as follows, which comes from my long experience. Four years ago I visited this country, Sri Lanka as a member of other follow-up team of JICA for Ceramic Development Seminar. This was one of the training course and discontinued after 1985. The ceramic engineering course is also discontinued in 1988. There is many ex-participants of this course here. This time we are the members of follow-up team on Glaze and Decoration course, which started 1949 and close in 1989. Then the course is succeeded the renewed course "Development and Application for Pottery and Porcelain", because of improvement of curriculum of the course.

This year the second course was held and Sri Lanka is allocated one seat with the other countries. We are waiting for your application form from your country more than one month after dead line. Unfortunately we received it too late.

I had information on the plant at Piliyandala and Negombo in 1986. But we didn't have new information after that. I prepared a little handout on 4S today. This is the text book for the Ceramic Development Seminar in 1985. Participant from Sri Lanka received this text. He knows 4S. After returning to his plant(Negombo), he tried to start to clean his factory. At first he put small planters at a side of the entrance of his factory. I saw him in 1986 there. He told me so. But next year I received a letter from him, and he left Negombo factories after that. I thought, your factory requires the knowledge on quality control including 4S. So I prepare the handout on 4S today.

Yesterday we visited Negombo factory. It is the same situation in Piliyandala factory. When I stepped in the factory, I saw the road is clean from entrance to office, and flowers and plants made us relaxed. I understood, I have nothing to explain on the problem of 4S to you.

You have already two small circles according to Mr.General Manager's explanation. I recognized you started to plan and to do the modern quality control already. And during walking around in the shops, I felt I had no subject to explain in the seminar. The subject I have prepared is no use for you today, I think. You know all the subject on modern QC.

At the shop of overglaze decoration, we visited there four years ago too, the female workers on the line stopped their hands and kept their eyes fixed upon us. The day before yesterday I could not look at their beautiful eyes again, their hands were moving continuously. I have a picture in the shop four years ago in my house. I had remembered with checking the last visit of this factory for my lecture. No more comment is required to explain my impression on your factory today.

Nothing should be given to you in my lecture today. I will respect the managers who made their efforts to start these activities. I do not know who is the key person of this activities, but modern quality control for industrial production should be done by all the personnel in the factory. So we call it TQC(total quality control).

Negombo factory also has two small groups of so called QC circles. In Piliyandala

factory we watched TV that personnel of Piliyandala factory got award on the 1st QCC Conference, 1990. Congratulation! By the way highlight of QCC in Japan explained as follows: ("4S Movement as Fundamental Approach to QC"を用いて説明。)

The purpose of quality control is that

to raise productivity,

to decrease defects,

to increase quality . . .

To achieve these targets, QC circle is created in Japan.

All of you may have the knowledge of this subject and try to set up QCC in your working lines. Your effort is not fruitful enough at this stage, I think. In Piliyandala factory I saw many bar graphs (or histograms) on the wall in the working shop, but in Negombo there is none, except the manager's room and laboratory. May be, you cannot organized QC circles totally in your shops, you can organize two small groups in a factory. One successful example was shown to us on the Brownian tube the other day.

You had the first conference '90 on QC. Your fruitful result is display on the table on the board. No matter how you got the first prize you got at the first conference '90, the barrier of promoting the QC circle organization is also these. I feel the difference of Piliyandala and Negombo factory will show this problems. Because the members consisting QC circles are workers in the shop themselves. The level of QCC is reflected by the educational background of the members and their attitude to the circle.

Besides of the problems on QC circle, the quality control activities should be carried out by the engineers in the factories. This is another way to promote the productivity, to develop the quality, to decrease the defects of the products. It is not the easy way. Personnel concerned QC activities has to work hard on the production line control. It is very severe condition for engineers to promote QC activities.

As you know very well already, I will review 4S here again. S is the first letter of the items in Japanese.

1. Seiri-----Clearing up

To make a clear distinction between things needed and not needed and clear away the latter

2. Seiton-----Keep in good order

To decide/maintain the place and method of storing objects to enable easy access/easy return

3. Seiso-----Work floor cleaning

To clear dusts and dirty spots to keep the equipments and the work floor clean

4. Seiketsu-----Hygiene

To maintain a good hygiene level of work environments for good work conditions

These items are already clear in your factories. And your incentive measure also is effective and bears fruits. In 1986 we had 4S, but after this they added one more item like this;

5. Shitsuke-----Discipline

Totally we call these items 5S. The last item is most important. For any purpose each item will be accomplished by the educational measure for the workers. To train the workers for promotion of quality of the products, managers or leading people should work hard to give a better understanding of statistical quality control. This is the next problems for you at their stage, I think.

Thank you very much .

(3) 題目:『日本における窯業の発展』("DEVELOPMENT OF CERAMICS IN JAPAN") 講演者: 山本隆一

Good morning ladies and gentlemen!

Today I would like to talk about development of ceramics in Japan, specially on conventional ceramics with my experiences.

By using of a cause and defect diagram, I would like to explain how Japanese ceramic industries developed. Especially a great number of small and medium enterprises exist to produce pottery and porcelain. (See the appendix)

(1) Modernization of small and medium industries

In Seto City, one of the famous pottery producing area near Nagoya in Japan. There are so many small factories, namely cottage industries in this area. About 90% of factories have employee less than 20 persons. The factory with more than 200 employee is only one. The production line of pottery and porcelain manufacturing is divided in each unit sections as follows:

1. Raw materials supplier
2. Body mixture manufacturer
3. Glaze manufacturer
4. Plaster mold maker
5. Forming shop
6. Decoration shop
7. Glazing and firing factory

In Japan more than 70% of production of pottery and porcelain is produced by large scale companies, for example, Noritake, Narumi China, Sango China, NGK, TOTO, NTK, INAX, and others.

After World War II, modern industries in Japan were destroyed completely by bombing and fire during war. We had stood on the start line like a LLDC. In 1948 ceramic industry had 11 tunnel kilns operating actually all over Japan. Keller, Harrop, and Dressler type they were in Nippon Toki (Noritake, today), Toyo Toki (TOTO, today), NGK, and so forth. In early 1950's some small and medium factories introduced the tunnel kilns for their porcelain manufacturing lines. They were mainly Harrop type or modified, meaning direct firing flame.

In the case of roofing tile production in Aichi Prefecture, surrounding area of Nagoya, in 1953 the first tunnel kiln for roofing tiles was built in this area. Mikawa Branch of Tokoname Ceramic Research Institute, Aichi Prefecture, was established in 1954. The activity of this branch supported the movement of development to produce roofing tiles in this area.

In 1964 Tokyo Olympic Games were held and Shinkansen Line, bullet train in Japan, started to serve a new transportation from Tokyo to Osaka via Nagoya. Demand of housing also increased specially along the pacific coast belt area in Japan. Therefore the output of roofing tile production also increased very much. Upto '75 number of tunnel kilns built in this area exceeded 150. Mostly small enterprises in this area challenged the modernization of their production lines to expand their output in the market. Today

in some factories 1,000,000 pieces per month of glazed roofing tiles are produced by only 4 persons. This is a typical example of small and medium industry's effort for modernization.

(2) Research and development

For development of production on roofing tiles, Mikawa Branch of Tokoname Ceramic Research Institute played its important rolls. Late 1940's after war we didn't have x-ray, DTA, and other modernized apparatus for experiments. Researchers of Electric Dept. of the University constructed an x-ray diffraction apparatus for research purpose. At that time, in USA, researchers worked to compose the phase diagrams for ceramics already by using automatically operated x-ray diffractometer. One of the researcher in GIRIN constructed DTA apparatus by himself, collecting parts, to study reaction of ceramic raw materials during firing in 1950s. He got Doctor Degree on this studies. Our researcher collected parts to construct a required tool, for example, dilatometer, slaking test apparatus, and small laboratory kilns in early stage of our activities.

I think you can make your own tools for study or for training by yourselves. Again my experiences, during my stay in the Philippines the exhaust pipe under my car was broken by hampers. I went to large repairing factory joined with TOYOTA, to ask them to repair the exhaust pipe. The reply was that they could not change the parts, because of no stock of spare parts. So I went to small shop in the town after the advice of my driver, of course, there was very poor facilities, but they could do make a new exhaust pipe after manifold to silencer. It cost around 2,000 yen 10 years ago.

You have your own techniques in your country, even it is a part of modernized products. You have to utilize these techniques completely, you may establish your own technology combined with the advanced foreign technology.

We have several national ceramics research institutions, NIRIM, GIRIN, GIRIO, GIRIK, and so on, where ex-participant of high technology material course have been. Besides these, there are about 50 prefectural or municipal research institutes (Japan is divided whole country into 47 prefectures.). Each prefecture has its own research institute or technology center. I delivered the handout on your desk today. It shows local prefectural institutions, their names and subjects of studying. According to this handout, most institutions are conducting on advanced ceramics. But actually they are conducting to study conventional ceramics for a long time. So they have enough potentials to instruct production of conventional ceramics.

(3) Education

We have the following scheme of education system in Japan.

6 years for elementary school (compulsory)

3 years for junior high school (compulsory)

3 years for senior high school

2 years for college or 4 years for university or college

Besides this, after junior high school

5 years for technical college

For ceramics education there are 10 senior high schools have their industrial educational course on ceramics.

Tokyo Institute of Technology, Kyoto Institute of Technology, and Nagoya Institute of Technology have Ceramic Department about 15 years ago. They changed Ceramic Dept. into Department of Inorganic Materials to designate their studies to focus advance ceramics. Before this the graduates after these departments mostly became ceramic engineers and they contributed to develop ceramic industries in Japan.

We have also two vocational school on ceramics in Seto and Kyoto.

(4) Measures by national government

Besides of loan facilitations by national government through prefectural government, there are several systems of technology related measures for small businesses. I will explain one of them.

Training for technicians of small businesses offered by prefectures: prefectures are offering various technical training courses for small business technicians to teach basic and applied technical knowledge with the help of national government subsidies, and the cooperation of industries, universities, and public research institutions.

Promotion of technical development services: public research institutes have technology development studies undertaken by them independently or under supervision of national research institutes for the services to small businesses.

(5) The rolls of the leading companies

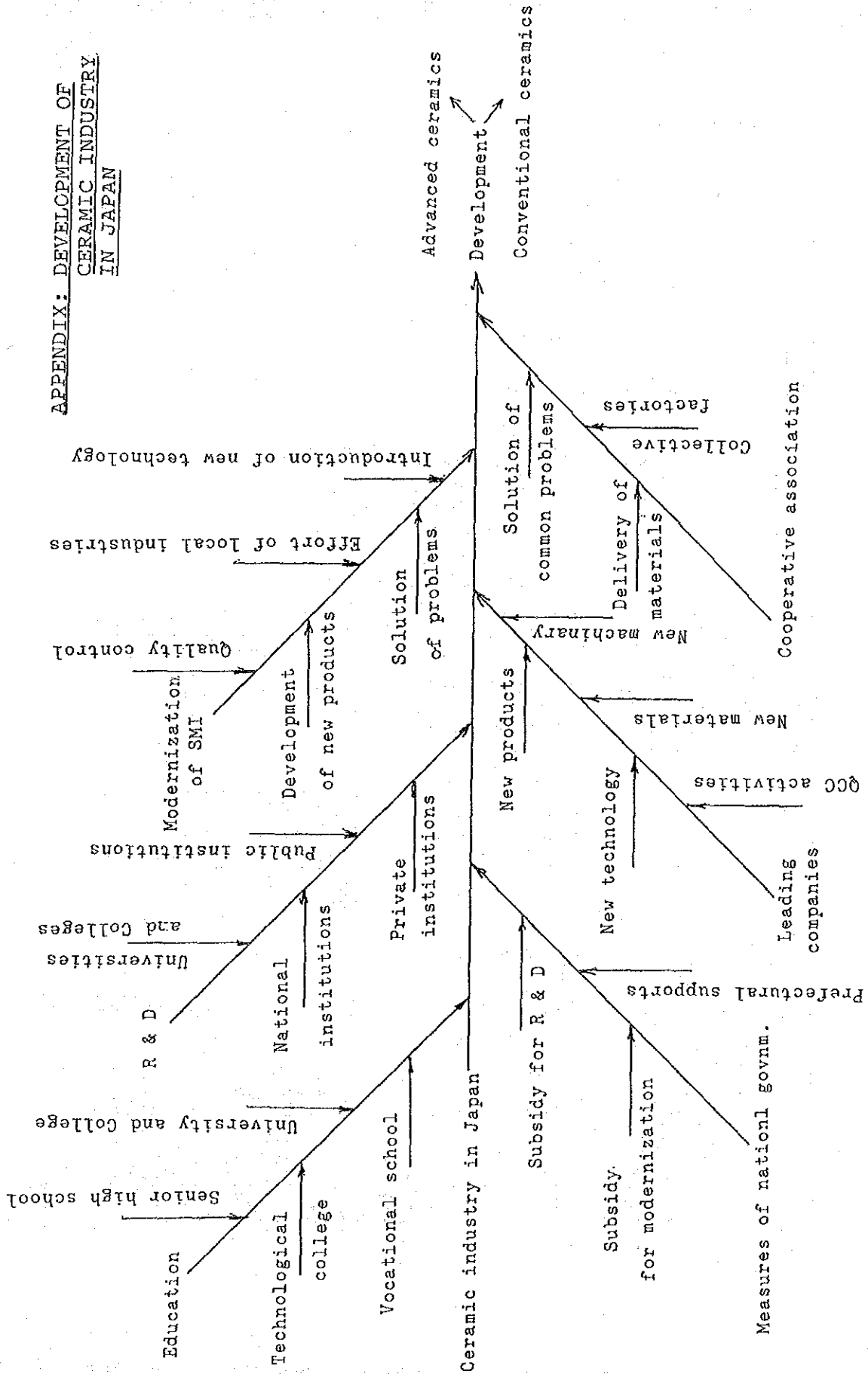
Development of new machinery, new products, new technology, or application of new materials is done by large scale factories. For example, my experience again, in 1964 I visited to a factory in Korea. I saw a new forming machine which didn't work in certain shop. I asked an engineer in that factory, when he replied. They could not operate this machine because of mismatch of machine to clay body they prepared. It came from West Germany. The machine from West Germany has an establish reputation. But this was not the case. In Japan Noritake developed their own roller machine for their production line. It could be useful for materials applied in Japan. This technology has been transferred widely. The small machine manufacturer could produce this type of machine later on, and widely applied to the forming process of ceramic factories.

(6) Cooperative association

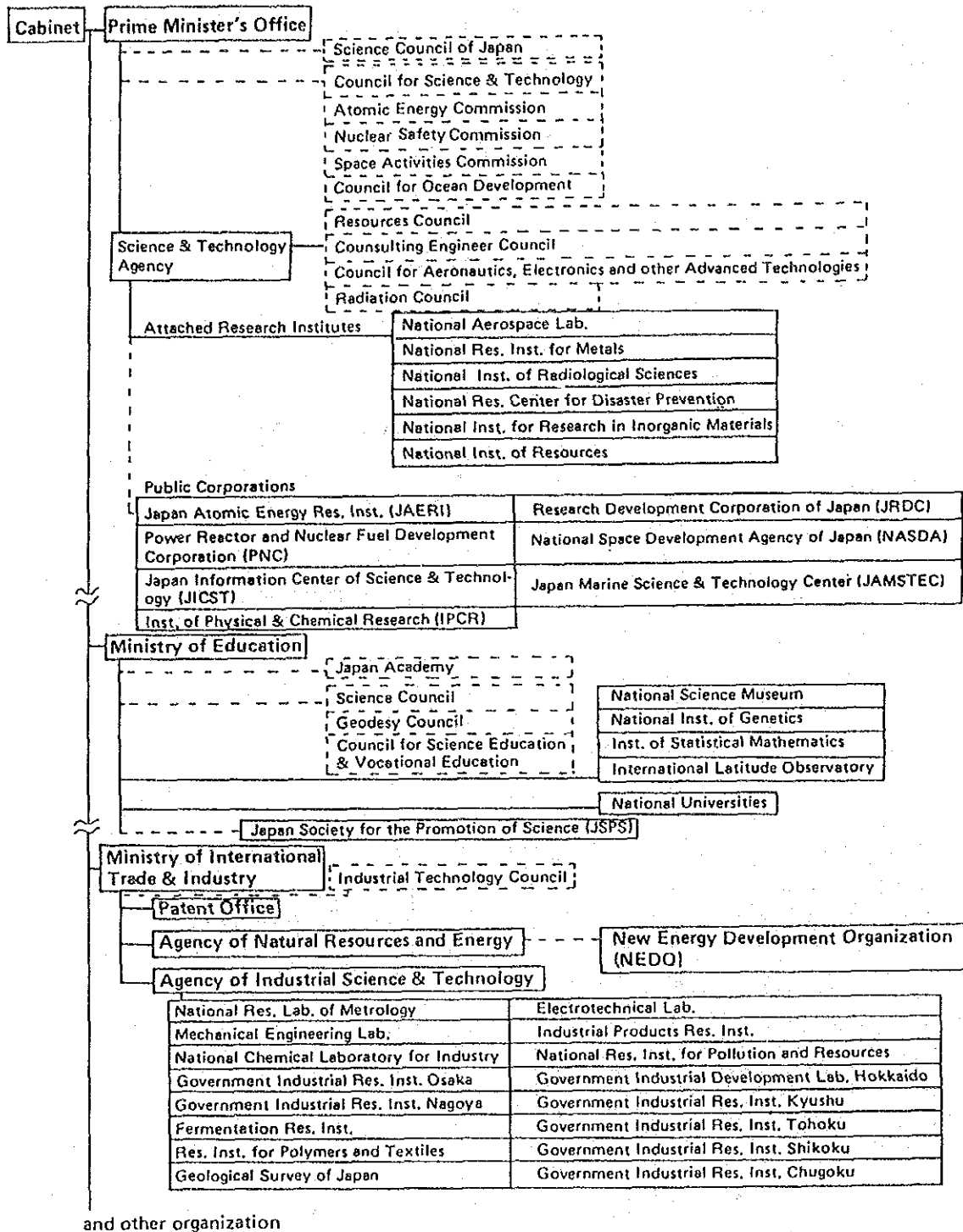
Cooperative association has important rolls in the ceramic field businesses. Unfortunately I cannot explain on this subject, because I am not familiar on this business. So today I would like to leave this subject out.

thank you very much

APPENDIX: DEVELOPMENT OF CERAMIC INDUSTRY IN JAPAN



Main Research Organization on Science and Technology in Japan



NATIONAL INSTITUTE FOR RESEARCH IN INORGANIC MATERIALS

4. BASIC RESEARCH IN GROUPS AND STATIONS

- 1st Research Group (Zr-Containing Oxides: $ZrO_2-M_xO_y$)
- 2nd Research Group (Ternary Tantalum Sulfide; M-Ta-S)
- 3rd Research Group (Silicon base Non-oxide: Si-C-N)
- 4th Research Group (Bismuth-based Oxyfluoride: Bi-M-O-F)
- 5th Research Group (Copper Perovskite: M-Cu-O)
- 6th Research Group (Chalcogenides of Metallic Typical Elements;
M-S, Se, Te)
- 7th Research Group (Octo-Titanates: $A(B,Ti)_8O_{16}$)
- 8th Research Group (Diamond: C)
- 9th Research Group (Rare Earth Alumino-Silicate Glass: $Ln_2O_3-Al_2O_3$ Glass)
- 10th Research Group (Barium Sodium Niobate: $Ba_2NaNb_5O_{15}$:BNN)
- 11th Research Group (Vanadium Bronze: $M_xV_{6n}O_{15-m}$)
- 12th Research Group (Tantalum Carbide: TaC)
- 13th Research Group (Rare Earth Garnets: $R_3M_2X_3O_{12}$)
- 14th Research Group (Nickel Oxide: NiO)
- 15th Research Group (Montmorillonite: $Al_2Si_8O_{10}(OH)_2 \cdot nH_2O$)

5. Research and Development of New Oxide Superconductors

- (1) Exploration of New Superconductors
- (2) Single Crystals
- (3) Crystal Structure

6. Special Research Projects

- (1) Research on Bioceramics
- (2) Research on the Synthesis of Semiconducting Diamond
- (3) Research on Super Abrasive Ceramics

Government Industrial Research Institute, Osaka

- # Research on structure controls of composite ceramics containing whiskers
- # Control of interfacial ionic conduction in ceramic composites
- # Research on optical property reinement of halide glasses
- # Research on prparation technology of ion conducting glass thin films
- # Research on preparation of opto-electric transparent ceramic film
- # Studies on synthesis of graphite bi-intercalation compounds
- # Study on evaluation and improvement of carbon materials and carbon fiber reinforced plastics
- # Studies on thermostable reinforcement from carbon fiber
- # A study on the ceramic coating by low pressure plasma spraying
- # Electric conductive ceramics
- # Theoretical study of interfaces in ceramic materials
- # Study of high precision glass fabrication
- # Study of the new functional optical glass
- # Study on fabrication technology of superconductive film
- # Ceramic Turbine for Coal Gasification: Measurement of tribological properties:-- Preparation process technology(Toughening technology)
- # Superconductive Materials for High Current Density and High Magnetic Field: New Synthetic process from molten phase

Government Industrial Research Institute, Nagoya

- # Technologies of Single Crystal Casting (Ceramic Mold)
- # New Ceramic Processing for High-Tc Superconductors
- # Research and Development on Evaluation Technologies of Ceramic Turbine Component for Coal Gasification System
- # Research and Development on Heat Resistance Ceramic Components
- # Synthetic Technology of Artificial Clay for High Performance Ceramics
- # Fundamental research on Improvement of High-Tc Superconductors
- # Photosensitive Ceramics
- # Fiber Reinforced Ceramics
- # Study on the Functional Porous Ceramics
- # Research on Superplasticity of High-Performance Ceramics and Superplastic Processing
- # Research on the Characterization and Effective Use of Clay Minerals in China
- # Research and Development of Ceramic Colour Containing Rare Earth Elements and Ceramic Colour Glazes
- # Materials Database Building and International Networking Standardization (Ceramics)
- # Research on Evaluation Test Technology for Important Advanced Material (Engineering Ceramics)
- # Research on Dispersion-Strengthened Ceramics
- # Studies on synthesis and sintering of calcium phosphate for an advanced artificial ceramic bone
- # Infrared radiant ceramics for energy conservation
- # Centrifugal casting of ceramic slurries
- # Studies on design of potteries for architectural space, exterior and interior applied traditional decoration techniques to modern pottery

Government Industrial Research Institute, Kyushu

- # Development of Advanced Carbon/Carbon Composites with Oxidation Resistance
- # Hot-gas Corrosion of Ceramics
- # Advanced Utilization of Lime and Lime-based Compounds for Materials Development
- # Machining Technology of Ceramics and their Utilization as for Cutting Tool
- # Studies on the Boride-base Ceramics Having Ductility at High Temperatures
- # Development of Carbon Material Having New Functions made of Carbonaceous Mesophase
- # Basic Studies on Sliding Properties of Carbon Materials at High Temperature
- # Porous Ceramic Materials from Rice Husks
- # Research on Fabrication and Thermomechanical Characterization of Heat Resistant Carbon-ceramic Composite Materials
- # Development of Cutting Ceramic Tool for Steel
- # Study on the Intelligent Composite Ceramics
- # Plastic deformation of ceramics dispersed metal composite
- # Mechanism of zeolite formation
- # Study on extrusion moulding
- # Advanced utilization of volcanic glass
- # Refining process of fine part of weathered granite
- # Processing and evaluation of inorganic polymer with layer structure
- # Extrusionbehaviour of particulate pasts
- # Research on carbon film
- # Research on hard carbon thin film
- # Studies of functionary carbon electrode
- # Research on carbon/ceramic composites
- # Research on boron nitride
- # Spectroscopic characterization of ceramics
- # Study on the fabrication of high strength and high oxidation resistance ceramics
- # Study on the properties of high performance ceramics

List of Universities and Colleges conducting ceramic researches

1. Hokkaido University (Science, Engineering)
2. Tohoku University(Engineering)
3. Akita University(Mining)
4. Yamagata University(Engineering)
5. Ibaraki University(Engineering)
6. University of TSukuba
7. Utsunomiya University(Engineering)
8. Gumma University(Technology)
9. Saitama University(Engineering)
10. Chiba University(Science, Engineering)
11. Tokyo University of Agriculture and Technology(Technology)
12. The Tokyo University(Science, Engineering)
13. Tokyo Institute of Technology(Engineering)
14. Yokohama National University(Engineering)
15. Niigata University(Dentistry, Engineering)
16. The Technological University of Nagaoka(Engineering)
17. Kanazawa University(Technology)
18. Yamanashi University(Engineering)
19. Shinshu University(Engineering)
20. Gifu University(Engineering)
21. Shizuoka University(Engineering)
22. Nagoya Institute of Technology(Engineering)
23. Nagoya University(Engineering)
24. Toyohashi University of Technology(Engineering)
25. Mie University(Engineering)
26. Kyoto University(Engineering)
27. Kyoto Institute of Technology(Engineering and Design)
28. Osaka University(Human Science, Science, Engineering)
29. Kobe University(Science)
30. Okayama University(Engineering)
31. Hiroshima University(Engineering)
32. Yamaguchi University(Engineering)
33. Kochi University(Science)
34. Kyushu University(Engineering, Engineering Sciences)
35. Kyushu Institute of Technology(Engineering)
36. Saga University(Science and Engineering)
37. Nagasaki University(Engineering)
38. Kumamoto University(Engineering)
39. Oita University(Engineering)

40. Kagoshima University(Engineering)
41. Tokyo Metropolitan University(Technology)
42. Osaka City University(Engineering)
43. University of Osaka Prefecture(Engineering)
44. Hokkaido Institute of Technology(Engineering)
45. Hachinohe Institute of Technology(Engineering)
46. Chiba Institute of Technology(Science, Engineering)
47. Aoyama Gakuin University(Science and Technology)
48. Keio University(Science and Technology)
49. Kogakuin University(Engineering)
50. Kokushikan University(Engineering)
51. Shibaura Institute of Technology(Engineering)
52. Sophia University(Aciense and Technology)
53. Showa University(Dentistry)
54. Seikei University(Engineering)
55. Chuo University(Science, Engineering)
56. Tokai University(Engineering)
57. Science University of Tokyo(Science and Technolgy)
58. Nihon University(Science and Technology, Industrial Technology, Engineering)
59. Musashi Institute of Technology(Engineering)
60. Meisei University(Physical Sciences and Engineering)
61. Kanagawa University(Engineering)
62. Sagami Institute of Technology(Engineering)
63. Aichigakuin University(Dentistry)
64. Aichi Institute of Technology(Engineering)
65. Chubu University(Engineering)
66. Toyota Technological Institute(Engineering)
67. Ritsumeikan University(Science and Engineering)
68. Kansai University(Engineering)
69. Kinki University(Science Technology, Engineering)
70. Okayama University of Science(Science)
71. Fukuoka University(Engineering)
72. The Kumamoto Institute of Technology(Engineering)
73. Aichi University of Education
74. Asahi University
75. Ibaraki Technical College
76. Osaka University of Education
77. Osaka High Technology Junior College

78. Osaka Prefectural Technical College
79. Oyama Vocational Junior College
80. Kanagawa Institute of Technology
81. Kanazawa Technical College
82. Kyoto University of Education
83. Kurume Technical College
84. Kobe Municipal Technical College
85. Industrial Technolgy Junior College
86. Tokyo Institute of Technology and Design
87. Nakanihon Automotive College
88. Nagano Technical College
89. Hyogo University of Education
90. Fukui Technical College
91. National Defense Academy
92. Meikai University
93. Yonago Technical College
94. Ryukoku University

R & D AT THE RESEARCH Institute of each prefecture or municipality

1. Hokkaido Industrial Research Institute
Chemical Technology Department, Nopporo Branch
 - a. Bodies and glazes for art pottery
 - b. Trial for art glass by using of local raw materials
 - c. Apatite ceramics from cows bone
 - d. Utilization techniques of sludge from sewer

2. Geological Survey of Hokkaido
 - a. Utilization of low grade ceramic materials
 - b. Application of zeolite resources
 - c. Prevention of aggregate reaction in concrete structure

3. Asahikawa Municipal Research Institute for Industrial Arts*
 - a. Survey on ceramics
 - b. Development of various products
 - c. Development of manufacturing technique

4. Aomori Industrial Research Institute
 - a. Utilization of zeolite and wastes
 - b. Development of new materials from mudstone
 - c. Trial manufacturing of new pottery products
 - d. Survey on ceramic raw materials

5. The Iwate Prefectural Institute of Technology
 - a. Injection molding of advanced ceramics by using of wax as a binder

6. Akita Prefectural Institute of Industrial Technology
 - a. Utilization of local resources in the prefecture to ceramics[Utilization of natural zeolite]

7. Yamagata Research Institute of Technology
 - a. Development of manufacturing process of porous body with ultra fine pores by using montmorillonite
 - b. Fabrication and utilization of mullite ceramics from local ceramic raw material in the Prefecture

8. Miyagi Prefectural Institute of Technology

- a. Study on refining of rare metals and their characterization
 - b. Studies on the characterization methods of fine ceramics by ultrasonic imaging method
 - c. High grade system of fine ceramic fabrication
9. Fukushima Prefecture Aizuwakamatsu Laboratory of Industry
- a. Coloured glazes for stonewares
10. Ceramic Technological Institute
Ibaraki Prefectural Industrial Technology Centre
- a. Utilization of industrial wastes
 - b. Survey analysis of ceramic raw materials
 - c. Utilization and value-adding development of local resources
 - d. Decoration method by sand blast
11. Tochigi Prefectural Ceramic Institute
- a. R & D on ceramic raw materials
 - i) Quality improvement of Mashiko ware's body
 - ii) Utilization of unused resources
 - iii) Quality improvement of clay roof tile body
 - iv) Development of raw materials for glazes
 - v) Utilization of ceramic raw materials
 - b. Development of design for new pottery ware
 - i) Tableware
12. Gunma-ken Industrial Research Institute
- a. Survey on utilization of fine ceramics
 - b. Fabrication of tiles (incl. roof tiles)
 - c. Manufacturing technology of fine ceramics and its characterization [BaTiO_3]
13. Industrial Research Institute of Saitama
- a. Improvement of emissivity of infra-red radiant ceramics
14. The Tokyo Metropolitan Industrial Technology Centre
- a. Fabrication of glass coating film by sol-gel method
 - b. Manufacturing of sintered non-oxide ceramics and its

characterization

- c. Electric discharge machining of conductive ceramics
- d. Development of corrosion resistant ceramics for aluminium alloy
- e. Environmental effects on electric characteristics of fine ceramics

15. Niigata Prefectural Industrial Technology Centre*

- a. Mechanical properties of ceramic composite composed of alumina and zirconia reinforced by organic fibre
- b. Grinding and polishing of fine ceramics by WA grinding wheel
- c. Effects of forming methods on sintering shrinkage of zirconia
- d. Thermal stability of sintered SiC thermister
- e. Firing condition and properties of Piezoelectric ceramics

17. Shizuoka Industrial Technology Institute Centre of Shizuoka Prefecture

- a. Application of new ceramics to various industrial parts
--Application of carbon film and special inorganic fibre to industrial materials

18. Industrial Research Institute, Aichi Prefectural Government

- a. Properties of aluminium-ceramics fibre reinforced composite
- b. Study on metal surface modification by ion sputtering
- c. Surface modification by plasma spraying
- d. Manufacturing technology of industrial parts and functional thin film of fine ceramics and their characterization
- e. Characterization of joint surface of ceramics/metal by ultrasonic microscope

19. Tokoname Ceramic Research Institute, Aichi Prefectural Government

- a. Studies on characterization and application of ceramic raw materials
- b. Glazes for stonewares

- c. Development of design on tablewares
- d. Casting technology of special type roofing tiles
- e. Development of bodies for ceramic building materials
- f. Development of roofing tile for melting snow
- g. Development of functional ceramics applied to fibre
- h. Development of anti-permeable rooftile

20. Seto Ceramic Research Institute, Aichi Prefectural Government

- a. Infra-red radiant ceramics applied PTC
- b. Junction technology of fine ceramics
- c. Application technology of artificial clay---Application of synthetic kaolinite to hard porcelain body---
- d. Forming technology of vibration casting during heating ---Materials for casting mould and preparation of slip-
- e. Systematization of ceramic design by using of advanced instrument---Database structuring of Japanese tableware
- f. Studies on pottery design in the local characteristics
 - i) Design of tableware in various life styles
 - ii) Development of pottery ware using by-products
- f. Studies on design of novelty corresponding to the market under sensual consumption

21. Nagoya Municipal Industrial Research Institute

- a. Evaluation technology on machining defects of ceramics
- b. Electrolytic cell of amorphous solid
- c. Alumina electroluminescent emitter
- d. Junction of ceramic and metal
- e. Synthesis of non-oxide ceramics and their application
- f. Machining characteristics of ceramic tools

22. Gifu Prefectural Ceramic Research Institute

- a. Application of synthetic materials to ceramics
- b. Development of new products of pottery and porcelain
- c. Development of glazes with high hardness
- d. Development of far infrared radiant ceramics
- e. Development of electroconductive ceramics

- f. Forming technology of aluminium nitride
 - g. Development of functional ceramics and their application to sensor
 - h. Forming technology of fine ceramics and its characterization
 - i. Survey on ceramic raw materials
23. Tajimi City Pottery Design and Technical Centre
- a. Trial production of toughened porcelain tableware
 - b. Trial production of exterior & interior items
 - c. Information collection and retrieval system on pottery & porcelain design: data base storage undertaking
 - d. Screen printing by colour decomposition
 - e. Study on novelty and trial production of newly designed products
 - f. Planning of management system on stable colouration of colours and pigments
24. Toki City Institute of Ceramics
- a. Study on high-strength porcelain
 - b. Study on ceramic paper
25. Mie-ken Ceramic Research Centre
- a. Synthetic technology of artificial clay
 - b. Study on the factors affected on thermal shock resistance of ceramics
 - c. Study on infrared radiant ceramics
 - d. Composite of ceramics and metal
 - e. Study on ceramics composed of hydraulic setting materials
 - f. Development of total design of new products
 - g. Development of materials for Iga ware and trial production
 - h. Study on CI manual on Iga ware
26. Toyama Prefectural Industrial Technology Centre*
- a. Study on densification of ceramic materials
 - b. Study on hydrothermal synthesis of ceramics
 - c. Structural analysis of ceramic materials
 - d. Study on low thermal expansion ceramics

- e. Study on wet ceramic coating
27. The Industrial Research Institute of Ishikawa Prefecture
 - a. Study on Synthesis of artificial clay from local resources
 - b. Development of electric conductive zirconia ceramics
 - c. Fabrication of artificial mullite and its application
 28. The Kutani Ware Research Institute of Ishikawa
 - a. Development of transparent porcelain
 - b. Study on printing technology
 - c. Study on prevention of peeling of overglaze colour
 - d. Study on casting technology
 - e. Study on high quality toughened porcelain
 29. Industrial Technology Centre of Fukui Prefecture

Miyazaki Laboratory

 - a. Functional film by sol-gel method
 - b. Machining condition of fine ceramics
 - c. Development of synthetic fine ceramics
 - d. Development of functional materials
 - e. Improvement of properties of pottery
 30. The Shiga Prefectural Shigaraki Ceramic Laboratory
 - a. Utilization of albite
 - b. Application of Shigaraki ware body to new products and improvement of quality
 - c. Study on artificial clay
 - d. Data Base construction of glazes
 31. Kyoto Prefectural Comprehensive Guidance Centre for Small and Medium Enterprises
 - a. Application of ceramic raw materials in Kyoto Prefecture and their high qualification
 32. Kyoto Municipal Institute of Industrial Research
 - a. Studies on plastic bodies and glazes of pottery
 - b. Development of new products of Kyoto ware and Kiyomizu ware

- c. Studies on ceramic glazes: Crystalline zinc glaze
 - d. Studies on new ceramics: Alumina ceramics
 - e. [Injection moulding of ceramics]
33. Osaka Prefectural Comprehensive Industrial Technology Institute*
- a. Development of high toughen, high strength and heat resistant materials by controlling micro-structures
34. Osaka Municipal Technical Research Institute
- a. Development of materials for functional thin films
 - b. Development of high performance glass and its application
 - c. Development and application of fine ceramics
 - d. Functional inorganic materials
 - e. Development of inorganic-organic composite material
35. Hyogo Prefectural Institute of Industrial Research
- a. Fabrication of functional thin film
 - b. Fabrication of new ceramics materials from amorphous substance
 - c. Clay tile body for pavement
 - d. Characterization on structure of inorganic materials
36. The Tottori-ken Industrial Institute
- nil.-
37. Shimane Prefectural Industrial Technic Institute
- Hamada Branch
- a. Studies on ceramic products with exothermal mechanism by ceramic plasma spraying
 - b. Fabrication of sintered spheroidized product and its application
38. Okayama Prefectural Industrial Technology Centre
- a. Studies on refractories
 - b. Studies on fine ceramics(Characterization)
 - c. Fabrication of inorganic composite
 - d. Studies on pottery(Production technology)

39. Yamaguchi Prefectural Industrial Technology Centre*
 - a. Application and evaluation of high functional materials
 - b. Development of high functional ceramics
 - c. Fabrication of transparent aluminium oxynitride sintered materials

40. Prefectural Industrial Research Institute, Tokushima
 - a. Fabrication of porous material from waste glass fibre
 - b. application of chlorite to ceramic glazes
 - c. Development of machining tools from ceramics

41. Kagawa Prefecture Industrial Technology Centre
 - a. Development of thin roofing ceramic material
 - b. Development of ceramic materials with low expansion

42. Ceramic Laboratory of Ehime Prefecture
 - a. Synthesis of traditional "Gosu(zaffer)"
 - b. Manufacturing Technology of ceramic building materials from local raw materials
 - c. New products with design of KOTOBE(old Tobe) porcelain

43. Kochi Prefectural Industrial Technology Centre*
 - a. Development of special ceramic products from serpentine
 - b. Variation of Calcium phosphate and their adsorption properties
 - c. Trial production of far infrared radiant body by plasma spraying
 - d. Development of ceramic building materials

44. Fukuoka Prefectural Industrial Technology Centre
Material Development Laboratory
 - a. Forming technology of fibre reinforced ceramic sheet (pore size control of porous ceramics)
 - b. Application of fibrous inorganic compounds to building materials (quality evaluation of needle crystal containing calcia as substitute of asbestos)
 - c. Manufacturing Technology of fibre cement board without asbestos

- d. Manufacturing technology of fibre cement board without asbestos
45. Fukuoka Prefectural Industrial Technology Centre*
- Chemical Fibre Laboratory
- a. Quality control of ceramic raw materials by rapid chemical analysis---Improvement of ceramic building materials---
 - b. Study on mechanical properties of fine ceramics
 - Sintering of zirconia and its mechanical properties
 - Firing of non-oxide ceramics and their properties
 - c. Study on gas separation membrane by functional ceramics
 - Trial production of oxygen separation membrane by perovskite type oxide and its evaluation of properties
46. Saga Prefectural Ceramic Research Institution
- a. development of local area network system technology
 - 1) data collection on drying and firing shrinkage of porcelain
 - 2) data collection of coloration of colours for porcelain
 - 3) data collection of pattern and configuration
 - b. Development of new pottery clay body with low melting pottery stone as materials
 - c. Development of decoration method by leadless colours
 - d. Development of anticorrosion overglaze colour(Study on leadless overglaze colours)
 - e. Development of tableware for aged people
 - f. Study on decoration ceramics
 - g. Development of materials for Karatsu-yaki
 - h. Development of porous silica from low cost material
 - i. Development porous ceramics from natural material as main component
 - j. Development of high strength ceramics at higher temperature
 - k. Development of surface treatment technology of material machining
 - m. Synthesis of ceramic thin film by plasma CVD

47. Nagasaki Prefecture Ceramic Research Institute
 - a. Development of ceramic filter
 - b. Forming technology of homogenous body
 - c. Development of high strength and high heat resistant porcelain
 - d. High technology on ceramic decoration by photoengraving method
 - e. Studies on fine ceramics and pottery
 - f. Advance utilization of lime and lim-based compounds for materials development
 - g. Development of new pottery clay body with low melting pottery stone as a material
 - h. Development of new (designed) products
 - i. Study on high quality products of pottery
 - j. Study on artificial gems
 - k. Study on high quality presentation of pottery decoration

48. Kumamoto Prefectural Industrial Technology Centre*
 - a. Application of limestone
 - b. Fabrication of electronic ceramics and its evaluation
 - c. Development of high strength porcelain by fine grinding of low melting Amakusa Toseki

49. Oita-ken Industrial Research Institute
 - a. Development of fabrication technology of metal-ceramic composite
 - b. Advanced utilization of lim and lim-based compounds for materials development
 - c. Treatment of heavy metal waste water by calcium carbonate

50. Miyazaki Prefectural Industrial Research Institute
 - a. High functionalization of SPG and its fabrication
 - b. Development of new technology of emulsification by SPG Membrane
 - c. Development of new china by using bones of swine and cows
 - d. Production of coloured roofing tiles
 - e. Manufacturing technology of water permeable tiles

51. Kagoshima Prefectural Industrial Technology Centre*
- a. Development of powder forming of ceramics with CIP and machining technology with ultrasonics
 - b. Development of new material by volcanic ejecta and its application
52. Division of Small and Medium Enterprises, Kagoshima-shi
- a. Tableware for local cuisine by Satsuma-yaki
 - b. Combination of Satsuma-yaki and composite
 - c. Study on lighting texture
53. Okinawa Prefectural research Institute
- a. application of coral to fine ceramics
 - b. Development of porous ceramics from coal ash
 - c. Studies on ceramic raw materials and glazes
 - d. Development of thermal shock resistant ceramics
 - e. Characteristics of pottery in Ryuukyu fired by electric kiln

IV. まとめ

調査結果による問題点の抽出

ここでは今回の調査の結果から、問題点をいくつか抽出して検討する。

1. コース内容の改善

帰国研修員のうちマレーシアの2名以外は、全員釉着彩コースの参加者である。彼等の言う陶磁器製造関連技術（QCを含む）については、たしかに釉着彩コースでの取り扱いは不十分であった。しかし現在の陶磁器コースでは製造関連技術が盛り込まれており、一応の対応は行われている。

個別研修に対する要望についても、日本の陶磁器関係の現場の技術者は英語を話せないのが一般的であるため、個別研修は日本語能力が十分な場合のみ可能で、平成2年度にも一部実施した。

期間の延長については現時点では困難である。しかし釉着彩は6カ月、陶磁器コースでは7カ月で1カ月の延長をしている。

2. 情報文献の不足

帰国研修員フォローアップチームに対しては、いつもこの種の問題が出る。また各コースの最終評価にもしばしば提案される。途上国におけるこの問題への取組みは、組織ではなく個人で何とかしようとする傾向にある。それより1つの試験研究機関から国外に勉強に出た人たちが、協力して技術情報を蓄積していくことが大切である。いろいろなフェローシップやスカラシップで国外に出る人は多いと思う。そういう人たちから情報を組織的に集めて、関係者に周知させる方策を考え出せないものだろうか。これはマネージメントの問題ともいえよう。

日本においては陶磁器に関する情報は豊かである。しかしそのほとんどが日本語のものである。明治以降の日本の技術発展史からみても100年位前には、日本の技術者、学者は外国語の習得に力を注ぎ、それを手段として外国から技術の情報、ノウハウを手に入れた。また、一方では国内にある伝統の技術をも発掘してそれを西洋技術の枠内に組み込んだ。そして外国の進んだ技術内容を日本語で普及することに努力した。窯業協会（現セラミックス協会）その他の努力で情報のサーキュレーションにも意を注いだ。いつの場合でも学校の教授とか公的機関の主要な研究者が中心となって活動を支えるということが行われた。多くの場合そのスタートはボランティアに近いものであった。

日本の陶磁器関係の技術者はほとんど日本語で十分な必要知識を吸収することができた。現場教育ではなおさら日本語である。したがって日本語を理解できる人が多い韓国や台湾では容易に日本の技術を吸収し、あるいは新しく日本で出版された書籍を購入して勉強した。そして彼らの陶磁器工業を盛んにした。

このようなヒントを得て何らかの方策を立てる努力が望まれる。

3. 人的資源の不足

シンガポールは小さな国であり、また工業としての陶磁器も十分大きなものでない。この点からそれほど大勢の熟練工が必要とも思えない。私たちが訪れた民間工場「明園」では自らの力で、若い人の訓練を長い時間をかけて行っており、必要な熟練工を育成している。

マレーシアでは公的試験研究機関と民間工場の結びつきはほとんどないようである。マラ工科大学（ITM）美術デザイン学部では美術工芸的な方向に舵を向けており、マレーシア標準工業研究所（SIRIM）には技術力の蓄積がない。JICAの研修コースで陶磁器を勉強した2人の帰国研修員が、他の部門へと引き抜かれてしまう。これでは人材育成の努力は極めて非効率的と言わざるを得ない。

スリランカの帰国研修員は、かつてのセイロン窯業公社に集中しており、現在のランカ窯業公社以外の意見は出てきにくい。しかしこの国の民間の企業の開発は、フリートレードゾーンの設定に見られるように大変盛んであり、自社に必要な熟練工は自社あるいは海外の提携会社において訓練して育てている。

4. 施設・設備の不足

これも各国の研修員のよく取り上げる問題点である。しかし各国の実際の生産現場では、この問題はかなり克服されている。これは陶磁器業界では業者のやる気の、公的機関では職員の努力の問題でもある。現実にマレーシアのIpohでは業者は地元で作られた設備を使いこなして生産を行っている。そして業者数十社が共同で新しい製土工場を作るための活動を開始している。

スリランカではこの数年の民営化による改革の結果、ランカ窯業公社の工場内はそれ程新しい機械が導入されたというわけではないが、生産が割合円滑に行われている。ここでは数年のうちに工程はもっと整備されると予測される。この国の民間企業の工場は公営企業以上に整備されている。

シンガポールでは、古い陶磁器工場で、古い機材を十分使いこなした生産が続けられている。

施設、設備について研修員が考えているのは、彼ら自身の仕事上での施設、設備の不足である。彼らがもっと民間の現場の状況を知った上で指導するのであれば、現在あるものを最大限に利用することを考えるようになるであろう。また次の段階で新しいものを購入できなければ、自ら工夫をして周辺の技術を応用して必要なものを作って仕事を進めるといった態度が望まれる。初めから高級な装置がなければ仕事ができないと考えることは進歩を妨げるものである。もっと民間の現場を見学して民間の努力も学ぶようにしたら良いと考える。

1. 現地関係機関への報告書 (英文所見)

SUMMARY REPORT BY THE FOLLOW-UP TEAM
FOR JICA EX-PARTICIPANTS OF THE GROUP TRAINING COURSE
IN DEVELOPMENT & APPLICATION TECHNOLOGY FOR POTTERY & PORCELAIN
AND IN CERAMIC GLAZE & DECORATION

1. Introduction

Being dispatched by Japan International Cooperation Agency as one of its follow-up programs for the ex-participants of the group training course in Development & Application Technology for Pottery & Porcelain and in Ceramic Glaze & Decoration, the team headed by Mr. Tetsuya Ueda, Head of Products Development Division, Ceramic Technology Department, Government Industrial Research Institute, Nagoya, Ministry of International Trade & Industry as mentioned below, arrived at Singapore on December 4th, 1990, and conducted its follow-up activities for a period of five days.

The team has the pleasure to submit a summary report on the results of its studies so that it would be referred to by the authorities concerned in the Government of Republic of Singapore.

2. Team Members

(1) Mr. Tetsuya UEDA:

The Team Leader, Technical Guidance
Head, Products Development Division,
Ceramic Technology Department,
Government Industrial Research Institute, Nagoya,
Ministry of International Trade & Industry

(2) Mr. Ryuichi YAMAMOTO:

Technical Guidance
Course Leader of Training Course in Ceramic Field,
Nagoya International Training Centre,
Japan International Cooperation Agency

(3) Mr. Yasuhiro MORIMOTO:

Follow-up Team Coordinator
Training Officer,
Training Division,
Nagoya International Training Centre,
Japan International Cooperation Agency

3. Objectives

The follow-up team primarily aims at knowing how and to what extent the ex-participants of Ceramic Glaze & Decoration Course are making use of the knowledge acquired in Japan, together with grasping the needs in order to improve future training program.

4. Summary of the Follow-up Activities

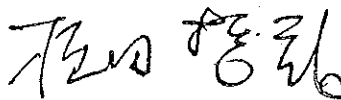
The team conducted;

- interview with the officials of Public Service Division, Ministry of Finance
- interview with ex-participants
- visit to Nanyang Academy of Fine Art and ceramic factory

Out of the above mentioned activities, we have grasped the present situation in the field of ceramics and confirmed the effects of the training program. For details, please refer to the appendixes.

Finally, we would like to express sincere appreciation and gratitude to the support extended by the Government of Republic of Singapore, Ministry of Finance and Ministry of Education, and also the contribution of the Embassy of Japan and JICA Singapore Office.

December 8th, 1990



Tetsuya UEDA
Leader of the Follow-up Team
for JICA Ex-participants
of the Group Training Course
in Development & Application Tech.
for Pottery & Porcelain
and in Ceramic Glaze and Decoration

I. LIST OF INTERVIEWEES

Ministry of Finance

Mr. Lee Kat Kan

Assistant Director, Training
Public Service Division

Ms. Ong Poh Chin

Training, Public Service Division

Ministry of Education

Mr. Wong Kian Ping
(Ex-participant in 1975)

Specialist Inspector(Art & Crafts)
Curriculum Planning Division

Temasek Polytechnic

Mr. Jaafar bin Abdul Latiff
(Ex-participant in 1975)

CertED, Teaching Associate,
School of Design

Nanyang Academy of Fine Arts

Dr. Gwee Yee-Hean

President

Mr. Foo Chee San

(Ex-participant of other course in 1963)

Head, Art Department

Mr. Chua Soo Khim

Lecturer

Embassy of Japan

Mr. Hideki Yamada

First Secretary

JETRO Singapore Office

Mr. Naohiro Taguchi

Managing Director

JICA Singapore Office

Mr. Tatsuo Hoshi

Resident Representative

Mr. Yukio Ishida

Assistant Resident Representative

II. COMMENTS

1. Out of six ex-participants of Training Course in Glaze & Decoration, the team could meet two ex-participants during its stay and three ex-participants answered questionnaire which was sent in advance. Through interview with them, it could be convinced that they are making use of knowledge and techniques acquired in this Course directly or indirectly.
2. Glaze & Decoration Course, which had focused on both artistic techniques and ceramic engineering, was re-organized by putting emphasis on engineering aspects of ceramics and changed its course title to Development & Application Technology for Pottery & Porcelain Course. Therefore, the curriculum of Pottery & Porcelain Course is designed suitable for acquirement of fundamental technical knowledge on ceramics. Those who major in art and design is recommended to apply for an individual training course or group training course in industrial design.
3. Ceramic factory runned by Mr. Chua Soo Khim (Part-time Lecturer of Nanyang Academy of Fine Arts) is producing flower pot for practical use by utilizing local raw material and exports for Europe. Such kind of private company with a traditional technology is usually situated as a foundation of modern industry.

SUMMARY REPORT BY THE FOLLOW-UP TEAM
FOR JICA EX-PARTICIPANTS OF THE GROUP TRAINING COURSE
IN DEVELOPMENT & APPLICATION TECHNOLOGY FOR POTTERY & PORCELAIN
AND IN CERAMIC GLAZE & DECORATION

1. Introduction

Being dispatched by Japan International Cooperation Agency as one of its follow-up programs for the ex-participants of the group training course in Development & Application Technology for Pottery & Porcelain and in Ceramic Glaze & Decoration, the team headed by Mr. Tetsuya Ueda, Head of Products Development Division, Ceramic Technology Department, Government Industrial Research Institute, Nagoya, Ministry of International Trade & Industry as mentioned below, arrived at Colombo on December 8th, 1990, and conducted its follow-up activities for a period of five days.

The team has the pleasure to submit a summary report on the results of its studies so that it would be referred to by the authorities concerned in the Government of Democratic Socialist Republic of Sri Lanka.

2. Team Members

(1) Mr. Tetsuya UEDA:

The Team Leader, Technical Guidance
Head, Products Development Division,
Ceramic Technology Department,
Government Industrial Research Institute, Nagoya,
Ministry of International Trade & Industry

(2) Mr. Ryuichi YAMAMOTO:

Technical Guidance
Course Leader of Training Course in Ceramic Field,
Nagoya International Training Centre,
Japan International Cooperation Agency

(3) Mr. Yasuhiro MORIMOTO:

Follow-up Team Coordinator
Training Officer,
Training Division,
Nagoya International Training Centre,
Japan International Cooperation Agency

3. Objectives

The follow-up team primarily aims at knowing how and to what extent the ex-participants of Ceramic Glaze & Decoration Course are making use of the knowledge acquired in Japan, together with grasping the needs in order to improve future training program.

4. Summary of the Follow-up Activities

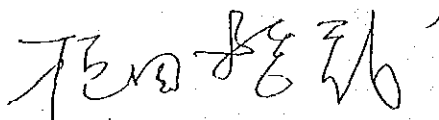
The team conducted;

- interview with ex-participants
- seminar on ceramic decoration techniques and quality control
- visit to
 - (1) Piliyandala Factory, Ceramic Research & Development Centre and Negombo Factory of Lanka Ceramic Limited
 - (2) Hand Crafted Ceramics Centre, Department of Small Industries, Sri Lanka Administrative Service
 - (3) Midaya Ceramic Company Ltd.

Out of the above mentioned activities, we have grasped the present situation in the field of ceramics and confirmed the effects of the training program. For details, please refer to the appendixes.

Finally, we would like to express sincere appreciation and gratitude to the support extended by the Government of Democratic Socialist Republic of Sri Lanka and Lanka Ceramic Limited, and also the contribution of the Embassy of Japan and JICA Sri Lanka Office.

December 14th, 1990



Tetsuya UEDA
Leader of the Follow-up Team
for JICA Ex-participants
of the Group Training Course
in Development & Application Tech.
for Pottery & Porcelain
and in Ceramic Glaze and Decoration

I. LIST OF INTERVIEWEES

Lanka Ceramic Limited

Mr. Tissa Jayaweera

Chairman/Managing Director

Mr. N.C.W. Attanayake

General Manager

Mr. D. Bandula Senarath

Deputy General Manager (Technical)

Mr. Harry Makawita

Factory Manager

Sri Lanka Administrative Service, Department of Small Industries

Mr. D.A.D. Jayawardena

Deputy Director

Mr. Katsuya Fukuyama

Hand Crafted Ceramics Centre

(Japan Overseas Cooperation Volunteer (JOCV))

Midaya Ceramic Company Ltd.

Mr. Dayasiri Warnakulasooriya

Chairman/Managing Director

Embassy of Japan

Mr. Yoshio Kanzaki

Second Secretary

JICA Sri Lanka Office

Mr. Hiroshi Niino

Assistant Resident Representative

II. SUMMARY OF SEMINAR

The seminar was held as follows;

1. Date and Time 9:30 - 12:15 December 13th, 1990
2. Place Function room of Lanka Oberoi Hotel
3. Subjects and speaker
 - (1) "Quality Control, QC circle activities and TQC"
by Mr. Ryuichi Yamamoto
 - (2) "Ceramic Decoration Techniques"
by Mr. Tetsuya Ueda
4. Attendants Nineteen persons attended as follows;

Lanka Ceramic Limited

Mr. T.Jayaweera, Chairman/Managing Director,
Mr. N.C.W.Attanayake, General Manager,
Mr. D.Bandula Senarath, Deputy General Manager(Technical),
five ex-participants of this course and related personnel

Department of External Resources, Ministry of Finance
Mrs. R.V.Nanayakkara, Deputy Director

Embassy of Japan

Mr. Yoshio Kanzaki, Second Secretary

JICA Sri Lanka Office

Mr. Hiroshi Niino, Assistant Resident Representative
Ms. Anita Joseph

III. Comments

1. The team could meet five ex-participants out of eleven of Ceramic Glaze & Decoration Course during stay. Most of the ex-participants are assigned to important positions in Lanka Ceramic limited. Through observation of their factories, the team was convinced that knowledge and techniques acquired in the Course are applicable and useful.

2. We were deeply impressed with the fact that the worker's attitude, circumstances and management of the factories of Lanka Ceramic Ltd. have been improved in comparison with the state in 1986 when JICA Follow-up Team for Ceramic Development Seminar visited the same factories.

Even though many of the machines and facilities in the factories are old, however, they are all maintained and operated well.

3. They have taken action to improve the productivity of the each production line and in order to show the result, diagrams are displayed on the wall in each shop of the Piliyandala factory. They offer incentive, which is effective to push up the productivity.

4. The printing shop of decal paper was full of irritating smell of organic vapor. The room should be well ventilated, otherwise harmful vapor will subvert the workers' health seriously.

5. Despite relatively high percentage of defects such as distortion and pinhole, the defects do not seem to be so big problem, because the products have sufficient quality so far as they are low price products for domestic market.

Export-oriented production requires high quality to compete with foreign products at the international market. The products of LCL in this stage, however, don't have enough quality in comparison with foreign products. Therefore, higher quality of the product shall be required in the near future.

6. QC Circle Activities are introduced into the factories and one of the two circles won the first prize in the first National Convention of QCC.

To assist QCC activities, the engineers in the factories are expected to focus on quality of the products and to manage SQC so that quality of the products could be improved further more.

7. At Hand Crafted Ceramic Centre, Waragoda, Sri Lanka Administrative Service, with efforts of four members of JOCV (Japan Overseas Cooperation Volunteers), techniques of decoration and molding has been accumulated abundantly in the Centre. By utilizing these techniques, value added products could be manufactured by manual decoration.

The purpose of this Centre is not identified clearly; The Center may aim at training of workers in ceramic producing area,

however it dose not seem to match with the potters in this area. The Centre has obligation to fill the role to develop the technique of pottery manufacturing and to produce high quality ware by the local potters. In order to promote the Centre, establishment of distribution routes and development of local market are most necessary.

SUMMARY REPORT BY THE FOLLOW-UP TEAM
FOR JICA EX-PARTICIPANTS OF THE GROUP TRAINING COURSE
IN DEVELOPMENT & APPLICATION TECHNOLOGY FOR POTTERY & PORCELAIN
AND IN CERAMIC GLAZE & DECORATION

1. Introduction

Being dispatched by Japan International Cooperation Agency as one of its follow-up programs for the ex-participants of the group training course in Development & Application Technology for Pottery & Porcelain and in Ceramic Glaze & Decoration, the team headed by Mr. Tetsuya Ueda, Head of Products Development Division, Ceramic Technology Department, Government Industrial Research Institute, Nagoya, Ministry of International Trade & Industry as mentioned below, arrived at Kuala Lumpur on December 14th, 1990, and conducted its follow-up activities for a period of seven days.

The team has the pleasure to submit a summary report on the results of its studies so that it would be referred to by the authorities concerned in the Government of Malaysia.

2. Team Members

(1) Mr. Tetsuya UEDA:

The Team Leader, Technical Guidance
Head, Products Development Division,
Ceramic Technology Department,
Government Industrial Research Institute, Nagoya,
Ministry of International Trade & Industry

(2) Mr. Ryuichi YAMAMOTO:

Technical Guidance
Course Leader of Training Course in Ceramic Field,
Nagoya International Training Centre,
Japan International Cooperation Agency

(3) Mr. Yasuhiro MORIMOTO:

Follow-up Team Coordinator
Training Officer,
Training Division,
Nagoya International Training Centre,
Japan International Cooperation Agency

3. Objectives

The follow-up team primarily aims at knowing how and to what extent the ex-participants of Development & Application Technology for Pottery & Porcelain and Ceramic Glaze & Decoration Course are making use of the knowledge acquired in Japan, together with grasping the needs in order to improve future training program.

Secondly, the team aims at providing ex-participants with latest information in ceramic field for the purpose of brushing up what they learned in Japan.

4. Summary of the Follow-up Activities

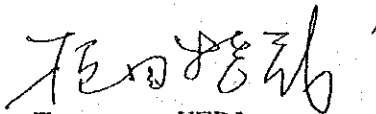
The team conducted;

- interview with ex-participants
- seminar on pottery and porcelain
- visit to
 - (1) Public Service Department,
 - (2) Malaysian Handicraft Development Corporation(HQ) and Handicraft Centre in Kuala Kansar,
 - (3) Standard and Industrial Research Institute of Malaysia,
 - (4) Mara Institute of Technology,
 - (5) Ministry of Human Resources,

Out of the above mentioned activities, we have grasped the present situation in the field of ceramics and confirmed the effects of the training program. For details, please refer to the appendixes.

Finally, we would like to express sincere appreciation and gratitude to the support extended by the Government of Malaysia, and also the contribution of the Embassy of Japan and JICA Malaysia Office.

December 21st, 1990



Tetsuya UEDA
Leader of the Follow-up Team
for JICA Ex-participants
of the Group Training Course
in Development & Application Tech.
for Pottery & Porcelain
and in Ceramic Glaze and Decoration

I. LIST OF INTERVIEWEES

Public Service Department

Mr. Azizan Ayob	Director, Training & Career Development Division
Mr. Mohd Nadzir Don	Assistant Director, Training & Career Development Division

Handicraft Development Corporation

# Mr. Sulaiman bin Othman	Director General
* Mr. Abdullah bin Hj. Abd. Rahman	Director for Development
Mr. Mohammad Rusli bin Abdullash	Development Officer for Ceramic

Standard and Industrial Research Institute of Malaysia (SIRIM)	
Dr. Hamzah Kassim	Head, Corporate Affairs Division
Ms. Jayamalar Savarimuthu	Head, Corporate Liaison
Mr. Ramli Salleh	Head, Advanced Ceramics Unit
* Mr. Zainal Zakaria	Assistant Researcher

Malaysian Project on Characterization on Fine Ceramics

Mr. Junshiro Hayakawa	Japanese Project Leader
Mr. Nobuaki Hirakawa	Project Coordinator

Mara Institute of Technology

Mr. D'Zul Haimi B. Md. Zain	Dean, School of Art & Design
Mr. Tuan Jaji Subhi Rakimin	Deputy Registrar in-charge of Training & Scholarship
* Mr. Kamaruddin Kamsah	Head, Department of Ceramic
* Mr. Hamdan bin Mohd	Laboratory Assistant

Manpower Department, Ministry of Human Resources

Mr. Asnan bin Pi'i	Director-General
* Mr. Nor Azman bin Ahmad	Tender Officer

Embassy of Japan

Mr. Yoshitaka Ito	Second Secretary
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JICA Malaysia Office

Mr. Takashi Nishimoto	Deputy Resident Representative
Mr. Yasuo Sakai	Assistant Resident Representative

note:

- * : ex-participant of Development & Application Technology for Pottery & Porcelain / Ceramic Glaze & Decoration Course
- # : ex-participant of Seminar on Ceramics Development

II. SUMMARY OF SEMINAR

The team held seminar as follows;

1. Date and Time: 9:00 - 12:15, December 18th, 1990
2. Place: Hotel Holiday Inn Shah Alam
3. Theme, speaker and skeleton:
 - (1) "Decoration Techniques for Ceramics"
by Mr. Tetsuya Ueda
The speaker introduced various kinds of ceramic decoration techniques, namely, different types of materials, bodies, shapes and patterns in Japan and the West by showing more than 80 slide pictures.
 - (2) "Development of Ceramics in Japan"
by Mr. Ryuichi Yamamoto
The speaker explained history of ceramic industry after World War II in Japan, role of national/local research institutes and quality control and QC circle activity.
4. Attendants:

Thirty five persons attended as follows;

 - four ex-participants out of five,
 - personnel from ex-participants' organization and related organs including JICA ex-participants of other courses in ceramic field,
 - Mr. Tomotaka Ito, Second Secretary, Embassy of Japan and
 - Mr. Yasuo Sakai, Assistant Resident Representative, JICA Malaysia Office

III. Comments

1. Standard and Industrial Research Institute of Malaysia(SIRIM)

The team confirmed that the ex-participant is making use of knowledge of glaze preparation and screen printing technique acquired in the Course, whereas it is to be regretted that the ex-participant of Tile Manufacturing Technology Course was transferred to a section other than conventional ceramics section.

It is desirable that SIRIM could be involved and play an important role in development of ceramic industry furthermore.

2. Mara Institute of Technology(ITM)

With regard to shortage of the equipments for the student, the team recommends procurement of the equipments not from abroad but within Malaysia in which standard quality of equipments can be obtained.

The clay work exhibited at the school's Art Gallery attracted our interests deeply, while with relation to table ware, more emphasis should be placed on functional design.

It is recommended to invite a technician of pottery company as a part-time instructor so as to teach students forming techniques.

3. Malaysian Handicraft Development Corporation

Painting technique is skillful and color tone reached to high level. However, in order to obtain higher value, there seems to be plenty of room to improve technique of slip cast.

Concerning non-glaze/over decoration products, the team recommends that products should be done after polishing the surface in the same way as black earthen ware.

2. 質問票

Follow-up Survey for Ex-participants of Group Training Program
Development & Application Technology for Pottery & Porcelain (Glaze & Decoration)
NAGOYA INTERNATIONAL TRAINING CENTRE, JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
No. 73, 2-chome Kamenoi, Meito-ku, Nagoya 465 JAPAN

Questionnaire for Organization Concerned with Dispatchment of JICA Trainees

援助窓口に対する質問

陶磁器開発・活用技術(旧釉・着彩) 集団研修コース

(Please type or write in block letters)

1. Please tell us the processes of nominating the participants after you receive pamphlet "Information on Group Training Course" (hereinafter referred as "The Pamphlet") sent from the Embassy of Japan / JICA Office and also the time required at each process.

G I 受領後の人選手順

- 1) _____ more than 2 months 2) _____ less than 2 months

Your office ⇨

⇨

⇨

⇨

⇨Your office

2. Are the above processes subject to change from year to year or the same over the years?

- 1) _____ same procedures 2) _____ subject to change 人選手順変更予定

If subject to change, why?

3. When your office finalizes the nomination of candidates recommended through various channels, do you finalize the nomination on the basis of "The Pamphlet" or on the basis of your organization's criteria? 窓口機関での最終人選の基準

1) _____ on the basis of "The Pamphlet"

2) _____ on the basis of your organization's criteria

If based on your criteria, please explain the screening policies in your organization.

4. Do you think "The Pamphlet" clearly describes the objectives of the contents of the training program? GI内容の適否

1) _____ clear 2) _____ not clear

If not clear, could you point out what sort of information should be added or omitted?

5. Please let us know whether you receive "The Pamphlet" just in time or too late to complete the procedures.

1) _____ just in time 2) _____ too late

6. After your organization receives the notice of participant's acceptance, how long does it take until the participant finishes all the procedures necessary for departure?

受入回答後、出発までの手続き

1) _____ more than 1 month 2) _____ more than 2 weeks 3) _____ less than 2 weeks

Please tell us the procedures necessary for departure.

7. What reporting will be made to your office, when the participant completed the training course? If no reporting is made, how does your organization confirm the accomplishment of the training?

帰国後、窓口機関での研修成果の確認

8. If you have any opinion about this course in comparison with other similar courses within your country or abroad, please state below. 他機関主催の研修との比較

9. Please state your observation about the future prospects in ceramic industry in your country and their related information so that we can apply them to this training course.

同分野での将来ニーズ等の関連情報

Thank you for your kind cooperation.

Follow-up Survey for Ex-participants of Group Training Program
Development & Application Technology for Pottery & Porcelain (Glaze & Decoration)
NAGOYA INTERNATIONAL TRAINING CENTRE, JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
No. 73, 2-chome Kamenoi, Meito-ku, Nagoya 465 JAPAN

Questionnaire for Organization which Ex-participants Belong to
研修員所属先に対する質問内容

(Please type or write in block letters)

I. JICA'S TRAINING PROGRAMME

1. Please let us know the necessary processes to nominate candidates. 人選の手順

1-2. Please tell us the necessary time to nominate candidates. 人選に要する日数

1) _____ less than 1 month

2) _____ more than 1 month ⇒ required time : _____ days

2. What is your policy and criteria to select candidates? 人選方針

3. Before the selection in your organization, are you well informed of the objectives, contents, and the level of training program? 人選時の十分な情報の有無

1) _____ yes 2) _____ no

4. Please let us know whether you received pamphlet "Information on the Group Training Course in Development & Application Technology for Pottery & Porcelain (Glaze & Decoration)" timely or late for the nomination. GI送付のタイミング

1) _____ received timely 2) _____ received late 3) _____ not received

5. Once the acceptance of the candidate is noticed, what kind of orientation for his training in Japan is given before his departure?

受入れ回答後、オリエンテーションの有無

6. What kind of report will the participant give to your organization or his superior when he returns to your country? 帰国後の報告
7. Do you take the participation in this group training course as a contributing factor for participant's personnel appraisal and promotion in your organization in future ?
研修参加と人事評価との関係
- 1) _____ yes (_____ a lot, _____ somewhat) 2) _____ no
8. Do you find that what the participant acquired or developed during his training in Japan is practically applied in his work? 研修成果の活用度
- 1) _____ yes (_____ a lot _____ somewhat) 2) _____ no
If no, please explain the reason why.
9. How do you evaluate this training from the view point of length, content, level etc?
Please give us your opinions, requests and suggestions to improve our future program.
研修へのコメント
10. In FY 1989, Development & Application Technology for Pottery & Porcelain Course was established by re-organizing 2 Courses, Ceramic Glaze & Decoration Course and Ceramic Engineering Course. Therefore, the training program of Pottery & Porcelain Course is composed of two themes, ① glaze & decoration techniques and ② ceramic production engineering. Please tell us your opinion, whether these two themes should be treated in two different courses or these themes could be treated in one course.
現コースプログラム構成について

11. As after-care services, JICA conducts for ex-participants as follows:

- to dispatch follow-up team for the purpose of further improvement of training courses (survey of training effects, future technical needs and technical guidance)
- to provide the ex-participants with technical information and literature
- to send magazine "KEN-SHU-IN" to ex-participants (currently for 10 years)
- to assist ex-participants to organize alumni associations

If you have any opinions or requests concerning these services, please let us know.
アフターケア活動へのコメント

II. GENERAL SITUATION OF CERAMIC INDUSTRY IN YOUR COUNTRY

1. Please choose and explain problem(s) which ceramic industry faces in your country.

(1) talent (technical expert and apprentice)

(2) standard raw materials

(3) machinery and its connected items

(4) kiln

(5) fuel

(6) research, development and training

(7) quality control

(to be continued)

(8) marketability

2. Please describe organization that conducts research and quality testing.

name & type of organization	kinds of service	research theme	instruments & facilities

3. Please describe training institute in ceramic field.

name & type of organization	objective & purpose	training & program	instruments, machinery & facilities

4. Please describe situation of export and import of the ceramic products:

5. How many ceramic factories in the following categories do you have in your country?
- a. big scale enterprizes (No. of employee: more than 100) _____ enterprizes
 - b. medium scale enterprizes (No. of employee: 30 to 100) _____ enterprizes
 - c. small scale enterprizes (No. of employee: less than 30) _____ enterprizes

6. Were there improvements in manufacturing process, application of new technology for practical production or development of new product by big scale enterprises in the past 15 years? Is there any of them to be transferred to small or medium scale enterprises? If yes, please show the example(s).

7. What kind of measures did small and medium scale enterprises adopt in the past 15 years?

- a. to develop their own technology
- b. to introduce technical know-how
- c. to improve traditional methods and products
- d. others

Please show us the example(s).

8. Please show us example(s) of new ideas or devices developed and applied for practical production by national/local institutions.

9. Do you have cooperative associations in your country?
If yes, please tell us their functions, date of establishment and problem(s) they have.
If no, (1) tell us the reason why cooperative associations have not been established.
(2) are there substitutive cooperative systems in your country?

10. How do enterprises introduce foreign companies' technology to process indigenous (domestic) raw materials and apply technology for production? Do national/local government support/promote introduction of foreign technology?

11. Please tell us measures that your national/local government adopt to promote domestic ceramic industry.

12. Please show us number of enterprises which were established and started their production in the past decade.

13. Please show us statistical data in 1979 and 1989.

- a. Production of raw materials
- b. Output of each ceramic products

Thank you very much for your kind cooperation.

Follow-up Survey for Ex-participants of Training Program
NAGOYA INTERNATIONAL TRAINING CENTRE (NITC)
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
No.73,2-chome Kamenoi, Meito-ku, Nagoya 465 JAPAN

~~Questionnaire for ex-participants~~
in Group Training Course
on
Development & Application Technology for Pottery & Porcelain
Glaze & Decoration
~~研修員本人宛~~
陶磁器開発・活用技術／釉・着彩

* Please write in block letter.

I. Personal Data:

1. Name in Full: _____ Age _____
(Please underline family name)

2. Name of organization where currently employed: _____

Address: _____
(Street and Number) (City) (State/Country)

(Zip code) (Facsimile) (Cable/Telex) (Telephone)

3. Current home address: _____
(Street and Number) (City)

(State/Country) (Zip code) (Telephone)

II. Educational data:

4. Education/Training (Degree/Non-degree) before attending training at JICA

Name of Educational/ Training Institute	Location of Institution	Years attended from- to-	Certificate/Diploma/ Degree & Major in

5. Education/Training (Degree/Non-degree) after attending training at JICA

Name of Educational/Training Institute	Location of Institution	Years attended from- to-	Certificate/Diploma/ Degree & Major in

III. Employment/Work Experience:

6. Work experience: Please describe briefly what kind of work/job you have had since you returned home, including the present one.

Work/Job Position	Dates (from-to-)	Responsibilities

7. Nature of your present job: Indicate by an (x) mark in the corresponding box.

Activities	Full approx. 85%	Major approx. 75%	Partly approx. 50%	Slightly approx. 25%
Administration				
Research				
Instruction				
Extension				
Others, please specify ()				

8. To what extent were you aware of the purpose of the training course before you came to Japan?

Activities	Full approx. 85%	Major approx. 75%	Partly approx. 50%	Slightly approx. 25%
Program				
Instruction				

8-1. To what extent did the training program correspond to your initial expectation(s)?

Full approx. 85%	Major approx. 75%	Partly approx. 50%	Slightly approx. 25%	Non 0%

8.-2 Please explain your answer briefly

9. If there is any personal improvement in your job/work after JICA training, please indicate below;

_____ (yes) improved (___ a lot / ___ somewhat)
 _____ (no) not improved

9-1. If, yes, please check below where applicable;

_____ work conditions	_____ for other better jobs
_____ responsibility	_____ contents of work
_____ prospects for future	_____ professional recognition
_____ salary wise	_____ international contact

9-2. Please explain briefly.

10. Please let us know two most useful subjects of the training you had in Japan and its reasons in relation to your subsequent position and responsibility.

Subject: Reason:

Subject: Reason:

11. To what extent can you apply the knowledge acquired through the JICA training to your job?

Full approx. 85%	Major approx. 75%	Partly approx. 50%	Slightly approx. 25 %	Non 0%

11-1. Please explain in what sort of ways and what part of the training you have been able to utilize.

11-2. Please explain what part of the training you have not been able to utilize with the reason why.

12. Have you been able to pass on to anyone any of the knowledge and techniques that you acquired ?

Full approx. 85%	Major approx. 75%	Partly approx. 50%	Slightly approx. 25 %	Non 0%

12-1. Please explain in what sort of ways and what part of your training you have been able to do this ?

(to be continued)

12-2. If you answered "Slightly" or "No", please explain why.

13. If you have any other ideas to improve training course in ceramic field, please state below. (for example, new subject to be added)

14-1. What do you consider to be the biggest problem in the performance of your present job? Please check 4 or less items.

Lack of

<input type="checkbox"/> trained personnel	<input type="checkbox"/> funds, budget
<input type="checkbox"/> national training institutes	<input type="checkbox"/> foreign currency
<input type="checkbox"/> technical literature	<input type="checkbox"/> markets
<input type="checkbox"/> foreign experts	<input type="checkbox"/> support of supervisor
<input type="checkbox"/> facilities, equipment	<input type="checkbox"/> career perspective
<input type="checkbox"/> research facilities	<input type="checkbox"/> transport facilities
<input type="checkbox"/> other, specify: _____	

17.-2 Please explain in details.

17.-3 Please check 4 or less items.

Various constraints:

<input type="checkbox"/> economic situation	
<input type="checkbox"/> political/social situation	
<input type="checkbox"/> poor management	
<input type="checkbox"/> personnel promotion structure	
<input type="checkbox"/> hollowing out of trained personnel (brain drain)	
<input type="checkbox"/> no in-service training	
<input type="checkbox"/> poor procurement of spare parts (specify: _____))
<input type="checkbox"/> poor maintenance of facilities (specify: _____))
<input type="checkbox"/> other, (specify: _____))

(to be continued)

17.-4 Please explain in details.

18. Please explain problems to be solved for ceramics industry in your country.

19. Request or suggestion to JICA and its training program, if any;

- Retraining
- Training of your subordinate personnel
- JICA publication
- Technical informations
- Others, please mention below;

Thank you very much for your cooperation.

3. 平成2年度 第2回陶磁器開発・活用技術集団研修コース日程

4月		5月		6月		7月		8月		9月		10月	
日	月	火	水	金	土	日	月	日	月	土	日	月	火
1	日	1	火	1	金	1	日	1	水	1	土	1	月
2	月	2	水	2	土	2	月	2	木	2	日	2	火
3	火	3	木	3	日	3	火	3	金	3	月	3	水
4	水	4	金	4	月	4	水	4	土	4	火	4	木
5	木	5	土	5	火	5	木	5	日	5	水	5	金
6	金	6	日	6	水	6	金	6	月	6	木	6	土
7	土	7	月	7	木	7	土	7	火	7	金	7	日
8	日	8	火	8	水	8	日	8	水	8	土	8	月
9	月	9	水	9	木	9	月	9	木	9	日	9	火
10	火	10	木	10	金	10	火	10	金	10	月	10	水
11	水	11	土	11	日	11	水	11	土	11	火	11	木
12	木	12	日	12	月	12	木	12	日	12	水	12	金
13	金	13	火	13	火	13	金	13	月	13	木	13	土
14	土	14	水	14	水	14	土	14	火	14	金	14	日
15	日	15	木	15	木	15	日	15	水	15	土	15	月
16	月	16	金	16	金	16	月	16	木	16	日	16	火
17	火	17	土	17	土	17	火	17	金	17	月	17	水
18	水	18	日	18	日	18	水	18	土	18	火	18	木
19	木	19	月	19	火	19	木	19	日	19	水	19	金
20	金	20	火	20	水	20	金	20	月	20	火	20	土
21	土	21	水	21	木	21	土	21	火	21	水	21	日
22	日	22	木	22	金	22	日	22	水	22	土	22	月
23	月	23	金	23	土	23	月	23	木	23	日	23	火
24	火	24	土	24	日	24	火	24	金	24	月	24	水
25	水	25	日	25	月	25	水	25	土	25	火	25	木
26	木	26	月	26	火	26	木	26	日	26	水	26	金
27	金	27	火	27	水	27	金	27	月	27	火	27	土
28	土	28	水	28	木	28	土	28	火	28	水	28	日
29	日	29	木	29	金	29	日	29	水	29	土	29	月
30	月	30	火	30	土	30	月	30	木	30	日	30	火
31	火	31	水	31	日	31	火	31	金	31	月	31	水

備考：① ① 講義、② 討論、③ 実習、④ 現場講義、⑤ 見学、⑥ 研修旅行、⑦ 評価会

4. 国別年度別参加研修員数

(昭和49年度～昭和63年度：釉着彩コース、平成元年度～平成2年度：陶磁器開発・活用技術コース)

地域	No.	回数		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	合計	
		年	度	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	元	2		
アジア	1	バングラデシュ					1	1	2	1	2	2	1		1	1	1	1			14	
	2	ビルマ				1	1	1	1	1	1		1		1	1	1					10
	3	インドネシア	1		2	1				1				1	1	1	1	1	1	2		13
	4	クメール	1																			1
	5	ラオス	1	2																		3
	6	マレーシア				1					1							1	1	1		5
	7	ネパール													1							1
	8	パキスタン				1					1						1					3
	9	フィリピン	2	3	2	2		1				1	1	1	1			1	1	1	1	18
	10	シンガポール		2	1	1	1	1														6
	11	スリランカ	1	1	1	1	1	1	1	1	1	1	1	1								11
	12	タイ	1	1	1	1	1			1	1	1	1	1		1	1	1	1	1	1	15
中近東	13	エジプト													1						1	
	14	イラン				1															1	
	15	ジョルダン																		1	1	
	16	トルコ					1							1		1						3
アフリカ	17	ガーナ								1	1				1		1				4	
	18	ケニア																1	1		2	
	19	マラウイ																		1	1	
	20	モロッコ															1				1	
	21	タンザニア											2		1	1	1	1	1			7
中南米	22	アルゼンティン													1				1		2	
	23	ブラジル					1	1	1													3
	24	コロンビア																		1		1
	25	ガイアナ										1										1
	26	メキシコ							1													1
		合計	7	9	7	10	7	7	7	7	7	8	7	7	7	7	8	8	8	8	129	

