CHAPTER 5 : COST ESTIMATES

5.1 Procedure

The cost for the TCS System, calculated in 1988 prices, consists of two (2) main elements, that is construction and operation costs. The construction cost comprises system, intersection improvement and renewal costs. The cost elements are as follows:-

(a) Construction Cost
- System Cost
- Intersection Improvement Cost
- Renewal Cost

(b) Operation Cost

The abovementioned cost elements incur expenditure in foreign and local currencies as follows:-

(a) System Cost
- incur expenses in foreign currency except local labour and material costs for installaton

(b) Intersection Improvement Cost
- incur expenses in local currency

(c) Renewal Cost
- incur expenses in foreign currency except local labour and material costs for installation

(d) Operation Cost
- incur expenses in local currency except foreign cost for spare parts

Basically, the cost estimates involve quantities estimated and unit cost analysis.

Each of the abovementioned cost elements is described below:-

(1) Construction Cost

(a) System Cost

The system cost is estimated in accordance with the proposed system configuration. It includes the following items:-

* Central equipment
* Software
* Terminal equipment
* Installation
* Contingency

The abovementioned cost elements are made up of the items as listed below:-

(i) Central Equipment

* Host computer
* Signal central controller (FEP)
* CCTV central controller
* CMS central controller
* Control desk
* Wall map
* Emergency power supply equipment
* Automative voltage regulator (AVR)
* Air conditioner
* Main distribution frame (MDF)
* Power distribution frame (PDF)
* Spare parts

(ii) Software

* Host computer programme
* Signal central controller (FEP) programme
* CMS central controller programme
* Timing parameter programme

(iii) Terminal Equipment

* Signal controller
* Loop detector
* CCTV camera
* Changeable message sign
* Communication and power cables
* Optical fibre cable
* Spare parts

(iv) Installation

* Foreign labour
* Local labour and material

(v) Contingency

* 10% of central equipment, software and terminal equipment costs

It should be noted that the system cost does not include costs of building/control centre and broadcasting station/facility.

The costs indicated exclude such items as tax and duty for imported equipment. Besides, inflation is not considered.

(b) Intersection Improvement Cost

The estimation of intersection improvement cost is based on the following items:-

* Pavement for carriageway and pedestrian
* Kerbs installation
* Drainage works
* Demolition cost for trees on existing structures
* Road markings
* Others

(c) Renewal Cost

In renewal cost estimation, the life span of ATC System is assumed to be fifteen years. The existing KL ATC System was started in 1980. Hence it will be renewed from 1996 onwards and targetted to be completed in 2000 (Stage 3). The terminal equipment that need to be renewed are signal controllers, detectors and communication cables. This renewal cost also includes installation cost, in foreign labour and local labour and material.

(2) Operation Cost

Operation cost comprises recurrent expenditures which are or will be incurred for the operation of the ATC System. The level of this expenditure is a function of the numbers and types of equipment units in operation, how these units are designed and assembled, where the unit is located, methods needed to operate it, amount and techniques of routine upkeep, etc.

The operation cost includes the following items:-

(a) Staff salary
- salaries of engineers and operators engaged in the operation of the system

(b) Electricity
- electricity consumed by both central and terminal equipment such as computers, signal controllers, detector, CCTV camera and changeable message sign.

(c) Line Rental
- fees paid for telephone lines leased from Syarikat Telekom Malaysia Berhad (STMB)

(d) Maintenance
- mainly routine upkeep expenses incurred by both central and terminal equipment and its value is largely dependent on the system size. Usually, maintenance task is undertaken by private contractors/firms.

(e) Spare Parts
- includes items needed in the control centre and at sites

5.2 Construction Cost

Tables 5.1, 5.2 and 5.3 show the estimated construction cost in each stage for the proposed TCS System.

The KL ATC System will require a construction cost of M$60.1 million, that is, M$24.1 million, M$15.7 million and M$20.3 million for Stages 1, 2 and 3 respectively.

For PJ ATC System, the construction cost for Stages 1, 2 and 3 are M$5.8 million, M$5.5 million and M$2.5 million respectively, thus totalling M$13.8 million.

The JKR HTS System will incur a total construction cost of M$42.4 million, that is, M$13.6 million, M$18.4 million and M$10.4 million for Stages 1, 2 and 3 respectively.

5.3 Annual Operation Cost

The annual operation cost of the TCS System comprises the following items:-

(a) Staff Salary
(b) Electricity
(c) Line Rental
(d) Maintenance
(e) Spare Parts

Tables 5.4, 5.5 and 5.6 show the annual operation cost of each system.

The KL ATC System will require an annual operation cost of M$1.2 million, M$1.6 million and M$2.1 million after completion of Stages 1, 2 and 3 respectively.

For PJ ATC System, the annual operation costs after completion of Stages 1, 2 and 3 are M$0.21 million, M$0.35 million and M$0.43 million respectively.

The JKR HTS System will incur an annual operation costs of M$0.3 million, M$0.8 million and M$1.1 million after completion of Stages 1, 2 and 3 respectively.

Table 5.1: Estimated Construction Cost in Each Stage - KL ATC System

Item	Stage 1	Stage 2	Stage 3	Total
1. System Cost				
1.1 Central Equipment	6,120.6	1,662.4	584.7	8,367.7
1.2 Software	7,813.2	1,018.0	451.2	9,282.4
1.3 Terminal Equipment	4,930.8	7,795.5	8,194.1	20,920.4
1.4 Installation	3,280.1	3,873.8	2,416.6	9,570.5
1.5 Contingency	1,886.5	1,047.6	923.0	3,857.1
Sub-total	24,031.2	15,397.3	12,569.6	51,998.1
2. Intersection Improvement Cost	57.3	316.3	88.9	462.5
3. Renewal Cost	-	-	7,684.7	7,684.7
TOTAL	24,088.5	15,713.6	20,343.2	60,145.3

Unit: M$'000, 1988 prices

Table 5.2: Estimated Construction Cost in Each Stage - PJ ATC System

Item	Stage 1	Stage 2	Stage 3	Total
1. System Cost				
1.1 Central Equipment	1,424.0	204.3	1.2	1,629.5
1.2 Software	404.1	94.1	64.7	562.9
1.3 Terminal Equipment	1,720.0	2,684.8	1,300.7	5,705.5
1.4 Installation	1,480.3	1,571.6	985.0	4,036.9
1.5 Contingency	354.8	298.3	136.7	789.8
Sub-total	5,383.2	4,853.1	2,488.3	12,724.6
2. Intersection Improvement Cost	405.1	651.5	10.0	1,066.6
3. Renewal Cost	-	-	-	-
TOTAL	5,788.3	5,504.6	2,498.3	13,791.2

Unit: M$'000, 1988 prices

Table 5.3: Estimated Construction Cost in Each Stage - JKR HTS System

Item	Stage 1	Stage 2	Stage 3	Total
1. System Cost				
1.1 Central Equipment	3,837.4	4,242.9	4.9	8,085.2
1.2 Software	6,407.2	1,268.8	325.6	8.001.6
1.3 Terminal Equipment	808.5	7,311.7	7,080.9	15,201.1
1.4 Installation	1,453.1	4,295.5	2,254.3	8,002.9
1.5 Contingency	1,105.3	1,282.3	741.1	3,128.7
Sub-total	13,611.5	18,401.2	10,406.8	42,419.5
2. Renewal Cost	-	-	-	-
TOTAL	13,611.5	18,401.2	10,406.8	42,419.5

Unit: M$'000, 1988 prices

Table 5.4: Estimated Annual Operation Cost in Each Stage- KL ATC System (1988 Constant Prices)
(Unit: M$'000)

Item	Stage 1	Stage 2	Stage 3
1. Staff Salary	147.6	186.0	210.0
2. Electricity	327.7	422.0	543.2
3. Line Rental	51.7	69.7	95.8
4. Maintenance	187.2	292.0	384.3
5. Spare Parts	280.8	438.0	576.4
6. Others	200,000	240.0	300.0
TOTAL	1,192.0	1,645.7	2,109.7

Note: Operating Cost includes the one in the ATC System

Table 5.5: Estimated Annual Operation Cost in Each Stage- PJ ATC System (1988 Constant Prices)
(Unit: M$'000)

Item	Stage 1	Stage 2	Stage 3
1. Staff Salary	51.6	66.0	75.6
2. Electricity	66.8	107.7	146.7
3. Line Rental	6.7	13.4	18.1
4. Maintenance	35.5	63.3	76.9
5. Spare Parts	53.2	94.9	115.4
TOTAL	213.8	345.3	432.7

Note: Operating Cost includes the one in the ATC System

Table 5.6: Estimated Annual Operation Cost in Each Stage-JKR HTS System (1988 Constant Prices)
(Unit: M$'000)

Item	Stage 1	Stage 2	Stage 3
1. Staff Salary	66.0	109.2	128.4
2. Electricity	59.3	107.7	163.9
3. Line Rental	2.1	-	-
4. Maintenance	82.4	232.9	303.8
5. Spare Parts	123.7	349.4	455.8
TOTAL	333.5	799.2	1,051.9

Note: Operating Cost includes the one in the TCS System

CHAPTER 6 : ECONOMIC EVALUATION OF THE PROJECT

6.1 General

6.1.1 Procedure

Economic analysis of the project is aimed at finding the economic feasibility by examining whether the Traffic Control and Surveillance (TCS) System project will bring about sufficient contribution to the national economy of Malaysia based on the comparison of the costs and benefits.

The procedure for the economic analysis is shown in Figure 6.1.

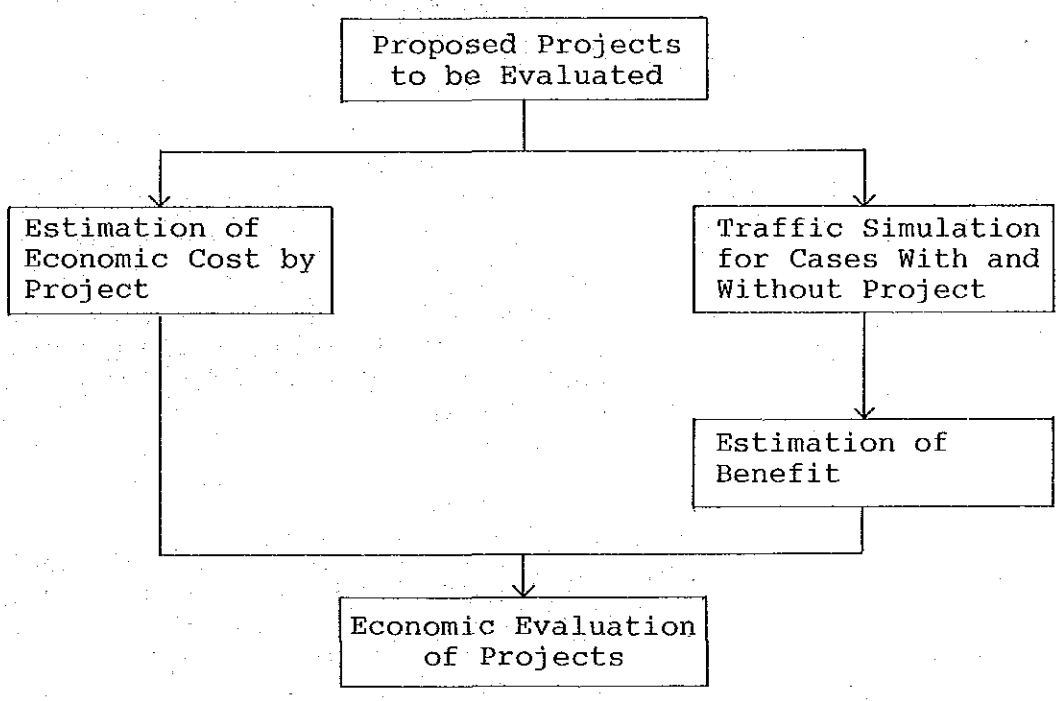

Figure 6.1: Procedure of Economic Evaluation

6.1.2 Indicators for Economic Evaluation

Following the standard procedure of the Economic Planning Unit and international financing organizations, three (3) types of economic indicators are calculated.

(a) Internal Rate of Return (IRR)

The IRR shows the discount rate which gives the break-even point between the present value of benefit and that of cost as given by the following formula.

$$B(R) - C(R) = 0$$

$$B(R) = \sum_{i=1}^{n} \frac{bi}{(1+R)^i}$$

$$C(R) = \sum_{1=0}^{n-1} \frac{bi}{(1+R)^i}$$

Where:-
R : Internal Rate of Return
Ci : Cost in year (i)
bi : Benefit in year (i)
n : Project Life in years

In order that the project be economically feasible, the IRR should be more than the rate of opportunity cost of capital, which is in general 12% in Malaysia.

(b) Net Present Value (NPV)

The NPV will indicate the difference between the discounted benefit and cost using the rate of opportunity cost of capital. A positive NPV means the project is economically feasible.

(c) Benefit Cost (B/C) Ratio

The B/C ratio is the ratio obtained by dividing the present value of benefit by that of cost.

$$\text{Benefit Cost Ratio} = \frac{B}{C}$$

Where:-

$$B = \sum_{i=1}^{n} \frac{bi}{(1+r)^i}$$

$$C = \sum_{1=0}^{n-1} \frac{Ci}{(1+r)^i}$$

bi : Benefit in year (i)
Ci : Cost in year (i)
r : Discount rate
n : Project life in years

The first indicator is used so as to determine whether investing in the transport sector rather than in other sectors is justified and for selecting the best plan among the alternatives or determining the project priority.

The second and third indicators come in useful where no significant difference is observable in the plan selection or project priority determination when conducted by way of the first indicator.

6.1.3 Basic Assumptions

The TCS System project is evaluated economically on the basis of the following assumptions:-

(a) The project life is assumed to be fifteen (15) years;
(b) The discount rate is 12% per annum;
(c) The construction schedule for the TCS System is based on the stage plan presented in Section 4.8.

6.2 Estimation of Economic Benefit

6.2.1 Economic Benefits of the Project

The favourable effects from the upgrading/ introduction of the TCS System on the national economy can be summarized as follows:-

(a) Alleviation of traffic congestion;
(b) Ability to monitor malfunctioning equipment units;
(c) Ability to facilitate emergency vehicle users;
(d) Ability to control vehicular traffic volume;
(e) Ability to control vehicle speed; and
(f) Reduction of noise and air pollution.

In addition, incidents can be detected by the CCTV cameras and the information can be relayed to drivers via the driver information boards. Automatic recording of traffic volume and compilation of statistical reports can be facilitated by the statistical data collection system.

Among these beneficial effects of the TCS System, the reduction in delay time and fuel consumption resulted from a decrease in vehicle idling can be quantified into direct monetary benefits.

6.2.2 Estimation of Benefit

The economic benefit derived from expanding and upgrading the KL ATC System as well as operating the PJ ATC System is shown in Tables 6.1 and 6.2 and Figures 6.2 and 6.3.

The KL ATC System could be expected to produce savings in annual transport cost by approximately M$20.5 million in 1992 (Stage 1), M$24.9 million in 1995 (Stage 2) and M$27.4 million in 2000 (Stage 3) after the upgrading and expansion of the ATC System.

The PJ ATC System could also be expected to yield savings in annual transport cost by approximately M$4.4 million in 1992 (Stage 1), M$12.0 million in 1995 (Stage 2) and M$15.9 million in 2000 (Stage 3).

Table 6.1: Economic Benefit According to KL ATC System Plan

Stage	Year	No. of Intersection		Annual Transport Cost (M$million)		
		Construction	Accumulated*	Without ATC	With ATC	Difference
1	1991	42	-	-	-	-
	1992		116	238.0	217.6	20.5
2	1993		116	247.7	228.5	19.2
	1994	30	116	257.7	239.0	17.8
	1995		146	365.7	340.8	24.9
3	1996		146	341.5	320.6	20.9
	1997		146	345.6	324.1	21.6
	1998		146	349.8	327.6	22.2
	1999	24	146	354.0	331.1	22.9
	2000		170	417.1	389.7	27.4
	2001		170	422.1	393.9	28.2
	2002		170	427.2	398.2	29.0
	2003		170	432.3	402.5	29.8
	2004		170	437.5	406.9	30.0
	2005		170	469.1	434.3	34.8

Note: * Including existing 74 computerized signalized intersections

Table 6.2: Economic Benefit According to PJ ATC System Plan

Stage	Year	No. of Intersection		Annual Transport Cost (M$million)		
		Construction	Accumulated*	Without ATC	With ATC	Difference
1	1991	16	-	-	-	-
	1992		16	39.3	35.0	4.4
2	1993		16	41.9	37.0	4.9
	1994	16	16	44.6	39.1	5.4
	1995		32	94.9	82.8	12.0
3	1996		32	95.7	83.7	12.0
	1997		32	96.5	84.6	12.0
	1998		32	97.3	85.4	11.9
	1999	11	32	98.2	86.3	11.9
	2000		43	133.1	117.2	15.9
	2001		43	134.2	118.4	15.8
	2002		43	135.4	119.6	15.8
	2003		43	136.6	120.8	15.7
	2004		43	137.7	122.1	15.6
	2005		43	138.9	123.3	15.6

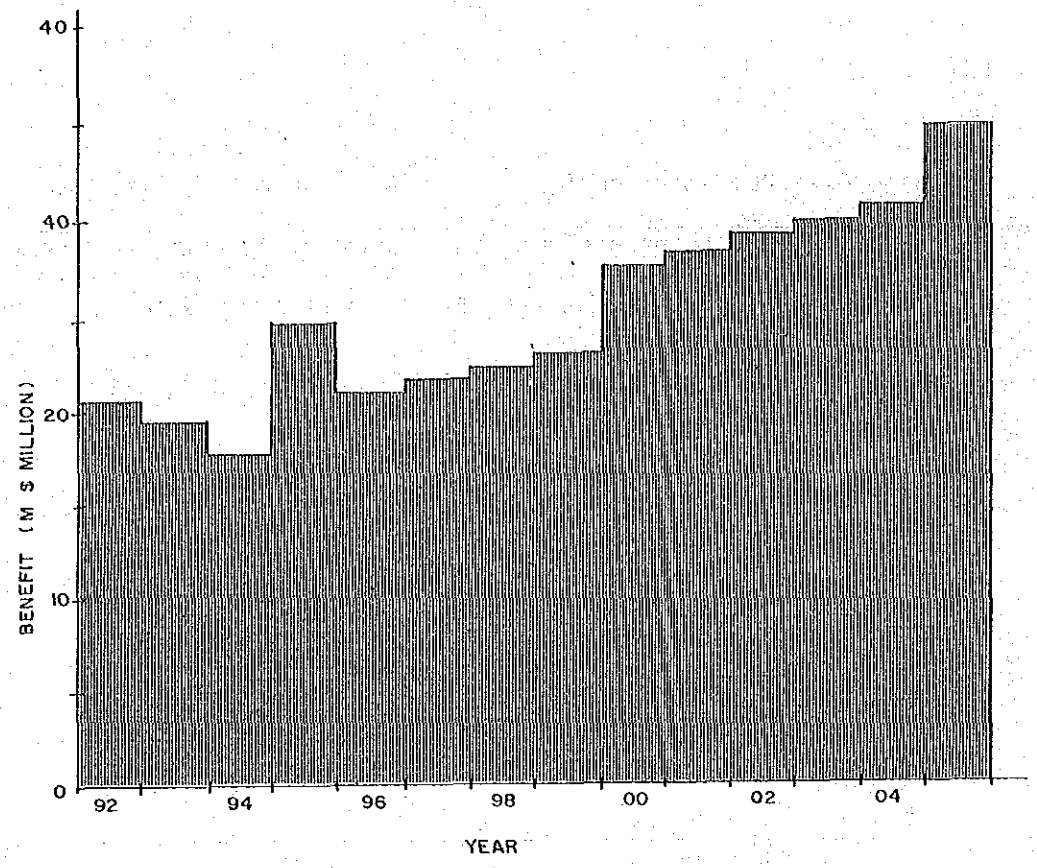

Figure 6.2: Economic Benefit - KL ATC System

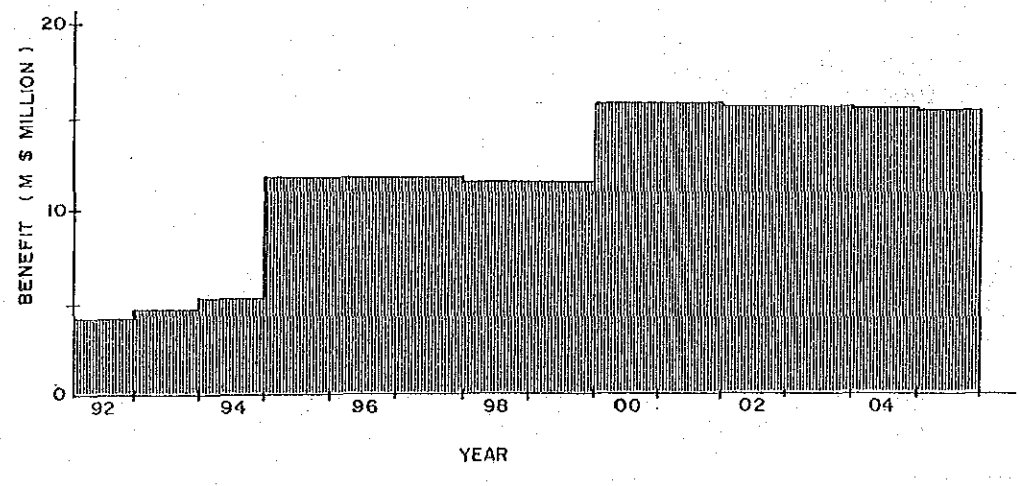

Figure 6.3: Economic Benefit - PJ ATC System

6.3 Economic Evaluation

Tables 6.3 and 6.4 show the yearly stream of costs and benefits whereas Table 6.5 depicts the economic indicators of the proposed System.

The economic evaluation for KL ATC System shows that the investment could yield a net present value of M$73 million, a benefit-cost ratio of 3.0 and an internal rate of return of 69.1%. Hence the proposed ATC System is found to be economically feasible.

Similarly, economic evaluation for PJ ATC System shows that the investment could yield a net present value of M$40 million, a benefit-cost ratio of 5.6 and an internal rate of return of 84.6%. Hence the proposed ATC System is also found to be economically feasible.

Table 6.3: Yearly Stream of Costs and Benefits - KL ATC System

	Undiscounted								Discounted at 12%	
	Cost						Benefit	Cost	Benefit
	Stage 1		Stage 2		Stage 3		Total			
	A	B	A	B	A	B				
1991	24088.5						24088.5	0.0	17145.7	0.0
1992		1192.0					1192.0	20500.0	757.5	13028.1
1993		1192.0					1192.0	19200.0	676.4	10894.6
1994		1192.0	15713.6				16905.6	17800.0	8564.9	9018.0
1995				1645.7			1645.7	24900.0	744.4	11263.5
1996				1645.7			1645.7	20900.0	664.7	8441.2
1997				1645.7			1645.7	21600.0	593.5	7789.2
1998				1645.7			1645.7	22200.0	529.9	7147.8
1999				1645.7	20343.2		21988.9	22900.0	6321.3	6583.2
2000						2109.7	2109.7	27400.0	541.5	7032.9
2001						2109.7	2109.7	28200.0	483.5	6462.7
2002						2109.7	2109.7	29000.0	431.7	5934.0
2003						2109.7	2109.7	29800.0	385.4	5444.3
2004						2109.7	2109.7	30600.0	344.1	4991.5
2005	-1605.9		-4190.3		-12205.9	2109.7	-15892.4	34800.0	-2314.6	5068.4
Total							66605.9	349800.0	35869.9	109099.4

Unit : M$'000, 1988 prices
Note : A - Construction Cost
B - Operation Cost

Table 6.4: Yearly Stream of Costs and Benefits - PJ ATC System

	Undiscounted								Discounted at 12%	
	Cost						Benefit	Cost	Benefit	
	Stage 1		Stage 2		Stage 3		Total			
	A	B	A	B	A	B				
1991	5788.3						5788.3	0.0	4120.0	0.0
1992		213.8					213.8	4400.0	135.9	2796.3
1993		213.8					213.8	4900.0	121.3	2780.4
1994		213.8	5504.6				5718.4	5400.0	2897.1	2735.8
1995				345.3			345.3	12000.0	156.2	5428.2
1996				345.3			345.3	12000.0	139.5	4846.6
1997				345.3			345.3	12000.0	124.5	4327.3
1998				345.3			345.3	11900.0	111.2	3831.5
1999				345.3	2498.3		2843.6	11900.0	817.5	3421.0
2000						432.7	432.7	15900.0	111.1	4081.1
2001						432.7	432.7	15900.0	99.2	3643.9
2002						432.7	432.7	15800.0	88.5	3233.0
2003						432.7	432.7	15800.0	79.1	2886.6
2004						432.7	432.7	15700.0	70.6	2561.0
2005	-385.9		-1467.9		-1499.0	432.7	-2920.1	15600.0	-425.3	2272.1
Total							15402.5	169200.0	8646.4	48844.8

Unit : M$'000, 1988 prices
Note : A - Construction Cost
B - Operation Cost

Table 6.5: Economic Indicator of ATC System Plan

KL ATC System Plan	Internal Rate of Return IRR (%) ..	69.1
	Benefit-Cost Ratio, B/C Ratio ..	3.04
	Net Present Value, NPV (M$'000) ..	73,229
PJ ATC System Plan	Internal Rate of Return, IRR (%)..	84.6
	Benefit-Cost Ratio, B/C Ratio ..	5.65
	Net Present Volue, NPV (M$'000) ..	40,198

6.4 Sensitivity Analysis

As the second step of the economic evaluation, a sensitivity, analysis on economic indicators is conducted.

The factors to be tested in this sensitivity analysis are considered as follows:-

(i) Benefit
- a.1 20% Reduction of benefit
- a.2 40% Reduction of benefit

(ii) Cost
- b.1 20% Increase of construction and operation costs
- b.2 40% Increase of construction and operation costs

(iii)
- c.1 20% Reduction of benefit and 20% increase of construction and operation costs
- c.2 40% Reduction of benefit and 40% increase of construction and operation costs.

Tables 6.6 and 6.7 show the results of the sensitivity analysis.

(1) Although the benefit is reduced by 40% of the original estimate, the proposed ATC Systems are still found to be economically feasible.

(2) Although the construction and operation cost is increased by 40% of the original estimate, the proposed ATC Systems are still economically feasible.

(3) Although the benefit is reduced by 40% and the construction and operation cost is increased by 40% of original estimates, the proposed ATC Systems are also considered to be economically feasible.

Table 6.6: Results of Sensitivity Analysis -KL ATC System

Factors	IRR (%)	B/C Ratio	NPC (M$'000)
Proposed Plan	69.1	3.04	73,229
a.1	51.8	2.43	51,409
a.2	34.8	1.82	29,590
b.1	54.7	2.57	66,685
b.2	44.5	2.24	60,350
c.1	40.5	2.06	44,865
c.2	20.8	1.34	16,710

Notes:-
a.1 : 20% Reduction of Benefit
a.2 : 40% Reduction of Benefit
b.1 : 20% Increase of Construction & Operation Costs
b.2 : 40% Increase of Construction & Operation Costs
c.1 : 20% Reduction of Benefit & 20% Increase of Construction & Operation Costs
c.2 : 40% Reduction of Benefit & 40% Increase of Construction & Operation Costs

Table 6.7: Results of Sensitivity Analysis
-PJ ATC System

Factors	IRR (%)	B/C Ratio	NPC (M$'000)
Proposed Plan	84.6	5.65	40,198
a.1	68.7	4.52	30,429
a.2	52.3	3.39	20,660
b.1	71.4	4.76	38,586
b.2	61.8	4.13	37,013
c.1	57.9	3.81	28,817
c.2	37.6	2.48	17,476

Notes:-
a.1 : 20% Reduction of Benefit
a.2 : 40% Reduction of Benefit
b.1 : 20% Increase of Construction & Operation Costs
b.2 : 40% Increase of Construction & Operation Costs
c.1 : 20% Reduction of Benefit &
20% Increase of Construction & Operation Costs
c.2 : 40% Reduction of Benefit &
40% Increase of Construction & Operation Costs

CHAPTER 7 : RECOMMENDATION AND IMPLEMENTATION PROGRAMME

7.1 Recommendation

The Traffic Control and Surveillance (TCS) System is recommended to be implemented as soon as possible.

For the KL ATC System, it is strongly recommended that it immediately be expanded to cover the entire Kuala Lumpur including its surrounding areas of Kepong, Selayang and Ampang in order to ensure effective coordination and control of the conurbation traffic. In addition, it is recommended that the existing ATC System be upgraded into a comprehensive ATC System with traffic responsive signal control, traffic surveillance, driver information and other functions which enable the implementation of comprehensive traffic management activities. In view of the accelerated and continued growth of traffic demand with private cars being the dominant means of transportation in Kuala Lumpur Conurbation, the implementation of the KL ATC System needs immediate attention.

The introduction of an ATC System for Petaling Jaya is of urgent matter as the existing signal controllers operating in an isolated mode cannot be coordinated and maintained with an optimum control timing. It is envisaged that the urbanization rate in Petaling Jaya will increase in the near future, thereby inducing greater traffic generation. Together with the fact that the urban street traffic in Petaling Jaya has a close relationship with the highway traffic, particularly at the Federal Highway Interchanges, the PJ ATC System, an integrated system of traffic responsive signal control and traffic surveillance systems, should be implemented as recommended.

With regard to the traffic control and surveillance system for the present highway network in the Klang Valley, it is of great importance and necessity to establish the recommended HTS System on the Federal Highway and Airport Highway in order to mitigate the congested operation and deteriorating level of services resulted from accelerated and continued traffic growth. With this sophisticated system, traffic management activities can be activated besides collecting traffic-related information pertaining to the existing highways. Moreover, the recommended HTS System is capable of maintaining close rapport with the being planned traffic surveillance system for the existing and proposed North-South Toll Expressways.

7.2 Implementation Programme

7.2.1 Task Force

In the Klang Valley Region, there are various government agencies concerned with traffic control. For instance, the ATC System which covers Kuala Lumpur and Petaling Jaya are under two different jurisdictions, Kuala Lumpur City Hall (DBKL) and Municipal Council of Petaling Jaya (MPPJ) respectively. The highway route on which the HTS System is covered, Federal Highway from the junction with North Klang Straits Bypass to the boundary of Kuala Lumpur and Airport Highway is under the jurisdiction of Federal Public Works Department (JKR).

With Klang Valley Region evolving into a metropolitan region, it is but only desirable that the traffic control and surveillance system be unified under a single task force. Being the authority formed to oversee the overall development of the Klang Valley Region, it is most appropriate that the task force be established under the Klang Valley Planning Secretariat. Members of the task force would be DBKL, MPPJ, JKR and other relevant agencies.

7.2.2 Detailed Engineering Work

Since the traffic control and surveillance system in the Klang Valley Region is recommended as an integrated system, it is necessary to implement the detailed engineering work as one package. This involves the detailed engineering design of the central and terminal equipment together with the communication cable network as well as the set up of the control centre. This detailed engineering work is recommended to be implemented and coordinated by the proposed task force.

7.2.3 Implementation Programme

Hitherto, the Klang Valley Traffic Control and Surveillance System is classified into three systems:-

(i) KL ATC System
(ii) PJ ATC System
(iii) JKR HTS System

Each system is equipped with individual sub-centres and linked to the main Klang Valley Traffic Intelligence Centre in Kuala Lumpur.

The recommended implementation programme is only applied for Phase 1 of the proposed Traffic Control and Surveillance System and in view of its urgency, it is recommended to be completed by year 1992. Besides, it is formulated with consideration of the allocation of federal funds under the immediate Malaysian Development Plan, that is, Sixth Malaysia Plan (1991-1995) and Seventh Malaysia Plan (1996-2000).

Table 7.1 shows the implementation programme inclusive of its construction cost.

The proposed Traffic Control and Surveillance System will require a construction cost of M$116.30 milllion, that is M$8.60 million for detailed engineering and engineering supervision and M$107.70 million for system installation. For the installation cost, KL ATC System will require M$55.65 million, PJ ATC System M$12.76 million and JKR HTS System M$39.29 million.

Table 7.1: Implementation Programme

	1991	1992	1993	1994	1995	Sub-Total	1996	1997	1998	1999	Sub-Total	TOTAL
Detailed Engineering	2.40					2.40	1.90				1.90	4.30
Engineering Supervision		0.48	0.96	0.96		2.40		0.64	0.63	0.63	1.90	4.30
Sub-total	2.40	0.48	0.96	0.96		4.80	1.90	0.64	0.63	0.63	3.80	8.60
Installation												
KL ATC System		7.45	14.70	14.70		36.85		6.30	6.30	6.20	18.80	55.65
PJ ATC System		2.12	4.17	4.17		10.46		0.80	0.80	0.70	2.30	12.76
JKR HTS System		2.55	5.02	5.02		12.59		8.90	8.90	8.90	26.70	39.29
Sub-total		12.12	23.89	23.89		59.90		16.00	16.00	15.80	47.80	107.70
TOTAL	2.40	12.60	24.85	24.85		64.70	1.90	16.64	16.63	16.43	51.60	116.30

Unit: M$million

In line with the Malaysian Development Plan, the construction cost of the traffic control and surveillance system will be M$64.70 million under the Sixth Malaysian Plan and M$51.60 million under the Seventh Malaysia Plan.

Table 7.2 presents the requirement of federal fund.

Table 7.2: Requirement of Federal Fund

Sixth Malaysia Plan	M$64.70 million
Seventh Malaysia Plan	M$51.60 million
Total	M$116.30 million