

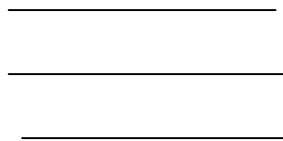
-

- J

-

-
-J -

2001 6



가

5

.	-----	1
1.	-----	1
2.	-----	2
.	-----	4
.	-----	11
1.	-----	11
2.	-----	12
3.	-----	15
4.	-----	20
.	-----	22
1.	- -----	22
2.	-----	36
.	-----	42
.	-----	47
	-----	49
	-----	51
	-----	55

1.	-	-----	23
2.		-----	24
3.	PACS	가	-----
		가	-----
			26
4.		-----	27
5.		-----	29
6.		-----	30
7.		-----	33
8.		-----	37
9.		-----	39
10.		-----	40
11.	가	가	-----
			41

1.	-----	20
----	-------	----

1.		-----	51
2.	MRI	2000	-----52
3.		-----	53
4.		-----	53
5.	MRI	2000	-----54

J .
2001 . 2000
5 .
-
,
,
가 PACS 가 가
, , , , , ,
, , , , , ,
, (storage media)
, ,
가 가 .
2,940,858,000

가 .

.

-

.

가 .

가

가

,

가

-

.

,

,

,

,

.

•

1.

,

,

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,

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,

.

1977

,

(HIS)

,

가

.(

, 1996)

-
·
1980
,
, 1990 (OCS),
(LIS), (PACS)
·
(PACS ; Picture Archiving and Communication System, ‘ , ’
)
·
가
, 가
·
·
·

2.

, . 가
, 가 가
가 .
, ,
, .
, 가
가 . 가

•

.(, 1993)

(Management Information System)

Davis Olson ‘ ,
- ,
, , ,
, .(Davis &

Olson, 1985) Kennevan ‘
,
, ,

(Kennevan , 1970) Fredericks ‘

.(Fredericks WA, 1971)

.(, 1998)



, 가

.(, 1995)

가

(TPS : Transaction Processing System)

(DDS : Decision Support System)

(Medical Support System)

(Management Subsystem)

가

5

(Image Acquisition)

CT, MR, CR

가

가

(Image Storage and Management)

가

File server, DB server

Archive server

(Image Display)

Image

Database

Network

(, 1998)

2K x 2K

2-3

가

가

가

가

((Teleradiology))

DICOM .(, 1996)

,

(Executive Supporting System)

가

40%

가

가

,
 .
 가
 .(,1998)
 .
 , 가,
 .
 ,
 , 가
 ()
 ,
 ,
 ,
 ,
 ,
 .(,1990)
 .
 ,
 (organizational risk) .
 , (definitional
 risk) .

,
(technical risk) .
, 가
(infrastructure risk) .(, 1991)

•

1.

600

J

Viewer

PACS interface

(DICOM option),

DICOM workstation, server disk array,

server array, juke box, juke box server

Viewer

soft ware

가

가

가

가

가
 가
 5 1999 5 24
 5

2.

가 - (CEA : cost-effectiveness analysis)
 - (CBA : cost-benefit analysis)
 (outcome) 가
 가 가 가
 가 가
 가

- 가
(alternatives)

가

- 가 , -
가 ,

- , -

가

· , - (practical)

· , -

- (positive approach)

(normative approach) · , -

(net benefit)

가

· (, 1997)

·

·

1996)

55

1

100 16

1

1 600 1

100 28

가 (Inflation)

[(가 - 가) / 가] x 100
가 , GDP deflator

가 (net present value)

가 , 가 가 ‘ ’
가 .

가

가 ,

가 .

, , ,
가 .

가 가

가 가

가

3.

2000 - 2001 ,
 5 .
 1998
 1999 가 . 5
 15
 , , 5
 , 가 5 5
 가 가

2001 .
 , , S/W, , PACS monitor, PC, monitor,

,
 .
 11 , 2
 .
 2001
 .
 ,
 ,
 .
 UPS(100Kva)
 .
 가
 가 , , ,
 가 가
 . 1999 11 15 가
 가 (full PACS)
 1 3,000 2 50%
 가 5 .
 9,000
 .

, , , , ,
 ,
 . 가
 가
 . 가 , ,
 . ,
 .
 ,
 .
 K
 2.5% .
 35% 가 , 27%, 20%
 , , 18% .
 , 47%
 53%
 .
 1.3% . (, 1998)
 ,

50 (165mxm)

MOD(Magnet Optical Disk)

140

70

MOD

350

175

100

MOD

가

3

가

가

가

'가

55

28%

가

(1 -)

가

13%

1 6 1

가

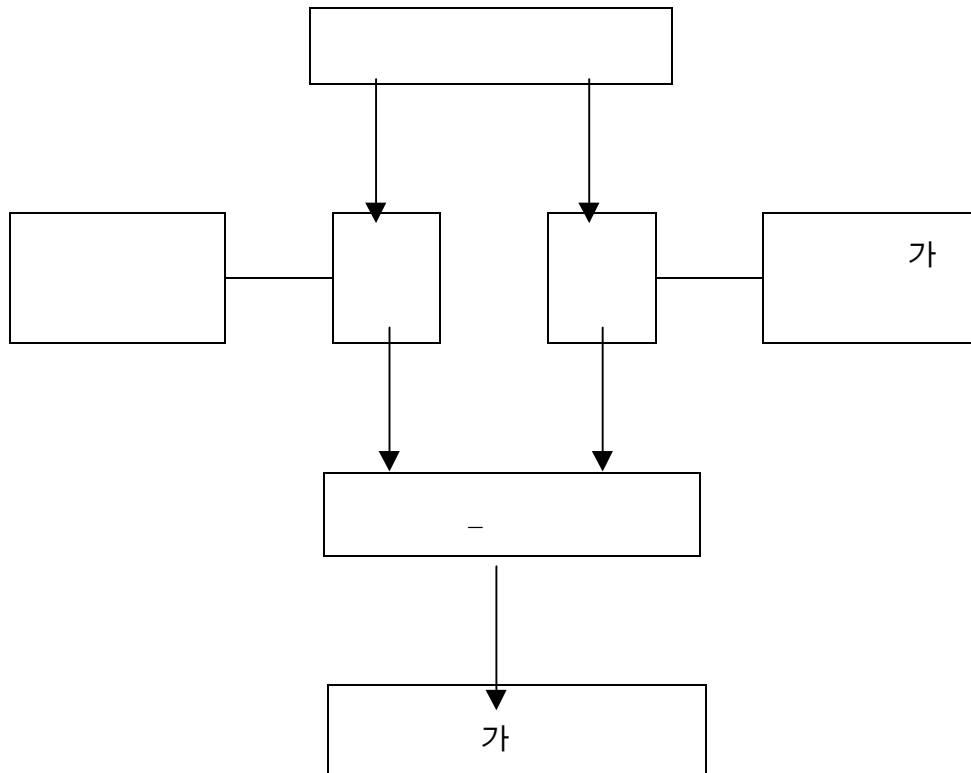
(1 -)

가 4%

가 9%

1

4.



1.

$$\begin{aligned} - &= / \\ &= (+ H/W) \\ + &(+ +) \end{aligned}$$

= 가 +
= 가 가
+
+
+
+ storage media
+

1. -

2001		2,940,858,000	
	2,040,000,000		70%
	900,858,000		30%
	8,945,270,000	가	
가가 5,427,232,000		61%	
	2,483,697,000	28%	
		32,288,000	(1%),
		812,052,000	(9%),
		10,000,000	(0.1%)
180,000,000	(2%)		
	6,004,412,255	3 : 1	.(1)

1.

-

(:)

			490,000,000
		H/W	1,550,000,000
			240,000,000
			588,000,000
			72,858,000
			2,940,858,000
PACS 가 가			5,427,232,500
			1,544,758,000
			62,776,000
			55,365,000
			294,078,000
			26,720,000
			200,000,000
			300,000,000
			812,052,000
	Storage media		10,000,000
			180,000,000
			8,945,270,000
			6,004,412,000
/			3.0

1).

2.

(:)

		(%)
		490,000,000 (17%)
		1,550,000,000 (53%)
		240,000,000 (8%)
		588,000,000 (20%)
		72,858,000 (2%)
		2,940,858,000

2.940,858,000 ,

2,040,000,000 70% 900,858,000

30% .

490,000,000

17% .

1,550,000,000 52% .

,

48,000,000

5 240,000,000 .

280,000,000 42%
 .(1) 5 588,000,000 .

$$= 280,000,000 / \times 5 \times 42\%$$

$$= 588,000,000$$

97,3 . 12,480 /
 14,751,600 , 5 72,858,000
 가 .

2).

(1). 가 가

2000

221,332 . 12 20,027 가 2

15,831 가 .

5,482 2.5%

1 529 가 12 413 가

가 5,588 2.5%

12 561 가 3 340

가 210,262 95.0%

12 20,027 가 2 15,831 가

. 1 가 86,461

41.1% 가 2 (31.5%), 4 (10.3%), 3 (9.1%), 5

(8.0%) .(2)

3. PACS 가 가

	PACS 가 ()		()
	9,000	11,070	99,630,000
1	3,000	86,461	259,383,000
2	4,500	66,164	297,738,000
3	6,000	19,189	115,134,000
4	7,500	21,647	162,352,500
5	9,000	16,801	151,209,000
	1,085,446,500		
5	5,427,232,500		

, , , , ,
 , , .
 516,779,337
 5 2,483,697,685 .
 308951737 59.8% 가
 (11.6%), (11.4%),
 (7.7%), (4.9%), (2.4%),
 (2.1%) .(4)

(2-1).

210,262
 446,949 . 2 가 132,328
 29.6% 가 4 (19.4%), 1 (19.3%), 5 (18.8%),
 3 (12.9%) .(3)
 14" x 17"가 65%
 가 10" x 12"(17%), 8" x 10"(12%), 11" x 14"(5%), 14"
 x 14"(1%) .(4)

6.

		CT	MRI
	8x10	14x17	14x17
	5,482	5,588	6,712
	4	4	6
	21,928	22,352	40,272
가 ()	333	947	947
()	7,302,024	21,167,344	38,137,584
	66,606,952		
5	333,034,760		

66,606,000

5 333,034,000 .

7,302,000

11.0%

가 가

가

8" x 10"

4

21,167,000

31.8%

4 .
 2.9% (5), 6,712 38,138,000
 57.3% .
 6 .(6)

(2-2).

500 ml 가 15,000
 635 . 531,501 ,
 12,555,000 5 62,776,000

$$\begin{aligned}
 &= 531,501 / / 635 \times 15,000 \\
 &= 12,555,000 \\
 5 &= 12,776,000 / \times 5 \\
 &= 62,776,000
 \end{aligned}$$

(2-3).

$$\begin{aligned} & 500\text{ml} \quad \text{가} \quad 15,000 \quad 720 \\ & \cdot \quad \quad \quad 531,501 \quad , \\ & 11,073,000 \quad 5 \\ & 55,365,000 \quad \cdot \\ & \cdot \\ & = 531,501 / / 720 \quad \times 15,000 \\ & = 11,073,000 \\ & 5 \quad = 11073000 / \quad \times 5 \\ & = 55,365,000 \end{aligned}$$

(2-4).

$$\begin{aligned} & , \quad \quad \quad 3 \quad , \quad \text{Laser} \quad 2 \\ & \quad \quad \quad 1 \quad \text{가} \quad \cdot \\ & \text{가} \quad \quad \quad 294,078,000 \\ & \cdot (\quad 7) \end{aligned}$$

7.

	가 ()		()
	15,000,000	3	45,000,000
Laser	120,189,000	2	240,378,000
	8,700,000	1	8,700,000
	294,078,000		

(2-5).

$$\begin{aligned}
 &\quad 150 \\
 &\quad 2 \\
 &\quad 25,384,000 \\
 &\quad 5 \\
 26,720,000 &= 167,000 \times 150 + 167,000 \times 2 \\
 &= 25,384,000 \\
 5 &= 167,000 \times 150 + 167,000 \times 10 \\
 &= 26,720,000
 \end{aligned}$$

(2-6).

2 . - ,
20,000,000 . 5
200,000,000 .

(2-7).

60,000,000 , 5 , 300,000,000
.

(3).

32,288,070 . 1.3% .

(4).

	5		6.6 x 6 mxm	50	
4	5		.		5
가	90%	5	24,720		812,052,000
			.		

(5).

		100	MOD	가	
	가	가	100,000	.	
MOD	50		5		가
	.	10,000,000			.

(6).

			,	,	,
		3		,	
J			1,000,000		.
5	180,000,000				.

2.

1).

			2,040,000,000	
	5		8,945,270,000	.
1,789,054,000		,	5	가
		.		
		900,858,000		
180,172,000		가		
가	408,000,000	.		가
	588,172,000	.		
1,200,882,000		.	1,200,882,000	
		864,635,000	.	(8)

8.

(:)

		2000	2001	2002	2003	2004	
	2040000						2,040,000
		1,789,054	1,789,054	1,789,054	1,789,054	1,789,054	8,945,270
		180,172	180,172	180,172	180,172	180,172	900,858
가		408,000	408,000	408,000	40,8000	408,000	2,040,000
		588,172	588,172	588,172	588,172	588,172	2,940,858
		1,200,882	1,200,882	1,200,882	1,200,882	1,200,882	6,004,412
		864,635	864,635	864,635	864,635	864,835	4,323,177

2).

		6,440,594,000	
	1,288,119,000	.	
가		가	
,	571,200,000		가
	114,240,000	.	
		7,011,794,000	
1,402,359,000	.		
		648,618,000	
	129,724,000	.	
			100%
			.
	4,323,176,000		1,272,635,000
.(9)			

9.

(:)

		2000	2001	2002	2003	2004	
1)		1,288,119	1,288,119	1,288,119	1,288,119	1,288,119	6,440,594
2) 가		114,240	114,240	114,240	114,240	114,240	571,200
		1,402,359	1,402,359	1,402,359	1,402,359	1,402,359	7,011,794
3)		129,724	129,724	129,724	129,724	129,724	648,618
4)	2,040,000						2,040,000
	2,040,000	129,724	129,724	129,724	129,724	129,724	2,688,618
5)	- 2,040,000	1,272,635	1,272,635	1,272,635	1,272,635	1,272,635	4,323,176

3).

5,056,356,000

2000

1,318,961,000 , 2001 1,367,149,000 , 2002
 1,417,266,000 , 2003 1,469,387,000 2004
 1,523,593,000 .(10)

10.

(:)

		2000	2001	2002	2003	2004	
1)		1,339,634	1,393,219	1,448,948	1,506,906	1,567,182	7,255,889
2) 가		114,240	114,240	114,240	114,240	114,240	571,200
		1,453,874	1,507,459	1,563,188	1,621,146	1,681,422	7,827,089
3)		134,913	140,310	145,922	151,759	157,829	730,733
4)	2,040,000						2,040,000
	2,040,000	134,913	140,310	145,922	151,759	157,829	2,770,733
5)	- 2,040,000	1,318,961	1,367,149	1,417,266	1,469,387	1,523,593	5,056,356

4). 가 가
 가 가 , 5
 3,039,275,000 , 2000
 1,197,975,000 , 2001 1,098,861,000 , 2002 1,008,307,000 , 2003
 925,102,000 2004 849,030,000
 .(11)

11. 가 가

(:)

		2000	2001	2002	2003	2004	
가		1,325,322	1,216,053	1,116,180	1,024,373	940,403	5,622,331
가	2040000	127,348	117,192	107,872	99,271	91,374	2,583,056
가	- 2,040,000	1,197,975	1,098,861	1,008,307	925,102	849,030	3,039,275

•

, ,

,

,

.

.

가

가 가

,

.(, 1996)

가

.(Gennip et al, 1990)

Gennip

가

.(Gennip et al, 1990)

Plumlee

2000

,

,

,

,

.(Plumlee et al, 1990)

가

,

1,197,975,000

가 가

.

가

가

.

5

, .
 Straub 135,000 550
 , , , 가
 1,824,000
 15% .
 , , 1%,
 3%, 5% 2,889,000 , 8,667,000
 , 14,445,000
 .(Straub et al, 1990)

, , , Work-Station
 . , ,
 , , .
 , , , ,
 PACS view monitor , .
 , , .
 , , .
 가 가 가
 .(, 1996)

가 21% , 43%

, 13% 가

.(Gur D et al, 1992)

가 , , 가

1

가 1 , 2 , 8 60

.(, 1998) 가 7- 10 % 가

(Cywinski et al, 1989),

2 (84)

.(Saarinen et al, 1990)

가

가 가

.(Tucker et al,

1995)

1 5 ,
가
10 30 .(, 1998)
2.5%
, 35% 가 ,
27%, 20%, , ,
18% . ,
47% 53%
, 가
.(, 1998)
6,458,000 .
, 75%, 67%,
94%가 가 , 86%가
.(, 1996)
-
, ,
, , ,
가 ,
.(Gennip et al, 1990)

가 .

, 5

6,004,412,000 / 3 :

1 .

,

가 5 3,039,275,000

가 가 .

.

가 .

가 가 ,

가 ,

.

가 가 .

•
 -
 600 J , 2001
 2000
 5 .
 H/W
 ,
 ,
 가 가
 PACS 가 가
 , , , , ,
 ,
 ,
 가 가 .
 가 , 5 3,039,275,000
 , 2000 1,197,975,000 , 2001 1,098,861,000
 , 2002 1,008,307,000 , 2003 925,102,000 2004
 849,030,000 .

가 가

가 가

가

가 가

가

가

가

가

가

가

. 1997
. PACS
. 1998
, , , , . (PACS)
. PACS , 1996
. 1998
. 1990
. 가
. 1995
. (IT)
1996
. , 1996
, .
1996;2(1)
1996
, , .
1991:24:473-484
. .
. 1993

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1.

	S/W ()	H/W ()	(%)
PACS	490,000,000	1,550,000,000	42
EMR	210,000,000	449,000,000	13
OCS	532,000,000	1,137,000,000	34
MIS	140,000,000	300,000,000	9
EIS	28,000,000	60,000,000	2
	1,400,000,000	3,469,000,000	100

2. MRI

2000

(:)

	/ C T					
		1	2	3	4	5
1	529/375	6,869	5,313	1,665	2,062	886
2	464/341	6,094	5,032	1,371	1,876	662
3	459/403	7,109	5,561	1,548	2,165	922
4	427/500	6,773	5,521	1,766	2,117	1,031
5	464/519	7,344	5,954	1,838	2,171	1,441
6	420/453	7,201	5,645	1,491	1,863	1,716
7	472/486	7,520	5,800	1,466	1,667	1,695
8	448/479	7,392	5,710	1,451	1,745	1,867
9	426/469	7,237	5,344	1,294	1,447	1,789
10	452/520	7,363	5,214	1,676	1,470	1,686
11	508/482	7,375	5,179	1,657	1,443	1,724
12	413/561	8,184	5,891	1,966	1,630	1,382
	5482 / 5525	86,461	66,164	19,189	21,647	16,801

3.

		()
1	86,461	86,461
2	66,164	132,328
3	19,189	57,567
4	21,647	86,588
5	16,801	84,005
	210,262	446,949

4.

	8" x 10"	10" x 12"	11" x 14"	14' x 14"	14" x 17"
	12 %	17 %	5 %	1 %	65 %

5. MRI

2000

(:)

			CT	MRI
1	16,795	529	375	401
2	15,026	464	341	348
3	17,305	459	403	494
4	17,208	427	500	538
5	18,748	464	519	649
6	17,916	420	453	647
7	18,148	472	486	589
8	18,165	448	479	612
9	17,111	426	469	592
10	17,409	452	520	570
11	17,378	508	482	646
12	19,053	413	561	626
	210,262	5,482	5,588	6,712

- A B S T R A C T -

**Cost – Benefit Analysis of
Picture Archiving and Communication System**

Sa Hoon Park

Graduate School of Health

Science and Management

Yonsei University

(Directed by Professor Seung- Hum Yu, M.D. ,Dr.P.H.)

The purpose of this study was to analyse the cost-benefit of the PACS. For that purpose, taken as the subject of this study was J Hospital with the scale of 600 sickbeds, located in Kyong-do, in which the PACS was configured at the time of its construction.

Cost analysis was based on the year of 2001 and benefit analysis on the test results in 2000, complying with standard of five years, the number of years stipulated in the Corporation Tax Law and its enforcement regulations.

Cost analysis utilized in the present study totalized the initial investment, including expenses incurring from the development of programs, especially required for the configuration of the system and the expenses of the purchase of H/Ws, and working expenses, including labour charges at Medical Information Department and

Development Room, maintenance and repair expenses for the system and management expenses.

Benefit analysis totalized gainings increased and cost reduction owing to the introduction of the PACS. The gainings increased included the augmentation of gainings by PACS medical charges. Cost reduction included expenses for films, film development, fixing solutions, film developing equipments, cassettes, labour charges for film development, maintenance and repair, cost reduction incurring from no making of films, that incurring from the low ratio of re-photographing, and that incurring from no necessity for the space for the storage of films, that incurring from decrease of the quantity of storage media, and that incurring from no necessity for managerial labour charge for film storage.

An analysis was conducted of investment values by taking into account corporation tax effects, inflation effects, discount rates, etc. on the basis of the totalized cost and benefits.

The expenses incurring from configuring the PACS amounted to 2,940,858,000 wons, while the benefit to 8,940,270,000 wons. And net value amounted to 6,044,412,000 wons and the ratio of benefit to cost pointed out 3 : 1.

Net profit after the corporation tax has been 4,323,177,000 wons for five years and 864,635,000 wons a year. The flow of net cash after the corporation tax amounted to 4,323,176,000 wons and 1,272,635,000 wons a year. The flow of net cash in consideration of inflation effects amounted to 5,056,356,000 wons for five years 1,318,961,000 wons in 2000, and expected to be 1,367,149,000 wons in 2001,

1,417,266,000 wons in 2002, 1,469,381,000 wons in 2003, and 1,523,365,000 wons in 2004.

The result of having analysed economic effects based on the net present value low indicated the benefit of 3,039,275,000 wons for five years, 1,197,975,000 wons in 2000, and is expected to be 1,098,861,000 wons in 2001, 1,008,307,000 wons in 2002, 925,102,000 wons in 2003, and 849,030,000 wons in 2004.

In consequence, the results indicated that there was investment value of the PACS aforementioned. The cost of materials increases over time according to price rises in relation to film development in the film business system, while investment of the PACS decreases every year. However the efficiencies of the PACS become more excellent. Thereupon its relative profit is expected to be greater.

However, as the principal factors affecting these results may vary with the scale of a hospital, it is required to thoroughly scrutinize the points in determining the introduction of the PACS. Furthermore, inasmuch as researchers use different variables or conditions in the calculation of cost and cost reduction for cost-benefit analysis of the PACS, consecutive studies are required since its economical efficiencies may be viewed as different.