

## . CRM

### 1.

가.

(factor)

(multiple common factor model)

$m (< p : \quad )$  (common factor

:  $F_1, F_2, F_3, \dots, F_m$ ) ,

$X_i$

(linear combination)

(specific factor)

$$X_i - \mu_i = \sum_{k=1}^m \lambda_{ik} F_k + \varepsilon_i, \quad i = 1, 2, \dots, p \quad (1)$$

$$X_i - \mu_i = \sum_{k=1}^m \lambda_{ik} F_k + \varepsilon_i, \quad i = 1, 2, \dots, p \quad (1)$$

(2)

$$\begin{matrix} X & - & \mu & = & A & F & + & \varepsilon \\ (p \times 1) & & (p \times 1) & & (p \times m) & (m \times 1) & & (p \times 1) \end{matrix} \quad (2)$$

$p$

$m$

(factor pattern)

가

$\lambda_{ik}$

(factor loading)

,

$i$

$X_i$

$k$

$F_k$

$m$ -

가

가 가 , 가  
 . 가  
 .  
 m , p  
 .  
 $F_1, F_2, \dots, F_m$  . 0  
 1 .  
 $\lambda_{ik}$   $F_k$  .  $i$   
 $k$  가 (factor  
 loading) .  
 $\epsilon_i, i= 1,2,3, \dots ,p$  .  
 $\epsilon_i$  0  $\Psi_i$  .

가  
 20).

R- .  
 , (factor loading)  
 (communality) .

20)

,  
 R- , Q .  
 : . , 『  $\Psi$  』 , SPSS , 1998, p.256.

,  
 , (PCA  
 : Principle Component Analysis)  
 , 21) (eigenvalue)  
 22) (communality) 23)  
 가 , 1  
 , 40%  
 , (factor  
 loading)  
 , 가  
 Varimax 24).  
 (orthogonal)

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21) ,  
 (Scree graph test),  
 22) 가 , 가 가  
 , 가 : 『SAS  
 』, , 1997, p.348.  
 23) 가  

$$\sum_{j=1}^m \hat{\lambda}_j / p$$
 가 , m  
 가  
 24) 가  
 (orthogonal rotation) (oblique),  
 (varimax  
 rotation)

가 0 (factor score)  
(multicollinearity)

(reliability)

(internal consistency)

25).

(construct)

CRM

CRM

9가

26).

Cronbach's 27)

가

25) Hair, Joseph F., Rolph E. Anderson, Ronald L. Tahtam and William C. Black, Multivariate Data Analysis with Readings(4th ed), Englewood Cliffs:Prentice Hall, 1995.

26) 4 5

27) 가 가 split-half reliability  
Cronbach's Alpha

$$\alpha = \frac{k}{k-1} (1 - \frac{\sum \sigma_i^2}{\sigma_y^2}), \quad k =$$

$$\sigma_i^2 = , \quad \sigma_y^2 =$$

: , 『SAS』 , 2000, p.240.

Cronbach  
 “ ” 0.62  
 4 Cronbach 0.80 0.85  
 (< -1> )  
 0.82 0.87(< -2> )  
 0.9 가  
 0.5 ,  
 .28)  
 가 ,  
 가 .  
 Cronbach 가  
 가

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28) , 『 , 1999, p.70

< -1>

		Cronbach's			Cronbach's
	Var132	0.835289		Var124	0.789757
	Var135	0.825901		Var125	0.771200
	Var136	0.838201		Var126	0.745648
	Var137	0.838213		Var127	0.760936
	Var138	0.818598		Var128	0.748563
	Var139	0.844346		Var129	0.767098
	Var1310	0.824786			<b>0.795309*</b>
		<b>0.852765*</b>		Var141	0.77232
	Var113	0.812324	IT	Var142	0.739551
	Var114	0.797488		Var143	0.712210
	Var115	0.805037		Var144	0.752561
	Var116	0.795029			<b>0.795779*</b>
	Var117	0.804037		Var123	0.715585
	Var121	0.810680		Var133	0.412558
	Var122	0.807989		Var134	0.406100
		<b>0.827819*</b>			<b>0.624501*</b>

: 1) raw data , \*

2) (deleted variable)

3) (56 ) Cronbach  
0.953668, 0.955007

< -2> ( )

		Cronbach's			Cronbach's
	VAR211	0.853216		Var231	0.832994
	Var212	0.853818		Var232	0.838551
	Var213	0.843327		Var233	0.840456
	Var214	0.841203		Var234	0.837795
	Var215	0.842569		Var235	0.837820
	Var216	0.847484		Var236	0.854278
	Var217	0.859170		Var237	0.842698
	Var218	0.858986			<b>0.860396*</b>
		<b>0.866285*</b>		Var241	0.807591
	Var221	0.773575		Var242	0.821866
	Var222	0.775164		Var243	0.798729
	Var223	0.803911		Var244	0.790571
	Var224	0.775805		Var245	0.800785
	Var225	0.796005			<b>0.836938*</b>
		<b>0.820889*</b>			

:

.

(validity)

가

가

가

(construct validity)

(criterion-related validity)

가 가  
 가 , 가  
 (eigenvalue) 1.0

가  
 29),  
 < -3>

< -3>

				IT	
	1.00000				
	0.33951*	1.00000			
	0.36500*	0.46149*	1.00000		
· IT	0.59139*	0.28178*	0.30840*	1.00000	
	0.47254*	0.29486*	0.40550*	0.36722*	1.00000
	3.15164	3.65751	3.40029	3.46795	3.34970
	0.83317	0.67838	0.77930	0.83643	0.91670

: \* p<0.01

29) , , pp.62-65.



CRM

( ) ( ) < -4> .

< -4> CRM

	(Eigenvalue)	(Difference)	(Proportion)	(Cumulative)
1	9.60241341	6.60428292	0.2895	0.2895
2	2.99813049	0.60934432	0.0904	0.3799
3	2.38878617	0.54215400	0.0720	0.4519
4	1.84663217	0.47053322	0.0557	0.5075
5	1.37609895	0.16968648	0.0415	0.5490

: 1) Eigenvalues of the Covariance Matrix: Total = 33.1713056 Average = 1.07004212

2) ( )  
가 . , = /

3) ( ) .

5

(communality) , <

-5> . 0.4

4 [Var111(0.2076), Var112(0.2866), Var129(0.4237),  
Var1210(0.2983)] 0.4

5

30).

30)

&lt; -5&gt;

(Communality)

	(Communality)	가 (Variable Weights)
<b>Var111</b>	<b>0.20786779*</b>	0.57135342
<b>Var112</b>	<b>0.28663854*</b>	0.89167862
Var113	0.54115705	0.93701578
Var114	0.63024937	1.03036824
Var115	0.50759740	0.81721664
Var116	0.58930006	0.77106648
Var117	0.53869849	1.17015782
Var121	0.47950840	0.89583931
Var122	0.48831150	0.87168819
Var123	0.63730012	1.28058345
Var124	0.63973810	1.48000956
Var125	0.49867674	1.30956480
Var126	0.67203580	1.19215686
Var127	0.64300101	1.04744142
Var128	0.58181856	1.02199904
<b>Var129</b>	<b>0.42372432*</b>	1.05920612
<b>Var1210</b>	<b>0.29839780*</b>	1.07460545
Var131	0.45037678	1.11573410
Var132	0.54717009	1.10009565
Var133	0.60119096	1.36284075
Var134	0.73745145	1.44318508
Var135	0.65554364	1.17254902
Var136	0.42830639	1.13161167
Var137	0.55311870	1.06948828
Var138	0.62397883	1.08632233
Var139	0.57540965	1.29564802
Var1310	0.58080564	1.07230990
Var141	0.43499711	0.90109995
Var142	0.54801331	0.89564802
Var143	0.66705421	1.03529412
Var144	0.58002967	1.06752750

: Total Communality: Weighted = 18.212061 Unweighted = 16.647468

CRM

loading)

-6>

6

< 1> < 2> 7  
< 4> 4 < 5> 3

5  
< 1>

< 1>  
CRM 가 , CRM

, CRM

CRM / , CRM / /

/ , CRM (cross-functional

integration, “ ” )

< 2>

< 2> 가 ,

가 ( ) ,  
, . 가 ,

31) 31

가 4

< -6>

가

31

< -6> CRM

		1	2	3	4	5
V132		0.66056				
V135	CRM	0.61903				
V136	CRM	0.59010				
V137	CRM 가	0.71635				
V138		0.74183				
V139	CRM / / /	0.51902				
V1310	CRM	0.66693				
V113			0.62281			
V114	가		0.75095			
V115			0.68294			
V116	가		0.75094			
V117	, 가		0.67236			
V121			0.50118			
V122			0.55687			
V124	e-mail			0.52970		
V125	/			0.62023		
V126	(TM, CM )			0.78325		
V127	( , )			0.66610		
V128				0.62405		
V129	,			0.56225		
V141	CRM IT				0.48140	
V142	CRM IT				0.66372	
V143					0.76205	
V144					0.62583	
V123	CRM ( )					0.61081
V133	CRM ( )					0.58058
V134	TFT CRM ( , )					0.78810

: 1) (factor loading) .  
 2) principal component analysis, Varimax .

,  
 ( " )  
 " )  
 < 3>  
 < 3> (DM, TM, CM )  
 , ( , ) ,  
 ,  
 , e-mail  
 , ( " )  
 " )  
 < 4> CRM IT  
 < 4>  
 , CRM  
 IT CRM IT  
 CRM IT  
 ( " " )  
 < 5> CRM  
 < 5> CRM ( , )  
 ) , CRM ( ) ,  
 CRM ( ) TFT  
 CRM ( " " )  
 )

## 2. 가

가.

CRM (+)

CRM (2, 3, 4, 5)

CRM (factor score : FS)

CRM (< -1>)

CRM (< -2>)

(stepwise)

가.

SAS

(C. L. Mallows)  $C_p$  (32).

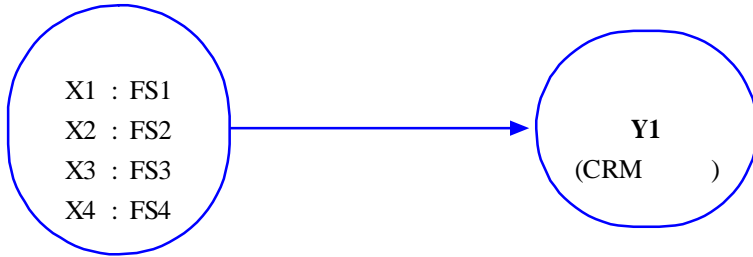
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32)  $C_p = \frac{Y - pX}{C_p \approx p + 1}$  p

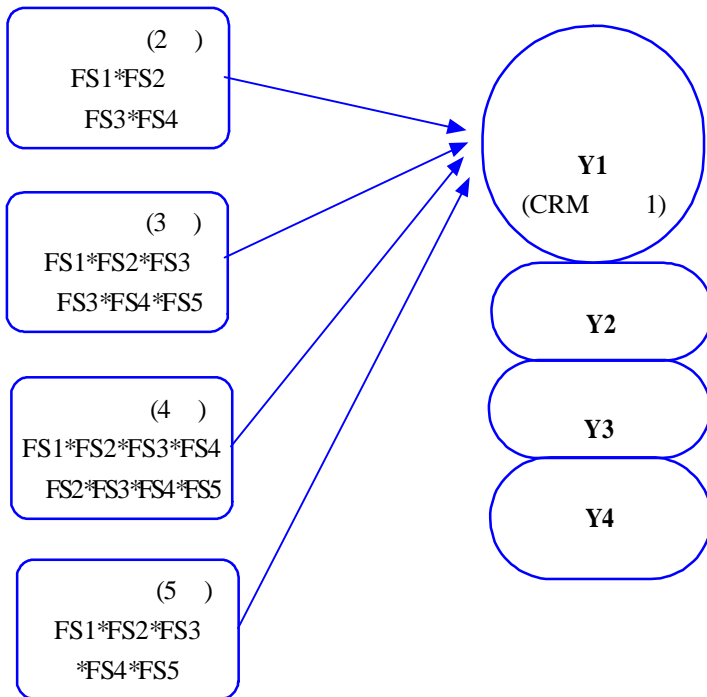
“가”

$C_p$  .  $C_p$  .

< -1> 가



< -2> 가



$$C_p = \frac{SSE_p}{MSE_k} - n + 2(p + 1)$$

$p$  : ( )  
 $MSE_k$  ( =  $SSE_k / (n - k - 1)$  ):

: ,  $\square$

▣ , pp.157-158.

. 가

( )

( )

< -7>, < -8>, <

-9>, < -10>

< -7>

			ANOVA				t (p-value)	
	R <sup>2</sup>	$\bar{R}$				F (p-value)		
	.1091	.1047	1 201	723.12 5904.42	- 29.38	24.62 (.0001)	4.96 (.0001)	1.90304
	.1803	.1762	1 201	1194.93 5432.61	- 27.03	44.21 (.0001)	6.65 (.0001)	2.42811
	.0954	.0909	1 201	631.13 5995.41	- 29.83	21.19 (.0001)	4.60 (.0001)	1.76526
	.0833	.0787	1 201	551.87 6075.67	- 30.23	18.26 (.0001)	4.27 (.0001)	1.65756
	.0063	.0013	1 201	41.59 6585.95	- 32.77	<b>1.27</b> <b>(.2612)</b>	1.13 (.2612)	0.45253

< -8>

			ANOVA				t (p-value)	
	R <sup>2</sup>	$\bar{R}$				F (p-value)		
	.1521	.1479	1 202	409.09 2281.20	- 11.29	36.22 (.0001)	6.22 (.0001)	1.41648
	.0992	.0947	1 202	266.78 2423.51	- 12.00	22.24 (.0001)	4.72 (.0001)	1.14481
	.0288	.0240	1 202	77.43 2612.86	- 12.93	5.99 (.0153)	2.45 (.0153)	0.61648
	.0623	.0576	1 202	167.49 2522.80	- 12.49	13.41 (.0003)	3.66 (.0003)	0.90628
	.0100	.0051	1 202	26.92 2663.37	- 13.19	2.04 (.1546)	-1.43 (.1546)	-0.36413



&lt; -9&gt;

			ANOVA				t (p-value)	
	R <sup>2</sup>	$\bar{R}$				F (p-value)		
	.1103	.1059	1 200	484.59 3908.14	- 19.54	24.80 (.0001)	4.98 (.0001)	1.58897
	.1201	.1157	1 200	527.47 3865.26	- 19.33	27.29 (.0001)	5.22 (.0001)	1.62154
	.0503	.0455	1 200	220.83 4171.91	- 20.86	10.59 (.0013)	3.25 (.0013)	1.04854
	.1199	.1155	1 200	526.70 3866.04	- 19.33	27.51 (.0001)	5.22 (.0001)	1.69342
	.0000	-.0050	1 200	0.08 4392.65	- 21.96	<b>0.00</b> <b>(.9525)</b>	-0.06 (.9525)	-0.01979

&lt; -10&gt;

			ANOVA				t (p-value)	
	R <sup>2</sup>	$\bar{R}$				F (p-value)		
	.0486	.0439	1 201	115.50 2259.22	- 11.24	10.28 (.0016)	3.21 (.0016)	0.75274
	.0561	.0515	1 201	133.33 2241.39	- 11.15	11.96 (.0007)	3.46 (.0007)	0.80942
	.1206	.1162	1 201	286.31 2088.41	- 10.39	27.56 (.0001)	5.25 (.0001)	1.18549
	.0503	.0456	1 201	119.55 2255.17	- 11.22	10.66 (.0013)	3.26 (.0013)	0.76687
	.0007	-.0042	1 201	1.78 2372.94	- 11.81	<b>0.15</b> <b>(.6985)</b>	0.39 (.6985)	0.09353

, , F (F<sub>0</sub>)

0.0001 &lt; p = 0.01

F

1.27,

2.04, 0.00, 0.15

, t F  
p<0.01

(-) (+) 가 (-) 가 positive

(R<sup>2</sup>)<sup>33)</sup>

( 5 ) 4 ( positive ) 4

<가 >

. 가

1)

33) R<sup>2</sup>( ) 가 R<sup>2</sup> (coefficient)

(statistical significance) . Damodar N. Gujarati, Basic Econometrics, McGRAW-HILL BOOK COMPANY, 1988. p186.

4 ( ) 2  
1

(stepwise method) . 2

< -11>

< -11> 2

\*

		R <sup>2</sup>	$\bar{R}$	F (p-value)	t (p-value)		C <sub>p</sub>
	1 FS2	0.2920	0.2848	40.42 (.0001)	5.66 (.0001)	2.45710	107.662
	2 FS1				7.11 (.0001)	2.01635	67.0863
	1 FS1	0.2329	0.2251	29.76 (.0001)	5.91 (.0001)	1.37640	67.9276
	2 FS2				5.10 (.0001)	1.15192	39.1547
	1 FS2	0.2371	0.2293	30.46 (.0001)	5.54 (.0001)	1.16993	83.8079
	2 FS4				5.44 (.0001)	1.67525	49.2006
	1 FS3	0.2051	0.1969	25.27 (.0001)	5.69 (.0001)	1.23773	43.0124
	2 FS4				4.45 (.0001)	1.01938	23.2157

: \* FS (factor score) . FS1 , FS2 , FS3 , FS4 , FS5

가)

(FS2) ,

(FS1) .

F 40.42 (p<0.0001)

, 2

(p<0.0001) , 가

positive(+) 가

. Cp 67.0863

가

. 2 28.48% 1

(17.62%, 10.47%) 가

가 <가 > .

)

(FS2) (FS1)

F 29.76(p<0.0001) 가 .

, 2

(p<0.0001) ,

positive(+) 2

22.51% 1 (14.79%, 9.47%) 가

가 <가 >

. Cp 39.1547

가

. )

2

(FS2), (FS4)

가 .

F 30.46(p<0.0001)

, 2

(p<0.0001)

positive(+) 2

22.93% 1 (11.57%, 11.55%)

가 가 <가 >

C<sub>p</sub> 49.2006

가

)

CRM 가 , 가

(FS3) (FS4)

F 25.27(p<0.0001)

, 2

(p<0.0001)

1.23773, 1.01938 positive(+) 2

19.69% 1 (11.62%, 4.56%)

가 가

<가 > C<sub>p</sub> 23.2157

가

.

2)

5 3

, 3

, ,

< -12>

< -12> 3

		R <sup>2</sup>	$\bar{R}$	F (p-value)	t (p-value)		C <sub>p</sub>	
	1 FS2	0.3834	0.3739	40.42 (.0001)	7.63 (.0001)	2.46683	107.662	
	2 FS1				5.97 (.0001)			1.99019
	3 FS3				5.38 (.0001)			
	1 FS1	0.3185	0.3080	30.38 (.0001)	5.91 (.0001)	1.30465	67.9276	
	2 FS2				5.34 (.0001)			1.14038
	3 FS4				4.95 (.0001)			
	1 FS2	0.3369	0.3267	33.02 (.0001)	6.06 (.0001)	1.65567	83.8079	
	2 FS4				5.45 (.0001)			1.57259
	3 FS1				5.42 (.0001)			
	1 FS3	0.2577	0.2463	22.57 (.0001)	5.89 (.0001)	1.24216	43.0124	
	2 FS4				4.55 (.0001)			1.01180
	3 FS2				3.72 (0.0003)			

가)

(FS2), (FS1), (FS3)

가

F 40.42 (p<0.0001)

(p<0.0001) , 3 가  
 2.46638, 1.99019, 1.73513 positive(+)  
 가 , Cp 3  
 35.5136 가  
 3 37.39% 2  
 28.48% 가  
 가 <가 >  
 ) (FS1),  
 (FS2), (FS4)  
 F 30.38(p<0.0001)  
 , 3  
 (p<0.0001)  
 1.30465, 1.14048, 1.11513 positive(+)  
 3 30.80%  
 2 (22.51%) 가  
 가 <가 > Cp  
 15.2497 가  
 ) (FS2),  
 (FS4), (FS1)  
 F (33.02) p<0.0001

3 (p<0.0001)

positive(+)

3 32.67 2

(22.93) 가 가

<가 > . Cp 19.5205

가

)

CRM 가 ,

(FS2) (FS3), (FS4),

F 22.57(p<0.0001)

(p<0.0001)

1.24216, 1.01180, 0.78481 CRM

positive(+)

3 ( :  $\bar{R}$ )

24.63 2 19.69% 가 , (

) 가 가 <가

> . Cp 10.8749

3 가

3)

5 4

, 4

< -13>



&lt; -13&gt; 4

		$R^2$	$\bar{R}$	F (p-value)	t (p-value)		$C_p$	
	1	FS2	0.4672	0.4563	42.54 (.0001)	8.13 (.0001)	2.44897	107.662
	2	FS1				6.03 (.0001)	1.87632	67.0863
	3	FS3				5.95 (.0001)	1.79095	35.5136
	4	FS4				5.53 (.0001)	1.75662	6.7174
	1	FS1	0.3533	0.3400	26.50 (.0001)	6.00 (.0001)	1.29296	67.9276
	2	FS2				5.48 (.0001)	1.14391	39.1547
	3	FS4				5.17 (.0001)	1.13901	15.2497
	4	FS3				3.23 (.0001)	0.67335	6.7201
	1	FS2	0.3920	0.3794	31.27 (.0001)	6.33 (.0001)	1.66143	83.8079
	2	FS4				5.82 (.0001)	1.61157	49.2006
	3	FS1				5.57 (.0001)	1.50979	19.5205
	4	FS3				4.19 (.0001)	1.09902	4.0321
	1	FS3	0.2893	0.2747	19.74 (.0001)	5.96 (.0001)	1.23196	43.0124
	2	FS4				4.44 (.0001)	0.96931	23.2157
	3	FS2				3.86 (0.0002)	0.79942	10.8749
	4	FS1				2.94 (0.0037)	0.62756	4.2855

CRM ( . . . ) (FS1),  
 (FS2), (FS3), (FS4)  
 .<sup>34)</sup>

가)  
 F 42.54 (p<0.0001)  
 . 4  
 (p<0.0001) , 가 2.44897,  
 1.87632, 1.79095, 1.75662 positive(+)  
 4  
 . , Cp 4 6.6174  
 4 45.63% 3  
 37.39% 가  
 가 <가 > .  
 )  
 F 26.50(p<0.0001)  
 , 4  
 (p<0.0001) . 4  
 가 positive(+)  
 4 34.00% 3  
 가  
 가 <가 > . Cp

---

34) 5 가 가 가 4  
 (CRM )  
 가 .

4 6.7201

)

F (31.27) p<0.0001

4 (p<0.0001)

, positive(+)

4 ( :  $\bar{R}$ )

37.94 3 (32.67%) 가

4.0321 <가 > . C<sub>p</sub>

)

F 19.74(p<0.0001)

4

(p<0.01)

1.23196, 0.96931, 0.79942, 0.62756 CRM

positive(+) 가

4 ( :  $\bar{R}$ )

27.27 3 가 , ( )

가 가 <가 >

. C<sub>p</sub> 4.2855

4

4)

CRM (FS1), (FS2), (FS3), (FS4), (FS5)

(+) .35

가)

F 34.87 (p<0.0001)

t (p<0.0001), (FS5)

p 0.1009 5%

가

5 가 positive(+)

, Cp 4 6.6174 5

6.0000 가

5 ( :  $\bar{R}$ )

46.1% 4 (45.63%) 가

, 가 가

<가 >

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35) p 0.10 90%

&lt; -14&gt; 5

		$R^2$	$\bar{R}$	F (p-value)	t (p-value)		$C_p$
1	FS2	0.4746	0.4610	34.87 (.0001)	8.18 (.0001)	2.45251	107.662
2	FS1				6.07 (.0001)	1.88102	67.0863
3	FS3				6.00 (.0001)	1.79894	35.5136
4	FS4				5.58 (.0001)	1.76733	6.7174
5	FS5				1.65 (0.1009)	0.49535	6.0000
1	FS1	0.3623	0.3458	21.93 (.0001)	6.01 (.0001)	1.28970	67.9276
2	FS2				5.50 (.0001)	1.14145	39.1547
3	FS4				5.16 (.0001)	1.13159	15.2497
4	FS3				3.22 (0.0015)	0.66781	6.7201
5	FS5				-1.65 (0.1007)	-0.34322	6.0000
1	FS2	0.3920	0.3794	31.27 (.0001)	6.33 (.0001)	1.66143	83.8079
2	FS4				5.82 (.0001)	1.61157	49.2006
3	FS1				5.57 (.0001)	1.50979	19.5205
4	FS3				4.19 (.0001)	1.09902	4.0321
5							
1	FS3	0.2893	0.2747	19.74 (.0001)	5.96 (.0001)	1.23196	43.0124
2	FS4				4.44 (.0001)	0.96931	23.2157
3	FS2				3.86 (0.0002)	0.79942	10.8749
4	FS1				2.94 (0.0037)	0.62756	4.2855
5							

)

F 21.93(p<0.0001)

, 4

(FS5) t

p 0.1007 5% 가

4 가 positive(+)

negative(-)

, Cp 4 6.7201 5

6.0000 가

5 ( :  $\bar{R}$ )

34.58 4 (34.00%)

가 가 <가 >

)

4 4

5

, <가 >

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5

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가,

(factor score)

가

(multicollinearity)

가 36).

37)

(nonconstant variance)

(nonlinearity)

< 3> < 6> ( )

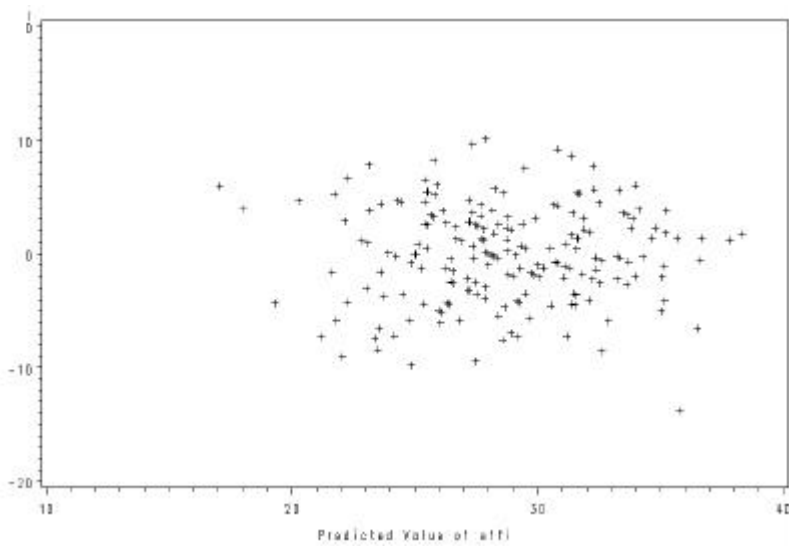
4

36) (Variance Inflation

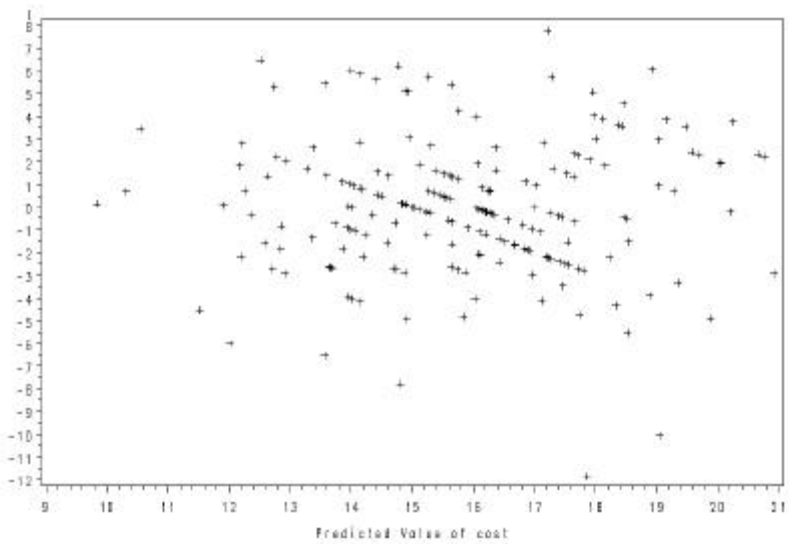
Factor : VIF)

37) (Cook) D , DEFITS, DFBETAS

< -3>

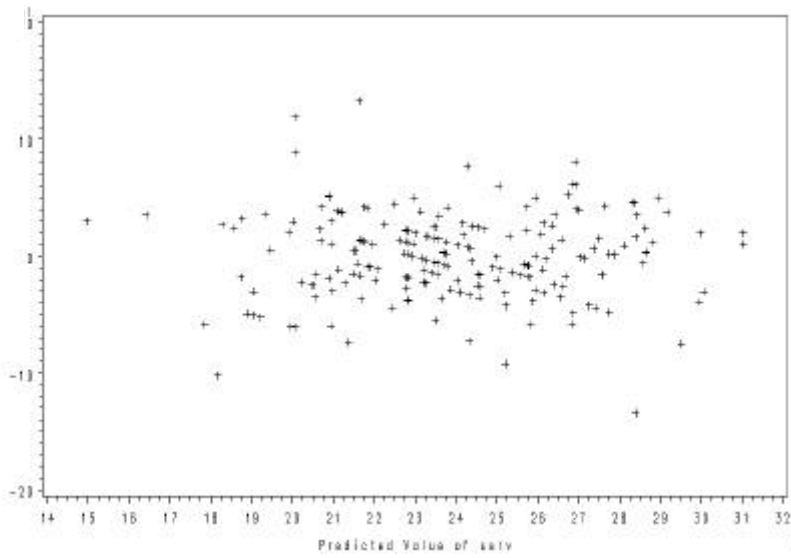


< -4>

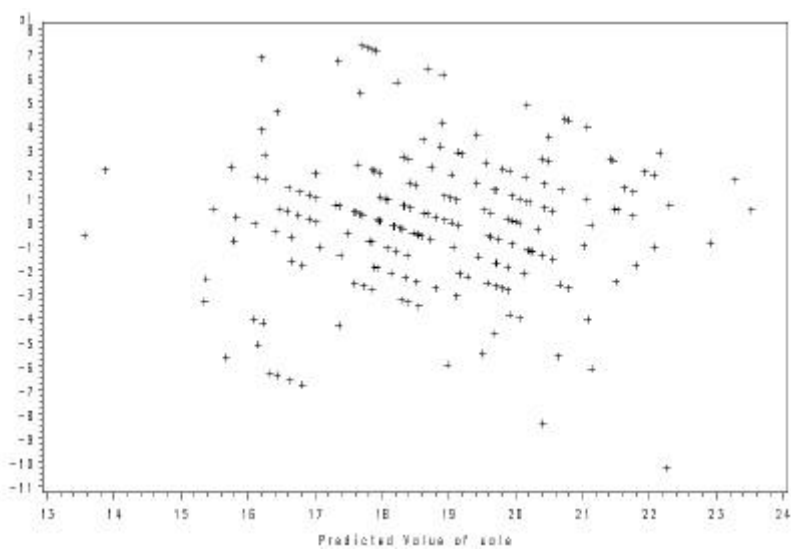




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CRM 가  
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	가	가			
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(competitive advantage)

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4가 . CRM

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.38) CRM

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CRM CRM

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“ ” “ ” “ (front-door

competition)” 가

, “ ” 가 “ ”

“ (back-office competition)”

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38)

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39).

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39) 'Stepwise

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< -16> CRM

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40) CRM  
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