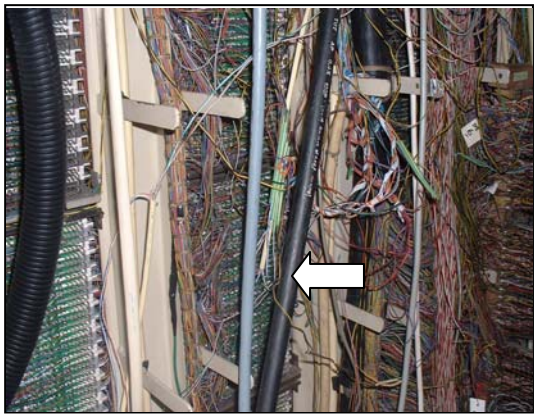
Thailand

Telephone Network Expansion Projects and Local Cable Network Projects (total:six Projects)

Report Date: August 2003
Field Survey: June to August 2003

1. Project Profile and Japan's ODA Loan

The project benefited all of Thailand



Primary cable at Jeangwattana Exchange in Bangkok
(arrow indicates cable funded by ODA loan)

1.1 Background

Demand is increasing in Thailand for various types of infrastructures as the economy develops, and demand for telephone service is no exception. With regard to demand for domestic telephone service, in 1984 there was a demand for 1.04 million telephone lines, and in 1990 the demand had doubled to 2.33 million. However, the domestic telephone line capacity was 0.57 million lines in 1984 and 1.68 million lines in 1990, which was far too small to satisfy the demand. The backlog (of customers waiting to subscribe) was continuously increasing.

Meanwhile, demand for international telephone service was also increasing rapidly as the number of foreign companies in Thailand was growing sharply and trade was expanding. The number of international calls placed in 1990 had grown to 17.99 million (1.078 million hours total) from 3.44 million (0.324 million hours total) in 1986, and difficulties were frequently experienced when placing international calls.

1.2 Objectives

The object of this project is to endeavor to expand and modernize local cables as one part of TOT's Economic Social Development Plan (ESDP) 1984-1992 to deal with the rapid increase in telephone demand in Thailand.

1.3 Output

- Optical fiber network in Bangkok Metropolitan Area: 410 km
- Transmission system in provincial area: 178 Spans
- Local Cable: 2,768,850 pairs

1.4 Borrower / Executing Agency

Telephone Organization of Thailand (TOT) / TOT

1.5 Outline of Loan Agreement

L/A No.	Telephone Network Expansion Project (1)	Telephone Network Expansion Project (2)
Loan Amount / Loan Disbursed Amount	6,716 million yen / 6,716 million yen	24,296 million yen / 24,095 million yen
Exchange of Notes / Loan Agreement	September 1987 / September 1987	September 1987 / February 1988
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	 3.0% 30 years (10 years) General Untied	 3.0% 30 years (10 years) General Untied
Final Disbursement Date	August 1989	February 1994

L/A No.	Telephone Network Expansion Project (Local Cable 2-1)	Telephone Network Expansion Project (Local Cable 2-2)
Loan Amount / Loan Disbursed Amount	10,421 million yen / 10,421 million yen	14,034 million yen / 12,335 million yen
Exchange of Notes / Loan Agreement	September 1988 / November 1988	September 1988 / September 1989
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	 2.9% 30 years (10 years) General Untied	 2.9% 30 years (10 years) General Untied
Final Disbursement Date	September 1990	January 1995

L/A No.	Telephone Network Expansion Project (Local Cable 3)	Telephone Network Expansion Project (Local Cable 4)
Loan Amount / Loan Disbursed Amount	15,318 million yen / 13,593 million yen	4,598 million yen / 2,512 million yen
Exchange of Notes / Loan Agreement	February 1990 / September 1990	September 1991 / September 1991
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	 2.7% 30 years (10 years) General Untied	 3.0% 25 years (7 years) General Untied
Final Disbursement Date	January 1996	January 1997

2. Results and Evaluation

2.1 Relevance

When this project (“this project” refers to all 6 of the above-mentioned ODA loan projects) was appraised, the Government of Thailand was planning “equipage of the telephone network” under its Economic Social Development Plan (ESDP) 1984-1992 to cope with the rapidly increasing domestic demand for telephone service, and this project, which was implemented as a part of ESDP, possessed high relevance.

Also, the current ESDP (2002-2006) calls for “a widespread communications network that functions favorably for international trade and investment,” and so it can be said that this project possesses relevance even today.

2.2 Efficiency

2.2.1 Output

The output of this project is generally as planned. The construction of the optical fiber network in the Bangkok Metropolitan Area was extended from the planned 410 km to 537.1 km. The transmission system development in rural areas was increased from the planned 178 spans to 270 spans. The local cables were increased from 2,768,850 pairs to 3,897,375 pairs. These alterations

were necessary measures, in alignment with the increase in demand which outstripped the levels in the plan.

2.2.2 Project Period

The “Telephone Network Expansion Project (1), (2)” was implemented as scheduled, from September 1987 to February 1994, a total of 78 months. The “Local Cable 2-1, 2-2, 3, 4” was also implemented according to schedule, from November 1988 to September 1993, for a total of 59 months.

2.2.3 Project Cost

The “Telephone Network Expansion Project (1), (2)” had a planned cost of 117,761 million yen, and the actual cost was 36,448 million yen. Meanwhile, the “Local Cable 2-1, 2-2, 3, 4” had a planned cost of 37,036 yen, and the actual cost was 33,874 million yen. The main causes of the decline in project cost were the fact that the devaluation of local currency exceeded inflation and efficient ordering through competitive bidding, etc.

2.3 Effectiveness

2.3.1 Telephone Saturation Rate The goal (1992) of ESDP (1984 - 1992) for the telephone saturation rate at the time of this project's appraisal was 13.22% in the Bangkok Metropolitan Area and 1.52% outside of the Bangkok Metropolitan Area. The saturation rate actually exceeded the goal in 1992, reaching 17.75% in the Bangkok Metropolitan Area (and climbing to 24.39% in 1994 immediately following completion of this project) and reaching 1.63% (and climbing to 2.7% in 1994) outside of the Bangkok Metropolitan Area.

Table 3: Telephone Density and Growth Rate (Unit: %)

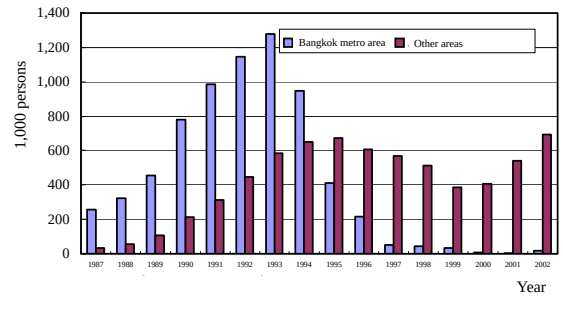
Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Bangkok metropolitan area	11.48	12.6	13.27	15	16.7	17.75	22.1	24.39	29.91	45.06	44.57	54.16	54.19	54.26	53.39	52.64
Other areas	0.84	0.93	1.01	1.2	1.45	1.63	1.9	2.7	3.38	4.86	5.3	5.79	5.98	6.07	6.23	6.53
Total	2.32	2.53	2.69	3.08	3.5	3.78	4.57	5.97	7.37	11.06	11.41	12.12	12.31	12.43	12.5	12.7
Increase ratio	n.a.	9.1	6.3	14.5	13.6	8	20.9	30.6	23.5	50.1	3.2	6.2	1.6	1.1	1.0	1.0

Source: TOT data

2.3.2 Size of Backlog

Looking at the trends in the size of the backlog in recent years in Figure 1, it can be seen that the backlog rapidly declined in the Bangkok Metropolitan Area starting in 1994, soon after this project was completed. (The backlog figure was 321,000 in 1988. It increased to 1,145,000 backlogs in 1992, but declined to 948,000 backlogs in 1994.) On the other hand, the effects were not so apparent outside of Bangkok, with the backlog gradually declining starting in 1996 and reaching in 1999 60% of the peak. However, from 2000 onward, TOT’s new investment for facility expansion did not keep pace with demand, and in rural areas the backlog began to grow once again.

Figure 1: Subscriber Waiting List



2.3.3 Improvement of the Quality of Telephone Service

The durability of subscriber cables was improved in this project because the outer casing of the subscriber cables was changed from the old paper casing to rubber casing. This improved the quality of telephone service by lessening the damage cables receive from moisture and flooding.

In the interview studies of telephone service users (see "Box 1" for details), many responses were received that, particularly compared to prior to the project, following the project "the audio quality of calls improved," "calls are connected quicker," and "calls are cut off less frequently." Also, approximately 80% of all the respondents replied that they are satisfied with TOT's service.

Box 1: Cases in the Bangkok Metropolitan Area and Eastern Thailand: Interviews with Beneficiaries -Evaluation of the Quality of Telephone Service-

(1) Interviewees

An interview survey of telephone service users was conducted to collect the opinions of the beneficiaries of this project. As interview sites, Bangkok and two other sites in outlying provinces were selected since this project benefited the entire country of Thailand and there is no visible bias toward a particular geographical region. In outlying areas, the two provinces selected were Chonburi, which was developed mainly by industry in eastern Thailand where economic growth was conspicuous around the time of project implementation, and Trat, a relatively agricultural region. In each region, the interview area was decided by looking in detail at the areas that had particular relationships with the facilities funded by the ODA loans, and sampling was carried out. In the sampling, interviewees were chosen at random, with some adjustment to include in the sampling different areas (urban and rural), user types (company and household), and lengths of service (new users who subscribed following the project and old users who subscribed prior to the project). The goal was to collect a minimum of 300 valid responses in total (100 responses in each city), and as a result 431 persons were interviewed.

Table 1.1: Interviewees

Target area		New Subscribers		Old Subscribers		Total
		Households	Companies	Households	Companies	
Urban	Bangkok metro area	35	25	56	40	156
Rural	Trat Province	44	19	51	31	145
	Chonburi Province	41	21	35	33	130
Total		120	65	142	104	431

(2) Evaluation of Quality of Telephone Service

Old users who subscribed prior to the project implementation were asked multiple-choice questions concerning changes in telephone service before and after the project, and the results are displayed in Tables 1.2 through 1.4. The majority of the respondents replied that after the project the audio quality "improved," and malfunctions (being cut off during a conversation) "decreased." When all interviewees were asked about their level of satisfaction with service (see Figure 1.1), over 80% replied that they are satisfied, and so telephone service was positively evaluated by the large majority.

Table 1.2: Opinions on Audio Quality

Response	Company		Household		Urban		Rural	
	Cases	%	Cases	%	Cases	%	Cases	%
Improved	67	64.4	70	49.3	52	51.2	95	56.7
No change	29	27.9	49	34.5	27	28.1	51	34
Worsened	3	2.9	3	2.1	3	3.1	3	2
No comment	5	4.8	20	14.1	14	14.6	11	7.3
Total	104	100.0	142	100.0	96	100.0	150	100.0

Table 1.3: Opinions on Time Required to Connect Calls

Response	Company		Household		Urban		Rural	
	Cases	%	Cases	%	Cases	%	Cases	%
Faster	53	51	53	37.3	44	45.8	62	41.3
No change	36	34.6	63	44.4	34	35.4	65	43.3
Requires time	1	1	0	0	0	0	1	0.7
No comment	14	13.5	26	18.3	18	18.8	22	14.7
Total	104	100.0	142	100.0	96	100.0	150	100.0

Table 1.4: Opinions on Cut-offs

Response	Company		Household		Urban		Rural	
	Cases	%	Cases	%	Cases	%	Cases	%
Fewer (or no) cut-offs	61	58.7	72	50.7	44	45.8	89	59.3
No change	33	31.7	46	32.4	38	39.6	41	27.3
More cut-offs	2	1.9	2	1.4	1	1	3	2
No comment	8	7.7	22	15.5	13	13.5	17	11.3
Total	104	100.0	142	100.0	96	100.0	150	100.0

2.3.4 Financial Internal Rate of Return (F.I.R.R.)

FIRR was not calculated because it was not possible to acquire all of the data necessary for

FIRR calculation.

2.4 Impact

2.4.1 Improvement in Business Environment and Standard of Living

According to the results of interview studies with beneficiaries, namely 431 subscribers (169 companies, 262 individuals) from three regions, discussed also in Box 1 above, approximately 80% of the respondents replied that the installation of telephones through this project had a positive impact. See Box 2 for details.

Box 2: Cases in the Bangkok Metropolitan Area and Eastern Thailand: Interviews with Beneficiaries -Evaluation of Impact-

Evaluation of Impact

When interviewees were asked about the impact of this project, they generally replied in a positive manner. According to the interview survey, approximately 80% replied that telephone installation had some sort of impact, regardless of whether the respondents were companies or households, in urban areas or rural areas. Responses that the impact was positive vary from 53.8% to 79.0% among the different respondent groups, and a particular tendency is visible among companies and agricultural areas to value the positive aspects (see Table 2.1).

The grounds on which companies based their impact evaluations were, in the case of positive evaluations, "improvement in customer service", "increase in company income". In the case of households, the basis was "increase in family communication" (see Table 2.2). On the other hand, cost increase was indicated as a negative impact by 93.2% of companies and 76.2% of households, but it can be said that the impact is largely viewed as positive.

Table 2.1: Impact of Telephone Installation

(Unit %)

Evaluation	company	household	urban	rural
Positive Impact	67.20	58.80	53.80	79.00
Negative Impact	0.00	3.10	0.80	2.70
Both positive & negative	32.80	21.00	45.40	18.30

Table 2.2: Positive Impact of Telephone Installation

(Multiple replies possible)

Evaluation Item (company)		Evaluation Item (household)	
Improvement in customer service	77.60 %	Increase in family communication	83.70 %
Increase in company income	61.90 %	Increase in family safety	50.70 %
Access to information	53.00 %	Access to information	30.60 %
Customer increase	39.60 %	Increase in household income	29.70 %
Improvement in service quality	32.10 %	Useful for job searching	23.90 %
Increase in transactions	23.90 %	Useful for health consultations	10.50 %
Expansion of business	17.20 %	Other	18.20 %
Other	8.20 %		

2.4.2. Improvement of Service in Rural Farming Areas and Stimulation of Rural Areas

Through this project, the main transmission system and local cables were installed in rural areas, and subsequently, a telephone expansion project was implemented by Thailand. As a result, there were no farming villages in Thailand without telephone service in the Year 2000.

In the above results of the interviews with beneficiaries, it can be seen that there is a strong recognition of the positive impact in rural areas (see Table 2.1).

2.5 Sustainability

2.5.1 Executing Agency

(1) Technical Capacity

TOT is implementing training for technical staff at a training center in Bangkok, and there are no apparent problems. (In cases where TOT itself cannot do repairs, it requests private companies to do so.)

(2) Operation and Management System

TOT is preparing for privatization by 2006. In July 2002, the company was incorporated at TOT Corporation Public Company. At that time, the plan was to organize TOT into a business department system consisting of 8 business groups, each with a different operation (see figure 2). To enable the new organization to cope with rapidly growing demand for extension of local cables, local service centers which had been placed under the Bangkok Metropolitan Service Center, were placed at the same level as the Bangkok Metropolitan Service Center.

As of 2003, the total number of staff is 21,597 persons, out of which 9,051 are technical staff and 12,546 management and office staff. Accompanying privatization, TOT Corporation Public Company is promoting staff reductions. Compared to the total number of TOT staff as of 2001, which was 23,475 total (with 9,704 technical staff and 13,771 management and office staff), the number of staff has decreased by approximately 2,000 persons.

(3) Financial Status

TOT's net income has been in the black since 1990, as shown in Table 2, and its financial condition is sound. (Since 1997, total expenditures have risen and net income has declined, but this is due to increased new investment in rural areas.) Furthermore, the collection rate for telephone charges which was 85.7% in 1998 rose to 93.46% in 2001.

Today as well, TOT Corporation Public Company is working to improve its financial status by implementing staff reductions, etc.

Table 2: TOT's Main Financial Records Unit: million bahts

	1990	1993	1995	1997	1998	1999	2000	2001
Total Liabilities and Net Worth	62,472.3	81,973.4	157,062.5	250,121.1	253,725.8	251,285.3	260,560.3	273,003.6
Current Assets	9,901.9	13,320.3	24,028.4	46,186.7	37,794.2	30,038.2	28,178.2	38,796.6
Current Liabilities	7,657.8	5,711.1	8,512.5	22,470.6	28,868.4	25,340.1	23,455.3	25,915.2
Capital	18,318.4	47,247.8	109,775.9	173,834.4	173,038.8	168,935.5	180,075.7	189,954.4
Total Income	17,036.3	28,117.3	38,049.4	51,792.6	52,619.9	47,362.1	49,238.3	54,356.1
(phone business income portion)	16,406.0	26,273.7	32,173.3	38,760.3	37,779.8	35,711.9	36,769.1	39,144.6
Total Expenditures	8,995.1	15,307.3	22,598.5	28,008.7	38,990.7	45,424.7	45,212.5	41,125.2.
(repair/maintenance expense portion)	501.4	1,035.7	1,312.5	1,583.7	7,754.4	7,711.0	7,989.8	11,391.6
Net Income	8,041.2	12,810.0	15,450.9	23,783.9	13,629.2	1,937.4	4,025.8	13,230.9

Source: TOT data

2.5.2. Operation and Management

The local service centers in each of the nine service areas in Thailand are in charge of the operation and management of this project's facilities under their jurisdiction. Of the nine service areas, four are in the Bangkok Metropolitan Area, and the other five are in the central area, the northeast area, the north area, the south area, and the east area. The offices of each service center are organized like the main office in a business department system, and there are no apparent problems in operation and management.

3. Feedback

3.1 Lessons Learned

None.

3.2 Recommendations

None.

Comparison of Original and Actual Scope

Thailand Telephone Network Expansion Project (1), (2)

Item	Planned	Actual
(1) Output Junction network: optical fiber network in Bangkok Metropolitan Area:Transmission system development in provincial area: Local cables	410km 178 spans 770,250 pairs	537.1km 270 spans 985,625 pairs
(2) Project Period 1. Bangkok junction network 2. Transmission system 3. Local cables 4. Completion	May 1986 – August 1988 January 1986 – August1991 January 1987 – August 1991 February 1994	May 1986 – November 1992 January 1986 – October 1992 January 1987 – February 1993 February 1994
(3) Project Cost Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	 59,606 million yen 58,155 million yen (10,574 million bahts) 117,761 million yen 30,811 million yen 1 baht = 5.5 yen (May 1987)	 26,665 million yen 9,783 million yen (2,174 million bahts) 36,448 million yen 30,811 million yen 1 baht = 4.5 yen (average from 1986 – 1993)

Note 1): ducts are conduits used to contain buried telephone lines.

Thailand Telephone Network Expansion Project (Local Cable 2-1, 2-2)

Item	Planned	Actual
(1) Project Scope Local cables	–	1,863,250 pairs
(2) Project Period 1. Appraisal/Design 2. Manufacture 3. Shipment 4. Installation 5. Test 6. Completion	 July 1988 – May 1992 October 1988 – June 1992 December 1988 – August 1992 November 1988 – August 1992 November 1988 – September 1993 September 1993	 November 1987- August 1990 February 1988 – November 1992 April 1988 – February 1993 February 1988 – February 1993 February 1988 – September 1993 September 1993
(3) Project Cost Foreign currency Local currency Total ODA Loan Portion Exchange rate	 17,120 million yen 22,440 million yen (4,488 million bahts) 39,560 million yen 24,455 million yen 1 baht = 5.0 yen (as of June 1988)	 18,279 million yen 17,841 million yen (3,431 million bahts) 36,120 million yen 22,757 million yen 1 baht = 5.2 yen (annual average 1987 -1993)

Thailand Telephone Network Expansion Project (Local Cable 3)

Item	Planned	Actual
(1) Output Local cable	529,900 pairs	782,400 pairs
(2) Project Period 1. Appraisal/Design 2. Manufacture 3. Shipment 4. Installation 5. Test 6. Completion	 July 1989 – March 1992 September 1989 – May 1992 November 1989 – July 1992 September 1989 – July 1992 November 1989 – September 1992 September 1992	 November 1987 – August 1990 February 1988 – November 1992 April 1988 – February 1993 February 1988 – February 1993 February 1988 – September 1993 September 1993
(3) Project Cost Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	 15,318 million yen 18,987 million yen (3,390 million bahts) 34,305 million yen 15,318 million yen 1 baht = 5.6 yen (as of August 1989)	 13,109 million yen unconfirmed unclear (local currency) unclear 13,953 million yen 1 baht = 5.2 yen (annual average 1987-1993)

Thailand Telephone Network Expansion Project (Local Cable 4)

Item	Planned	Actual
(1) Output Local cable	257,900 pairs	266,100 paris
(2) Project Period 1. Appraisal/Design 2. Construction 3. Delivery Test 4. Completion	 January 1991 – May 1992 May 1991 – October 1992 September 1991 – December 1992 December 1992	 May 1991 – November 1991 September 1991 – March 1993 January 1992 – March 1993 March 1993
(3) Project Cost Foreign currency Local currency Total ODA Loan Portion Exchange rate	 4,598 million yen 11,925 million yen (2,250 million bahts) 16,523 million yen 4,598 million yen 1 baht = 5.3 yen (as of January 1991)	 2,486 million yen unconfirmed unclear (local currency) unclear 2,512 million yen 1 baht = 4.9 yen (annual average 1991-1993)

Third Party Evaluator's Opinion on
Telephone Network Expansion Project

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Thailand Development Research Institute

Relevance

During the 1980s, the Thai economy grew rapidly with double digit GDP growth for several consecutive years. With influx of foreign direct investments along with growth in domestic and international trades as well as rapid rise in per capita income, the need for an adequate telecommunications (at the time, fixed telephone services) infrastructure both in terms of meeting huge number of unmet demands (backlog) and in upgrading poor service quality was extremely pressing in order to sustain the country's economic and social development momentum.

With waiting list growing rapidly from 300,000 in the mid 1980 to over one million mark in 1990, this project, set to expand and modernize transmission system and local cable networks, is thus most relevant and timely. The optical fiber network in Bangkok Metropolitan Area (BMA) and the transmission system in the provincial area were needed to meet the rapid increase in call traffic in the 1990, from both the 4.1 million lines which were added to TOT's fixed line network nationwide and from the new cellular phone networks, arising from BTO concessions agreements given by TOT and CAT in the early 1990. Additionally, the above transmission network together with the nearly 3.9 million pairs of local cable network was instrumental in upgrading service quality with improved audio quality, better successful connections, and lower failure rates. They are also instrumental in providing a modern "access network" necessary to allow telephone users to connect to the Internet, and in the immediate future, to new Broadband Internet (ADSL) service.

The Ministry of Information and Communication Technology (MICT) has set a target of one million broadband Internet users by 2004, the project can be viewed as relevant even today. One observation here is that, while the project (undertaken from 1987-1994) has succeeded greatly in meeting the rising demand of users in the BMA where waiting list there had declined from 1.3 million in 1993 to about a mere 20,000 in 2003, little attention was given to the provincial area, resulting in the further widening of the digital-divide gap between BMA and the rest of the country where currently the provincial area has an unmet demand of nearly 560,000 in waiting-list. Future projects of this kind could perhaps address the problem of a more equitable service provision to the rural area.

Efficiency

Overall, the project was able to exceed the originally planned scope of work, while simultaneously completed in time and at lower costs than projected. In all account, the length of optical fiber network built was extended by 32%, the number of local cable pairs by 41%, and the number of sections of long-distance transmission spans by 52%, while the actual entire project costs were 70,322 million yen (according the evaluation report), or 55% lower than the projected (planned) costs of 154,797 million yen. Two major reasons were identified in the evaluation report. One is the appreciation of yen against Thai baht (averaging about 18% between 1986-1993 against the actual rate in 1987). The other is due to a more transparent process of competitive bidding which should be the bigger contributor to the cost saving.

One other significant factor may be added as well. It arises as a result of economy of scale of the project. In 1984 or 30 years since the establishment of TOT, the total line capacity was a mere 0.57 million lines, increasing to 1.68 million in 1990. It can be observed that if based on past expansion projects of much smaller scale of say, 300,000 lines, the planned cost would be much

higher. Consequently it is probably the combination of the more transparent process of competitive bidding used, together with the economy of scale and scope of the project that contributed the most to the overall efficiency of this undertaking. This could be one key lesson learnt for future projects of this kind.