

السنة (4) العدد (7) كانون الثاني 2007



دراسات إقليمية

**دور كفاءة البحث والتطوير وتقنيتهما في
النمو الاقتصادي لشركة الكندي العامة**

د. نوفل قاسم علي الشموان

مستخلص البحث :





دور كفاءة البحث والتطوير وتقنيتهما في النمو الإقتصادي لشركة الكندي العامة

د. نوفل قاسم علي الشهران*

مدخل

[2001]

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(

(1988-2000).

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$$\dots (\dots) \dots -1$$

$$\dots (\dots) \dots -2$$

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$$X = f(L, K, D, L_D, K_D) \quad (1)$$

$$X = f(L, K, R, L_R, K_R) \quad (2)$$

$$X = f(L, K, R\&D, L_{R\&D}, K_{R\&D}) \quad (3)$$

$$(X=va, va'/va, \text{ or } (X)$$

$$(1) \quad (va) \quad : \quad A'/A$$

$$(va'/va)$$

$$\dots (A'/A) \text{ في المعادلتين (3) و (4).} \quad (2)$$

(Z)

$$\log va_t = \alpha_0 + \alpha_1 \log L_t + \alpha_2 \log k_t + \alpha_3 \log Z_t + \alpha_4 \log L_{z,t} + \alpha_5 \log L_{z,t} + e_t \dots (1)$$

$$(va/va)_t = \beta_0 + \beta_1 (\dot{L}/L)_t + \beta_2 (\dot{K}/K)_t + \beta_3 (\dot{Z}/Z)_t + \beta_4 (\dot{L}/L)_{z,t} + \beta_5 (\dot{K}/K)_{z,t} + e_0 \dots (2)$$

$$(A/A)_t = \lambda_0 + \lambda_1 (\dot{Z}/Z)_t + \lambda_2 (\dot{L}/L)_{z,t} + \lambda_3 (\dot{k}/k)_{z,t} \dots (3)$$

$$(A/A)_t = \gamma_0 + \rho_1 (z/va)_t + \rho_2 (L_z/va)_t + \rho_3 (k_z/va)_t \dots (4)$$



.Z = R, D, Or R&D :

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APPLIED RESEARCHES (R) PIVOT

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(log va)

(KR)

(R)

(K_R)

(L_R)

.(1-)





Table 1: Production Function And Technological Change With The Applied
KR
Researches in the Research Company.

$$\ln y = -29.776 + 0.562 \ln k + 1.37 \ln L_{KR} - 0.330 \ln k_{KR} + 2.61 \ln L$$

(4.57) (9.19) (-5.05) (3.83) SE = 0.213 R² = 98.7%

1 - CAPITAL 2 - EFFICIENCY 3 - TECHNIQUE 4 - LABOR

$$va/va = 0.0655 + 1.166 (\dot{k}/k) + 2.83 (\dot{L}/L) - 0.134 (\dot{k}/k)_{KR} - 0.0204 (\dot{K}R/KR) + 0.246 (\dot{L}/L)_{KR}$$

(24.23) (10.86) (-7.38) (-4.68) (4.49)

SE = 0.0511 R² = 99.3%

$$\dot{A}/A = -0.02503 - 0.156 (\dot{k}/k)_{KR} + 0.269 (\dot{L}/L)_{KR}$$

(-5.50) (2.95)

SE = 0.088 R² = 64.03%

$$\dot{A}/A = -0.08031 - 0.48 R/va + 0.00291 L_R/va - 0.00000 K_R/va$$

(-1.73) (3.15) (-2.46)

SE = 0.117 R² = 40.4%

Table 5: Production Function And Technological Change With The Development
KD
Activities in the Research Company.

$$\ln y_i = 3.966 + 0.683 \ln K_i - 0.0317 \ln (K_{kd})_i + 0.203 \ln Kd_i$$

(23.13) (-7.81) (5.27) S.E = 0.203 R² = 98.7%

$$(va/va)_i = 0.03132 + 1.242 (\dot{k}/k)_i + 2.190 (\dot{L}/L)_i - 0.01521 (\dot{L}/L)_{kd,i}$$

(14.18) (5.83) (-5.23)

$$+ 0.00003 (\dot{k}/k)_{kd,i} - 0.170 (\dot{K}d/Kd)$$

(4.16) (-274)

S.E = 0.0468 R² = 99.3%

$$(\dot{A}/A)_i = -0.08283 - 0.00298 (\dot{L}/L)_{kd,i}$$

(-3.36)

S.E = 0.0956 R² = 46.3%

$$(\dot{A}/A)_i = -0.04787 + 0.21 (\dot{d}/va)_i - 0.00000 (\dot{L}_d/va)_i + 0.00000 (\dot{k}_d/va)_i$$

(0.48) (-0.57) (0.05)

S.E = 0.148 R² = 3.8%



(1-)

Table 9 : Production Function And Technological Change With The Research and Development Activities in the Research Company .

$$\begin{aligned} \text{Log } y &= -30.29 - 0.314 \text{ Log } k_{KR \& D} + 0.579 \text{ Log } k + 0.093 \text{ Log } KR \& D + 0.96 \text{ Log } L_{KR \& D} \\ &\quad (-9.53) \quad (7.95) \quad (1.77) \quad (5.58) \\ &\quad + 2.71 \text{ Log } L \\ &\quad (4.61) \quad \dots \quad \text{S.E} = 0.0203 \quad R^2 = 89.8\% \\ \dot{y}_a / y_a &= 0.068403 + 1.266 (k/k) + 2.92 (\dot{L}/L) - 0.0556 (k/k)_{KR \& D} - 0.240 (KR \& D / KR \& D) \\ &\quad (17.65) \quad (0.14) \quad (-7.58) \quad (-4.01) \quad \dots = 0.0583 \quad = 98.97\% \\ &= 0.07167 + 2.86 (\dot{L}/L) + 1.286 (k/k) - 0.251 (KR \& D / KR \& D) + 0.068 (\dot{L}/L)_{KR \& D} \\ &\quad (9.73) \quad (17.28) \quad (-4.13) \quad (1.02) \\ &\quad - 0.0609 (k/k)_{KR \& D} \\ &\quad (-6.79) \dots = 0.0582 \quad = 99.4\% \\ \dot{A} / A &= -0.04146 - 0.054 (k/k)_{KR \& D} \\ &\quad (-5.40) \quad \dots = 0.088 \quad = 61.81\% \\ &= -0.03997 - 0.053 (k/k)_{KR \& D} - 0.040 (\dot{L}/L)_{KR \& D} - 0.023 (KR \& D / KR \& D) \\ &\quad (-3.82) \quad (-0.40) \quad (-0.49) \quad \dots = 0.0922 \quad = 62.76\% \\ &= -0.06578 + 0.00071 L_{KR \& D} / y_a - 0.00000 k_{KR \& D} / y_a - 14.0 KR \& D / y_a \\ &\quad (2.31) \quad (-1.99) \quad (-0.46) \quad \dots = 0.129 \quad = 26.53\% \end{aligned}$$

(2) (1) :

$$\begin{aligned} \dots [(1) - \dots] &\quad (4) \quad (3) \\ (3) \quad (2) \quad (1) & \\ \dots [(2) - \dots] &\quad (5) \quad (4) \end{aligned}$$

$$[(4) - \dots] \quad \dots [(3) - \dots]$$

(R)

$$\dots (k_R) \quad \dots (L_R)$$



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[(R²)

(SE)

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(STEPWISE

REGRESSION)

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(%11,89)

[(LOGK)

[α₁ (t_α)=)

[0.856(12.47)].





الجدول-2: تقديرات آثار تغيرات

للشركة البحثية (1988-2000)*

Step	1	2	3	4
Constant	2.562	-2.387	10.662	-29.776
Log k	0.856	1.067	0.379	0.562
T-Ratio	12.47	14.02	2.49	4.57
logL.K _R		1.07	1.41	137
T-Ratio		3.83	7.05	9.19
logk _{KR}			-0.403	-0.330
T-Ratio			-4.81	-5.05
Log L				2.61
T-Ratio				3.83
S.E.	0.560	0.427	0.286	0.213
R ²	89.11	94.00	97.45	98.67

- 2

(L_{KR})[α₂ (t_α)=1.07(3.83)]

(0,94)

(%94)





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$$(k_{KR})$$
$$(R^2=97.45\%)$$
$$.[\alpha_3 (t_\alpha) = - 0.403(-4.81)].$$

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(Log L)

(%67,98)

$$.[\alpha_4 (t_\alpha) = 2.61(3.83)]$$

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((R)

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-) (2)

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* () ($R^2 = 96.49\%$)

$$[\beta_3(t_\alpha) = -0.091(-2.85)]$$

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 (R^2)
 $[\beta_4(t_\alpha) = - () (98,2\%)$

$$0.204(-4.68)]$$

 $(dK/K)_R$

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 $[\beta_5(t_\alpha) =$ $(\%99,26)$

$$.0.24(4.49)]$$

6,55)

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 $.(3-) (4,5)$
 $(\%89)$
 $(7,36$ $(\%10)$

♣



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(2000-1988)

Step	1	2	3	4	5
Constant	0.12555	0.05138	0.01672	0.07363	0.06550
dk/k	1.225	1.114	1.008	1.184	1.166
T-Ratio	12.38	14.42	13.49	16.35	24.23
dL/L		2.43	2.71	3.05	2.83
T-Ratio		4.10	5.34	7.90	10.86
(dk/k) _{KR}			-0.091	-0.093	-0.134
T-Ratio			-2.85	-3.93	-7.38
dKR/KR				-0.242	-0.204
T-Ratio				-3.77	-4.68
(dL/L) _{KR}					0.246
T-Ratio					4.49
S.E	0.170	0.124	0.104	0.0772	0.0511
R ²	89.49	94.71	96.49	98.20	99.26

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$$\begin{aligned}
 & (R) \\
 & (K_R) \quad (L_R) \\
 & :[(4- \quad) \quad] \quad (R) \\
 & -1
 \end{aligned}$$

$$\begin{aligned}
 &) \quad (%45,67) \\
 & (\quad) \quad (\\
 & [\lambda_1(t_\alpha)=0.109(-3.89)] \\
 & .(t_\alpha)
 \end{aligned}$$

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(2000 - 1988)

Step	1	2
Constant	-0.01961	-0.02503
(dk/k) _{KR}	0.109	-0.156
T-Ratio	-3.89	-5.50
(dL/L) _{KR}		0.269
T-Ratio		2.95
S.E	0.105	0.0879
R ²	45.67	64.03

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$$\begin{aligned}
 & (%64,03) \\
 & .[\lambda_2(t_\alpha)=0.269(64.03)] \quad (\quad)
 \end{aligned}$$





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(- ()
(4-)

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(0.025) 0.020

) (%7,36-6,55) ()

) (

(

(%7)

(%2-)

(%9)

DEVELOPMENT (D) PIVOT

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.(1998-1988)





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(Log va)

(D)

(K_D)

(L_D)

(5-)

1-2

Stepwise Regression

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(6-)

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(log k_{Kd})
(R^2) (%96,64)

(-0.0385)

(7) (%100)

:6-

(2000 - 1988)

Step	1	2	3
Constant	2.562	5.489	3.966
Log k_i	0.856	0.743	0.683
T-Ratio	12.47	17.25	23.13
Log $k_{Kd,i}$		-0.0385	-0.0317
T-Ratio		-6.34	-7.81
Log Kd_i			0.203
T-Ratio			5.27
S.E	0.560	0.320	0.203
R^2	89.11	96.64	98.72

(log Kd)

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(%99)

(%98,7)

(0.203)

($t^*=5.27$)

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(2)

(1) :

(5)

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($R^2 =$

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($e_L =$

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%94.32)

.1.93)

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(0.0026)





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(2000 - 1988)

Step	1	2	3	4	5
Constant	0.10415	0.03034	-0.02372	-0.01395	0.03132
dk/k	1.115	1.050	0.993	1.023	1.242
T-Ratio	11.44	12.48	14.76	21.91	14.18
dL/L		1.93	2.24	1.67	2.19
T-Ratio		2.66	3.95	4.00	5.83
(dL/L) _{Kd}			-0.00260	-0.01610	-0.01521
T-Ratio			-3.05	-4.34	-5.23
(dk/k) _{Kd}				0.00003	0.00003
T-Ratio				3.68	4.16
dKd/Kd					-0.170
T-Ratio					-2.74
S.E	0.139	0.114	0.0880	0.0601	0.0468
R ²	90.96	94.32	96.92	98.69	99.29

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$$[\beta_4(t^*)=0.00003(3.681)]$$

.(%98,69)



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 (Kd) ()
 $[\beta_5(t^*) = -0.170(2.74)]$

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 (-0.00298) ()
 .(-0.003)

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(2000 - 1988)

Step	1
Constant	-0.08283
(dL/L) _{Kd}	-0.00298
T-Ratio	-3.36
S.E	0.0956
R ²	46.52

[(8-)]

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RESEARCH AND DEVELOPMENT (R&D) PIVOT

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(D)

(R)

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(K_{R&D})

(L_{R&D})

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(9-)

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1 - 3

Stepwise Regression

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(R&D)

(R)

(R)

(D)



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دراسات إقليمية

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(1988 - 2000)





(R)

(D)

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(R)

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(R)

(D), (R)

(R&D)

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(2000-1988)

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(R&D)





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(2000 -1988)

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Step	1	2	3	4	5	6
Constant	19.643	13.151	10.193	8.418	-19.459	-30.929
Log $k_{Kr&d}$	-0.433	-0.283	-0.248	-0.299	-0.300	-0.314
T-Ratio	-16.45	-5.20	-5.75	-8.15	-9.38	-9.53
Log k		0.333	0.343	0.430	0.530	0.579
T-Ratio		3.03	4.03	6.07	7.17	7.95
Log $Kr&d$			0.217	0.172	0.093	
T-Ratio			3.63	3.56	1.77	
Log $L_{Kr&d}$				0.66	0.83	0.96
T-Ratio				3.46	4.61	5.58
Log L					1.89	2.71
T-Ratio					2.47	4.16
S.E	0.435	0.363	0.281	0.219	0.191	0.203
R^2	93.44	95.65	97.55	98.60	99.00	98.80

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 $(k_{KR&D})$

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(%44.93)

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(-0.314) , (-0.248) , (-0.433) ()
(1989)

(248)

(433)

(TECHNOLOGY)
(19.643)

.[(43,,2)]
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(0.333) ()
(T-RATIO=3.03)
(R²=95.65%).





$$\begin{aligned} & (KR\&D) \quad (\quad) \quad -3 \\ (0.217) \quad & (\quad) \\ & (0.07) \\ & (\quad) \quad (Griliches) \end{aligned}$$

$$\begin{aligned} &) \quad : \\ & (k) \quad (k_{KR\&D}) \quad (\quad) \\ & \quad (\%97,55) \quad (KR\&D) \quad (\quad) \end{aligned}$$

$$\begin{aligned} & (L_{KR\&D}) \quad -4 \\ (T- \quad & (0.66) \end{aligned}$$

$$\begin{aligned} & RAI0 = 3.46) \\ & .(R^2=98.6\%) \end{aligned}$$

$$(1.89)$$

$$\begin{aligned} & (T-RATIO=4.16) \\ & (R^2=99.0\%). \end{aligned}$$

$$\begin{aligned} & : \\ k \quad - \quad k_{KR\&D} \quad - \\ & - \quad KR\&D \quad (\quad) \quad - \\ & \quad .L \quad - \quad L_{KR\&D} \end{aligned}$$



(KR&D) ()
 (%99) (%0,2) (R²)
 .(%98.9)

(L_{KR&D})

(L)

(%1,02)

.(%99)

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 : (11-)
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 (2000 - 1988)

Step	1	2	3	4
Constant	0.125551	0.051385	0.003167	0.068403
dk/k	1.225	1.114	1.024	1.266
T-Ratio	12.38	14.42	19.05	17.65
dL/L		2.43	2.65	2.92
T-Ratio		4.10	6.80	10.14
(dk/k) _{Kr&d}			-0.0482	-0.0556
T-Ratio			-4.88	-7.58
dKr&d/ Kr&d				-0.240
T-Ratio				-4.01
S.E	0.170	0.124	0.0812	0.0583
R ²	89.49	94.71	97.87	98.97



			-1
	(%89,49)	(1.225)	
		.	-2
		(2.43)	
		.(%94,71)	-3
(-0.0482)		()	
.(%97,87)		(%5)	-4
	()		
	(-0.24)		
	(%99)		
()			
	(-0.248) =	}	
	.{5.64655=		
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		.	
		.(/11-)	





(2000 -1988)

Step	1	2
Constant	0.07167	0.06840
dL/L	2.86	2.92
T-Ratio	9.73	10.14
dk/k	1.286	1.266
T-Ratio	17.28	17.65
dKr&d/Kr&d	-0.251	-0.240
T-Ratio	-4.13	-4.01
(dL/L) _{Kr&d}	0.068	
T-Ratio	1.02	
(dk/k) _{r&d}	-0.0609	-0.0556
T-Ratio	-6.79	-7.58
S.E	0.0582	0.0583
R ²	99.04	98.97

(0.07)

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(%99,04)

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(%61,81)

(-0.054)

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(t*=-5.40).

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(12-)

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 $(\alpha_0 = -0.042)$

.2000 - 1988

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(2000-1988)

Step	1
Constant	-0.04146
$d(k^k)_{Kr\&d}$	-0.054
T-Ratio	-5.40
S.E	0.0880
R^2	61.81





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(2000-1988)

Step	1	2	3
Constant	-0.03997	-0.04234	-0.04146
dKr&d/Kr&d	-0.023	-0.023	
T-Ratio	-0.49	-0.51	
(dL/L) _{Kr&d}	-0.04		
T-Ratio	-0.40		
(dk/k) _{Kr&d}	-0.053	-0.057	-0.054
T-Ratio	-3.82	-5.07	-5.40
S.e	0.0922	0.0899	0.0880
R ²	62.76	62.38	61.81





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(Disembodied Technology " -)

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..(D)

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(R, D, R&D)

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(R&D)

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(D).

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Table -13 : abbreviative Estimates

$$\text{(Table - 4): } \dot{\text{TFP}}/\text{TFP} = -0.025 - 0.156 (\dot{k}/k)_{\text{KR}} + 0.269 (\dot{L}/L)_{\text{KR}}$$

$$(-5.50) \quad (2.95) \quad R^2 = 64.03\%$$

$$\text{(Table - 9): } \dot{\text{TFP}}/\text{TFP} = -0.083 - 0.003 (\dot{L}/L)_{\text{KD}}$$

$$(-3.36) \quad R^2 = 46.52\%$$

$$\text{(Table - 11): } \dot{\text{TFP}}/\text{TFP} = -0.0415 - 0.054 (\dot{k}/k)_{\text{KR\&D}}$$

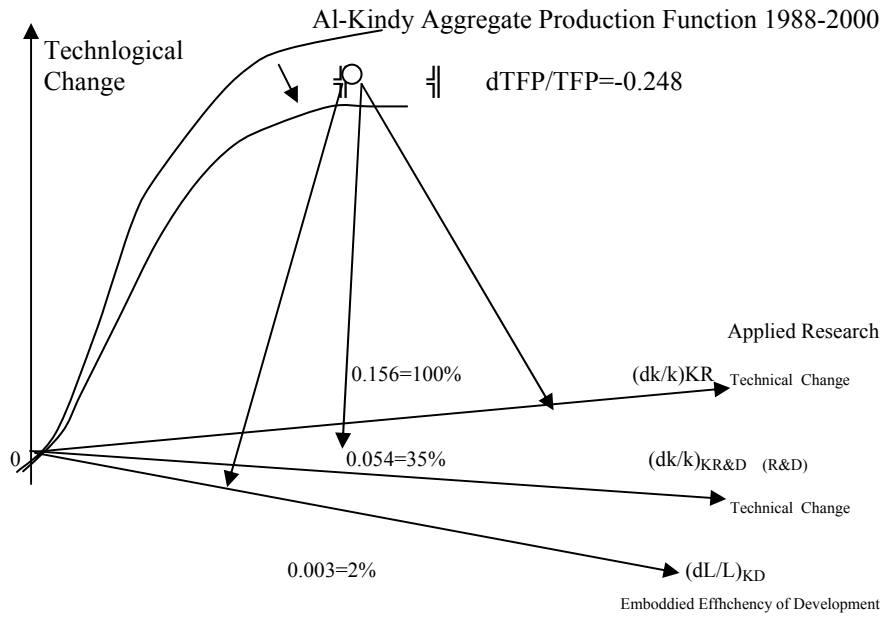
$$(-5.40) \quad R^2 = 61.81\%$$



($dTFP/TFP$)
(dva/va). (At)
(1998-1995)
(46.52%) .[(18-)]
(64.03%)

(0.156)
(dk/k)_{KR}
(%100)
(2%) (λ_1 of (dL/L)_{KD}=0.003)
(λ_1 of
(%35) (dk/k)_{KR&D}=0.054)
(3-)





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(2000-1988)

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(stepwise)

(F*=0.4)

(1999-1998)





(14-)
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(2000-1988)

Step	1	2
Constant	-0.06578	-0.07575
r&d/va T-Ratio	-14 -0.46	
L _{Kr&d/va} T-Ratio	0.00071 2.31	0.00065 2.41
k _{Kr&d/va} T-Ratio	-0.00000 -1.99	-0.00000 -2.06
S.E	0.129	0.126
R ²	26.53	25.56

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$$(\rho_1=14.0)$$

$$\begin{pmatrix} () & () \\ () & () \end{pmatrix} \quad ()$$

($\rho_2=0.00071$)

$$\begin{pmatrix} () \\ () \end{pmatrix} \quad ()$$

($\rho_3=0.00000$)

$$\begin{pmatrix} () \\ - \end{pmatrix} \quad () \quad (27\%)$$

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$$\begin{pmatrix} () \\ 5 - \end{pmatrix} \quad (1) \quad () \quad ()$$

: (13 9)

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$$t^* \quad () \quad () \quad ()$$

(3,77%) (40%)

$$\begin{pmatrix} - \\ (D) & (R) \\ () & () \end{pmatrix} \quad ()$$

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-3 ())

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الخاتمة

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-1 (15-)

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(-0.025) (-0.02)





$$Eq.1, (Table 5) : TFP/TFP = -0.08 - 0.48 R/va + 0.0029 L_R/va - 0.0000 k_R/va$$

$$- (1.73) \quad (3.15) \quad (-2.46) \quad \dots R^2 = 40.44 \%$$

$$Eq.1, (Table 9) : TFP/TFP = -0.048 - 0.21 D/va - 0.0000 L_D/va + 0.0000 k_D/va$$

$$(-0.48) \quad (-0.57) \quad (0.05) \quad \dots R^2 = 3.77 \%$$

$$Eq.1, (Table 13) : TFP/TFP = -0.066 - 14.0 R \& D/va - 0.00071 L_{R\&D}/va - 0.0000 k_{R\&D}/va$$

$$(-0.46) \quad (-2.31) \quad (-1.99) \quad \dots R^2 = 26.0 \%$$

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(16-) -2
(6) :6

:7

() (L,K)
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() -17) -3

:8

()
()

:9

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(0.003) :10

(0.054)

(0.156) ()

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		R			
1.37 (9.19) **	-0.330 (-5.05) ***		0.562 (4.57) *	2.61 (3.83) ****	
0.246 (4.49)	-0.134 (-7.38)	-0.204 (-4.68)	1.166 (24.23)	2.83 (10.86)	
0.269 (2.95)	-0.156 (-5.50)				
0.00291 (3.15)	0.00000 (-2.46)	-0.48 (-1.73)			

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100 = 1989

		D			
	-0.0317 (-7.81) **	0.203 (5.27) ***	0.683 (23.13) *		
-0.015 (-5.23)	0.0003 (4.16)	-0.170 (-2.74)	1.242 (14.18)	2.19 (5.83)	
-0.003 (-3.36)					
-0.00000 (-0.57)	0.00000 (0.05)	0.21 (0.48)			

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		R&D			
0.96 (5.58) ****	-0.314 (-9.53) *	0.093 (1.77) ***	0.579 (7.95) **	2.71 (4.61) *****	
0.068 (1.02)	-0.0609 (-6.79)	-0.251 (-4.13)	1.286 (17.28)	2.86 (9.73)	
	-0.054 (-5.40)				
0.00071 (2.31)	-0.00000 (-1.99)	-14.0 (-0.46)			

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1: 2=3	2	1	
1.803	-0.4965	-0.8953	1995-1988
0.391	0.3385	0.1324	1998-1996
2.386	-0.246	-0.587	2000-1988

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R&D	D	R		
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-	-	-		
-	+	-		()
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The Role of the (R&D) Efficiency and Technicality On the Economic Growth of Al-Kindy State Co.

Abstract

The current information about the role of the scientific activities, due to research and development (R&D) in the economic promotion and in technological progress are internationally limited till at the advanced economies. It's Scarcity doesn't make any difference for the macro or microeconomic level, and whether in the field of production or of research. Although that information are guessed and roughly estimated, yet it enjoy the favor of a big commensurate with importance in the evaluation of the performance and by what the economic importance does which the innovation activities acquire with the same or more.

This study aims to submit more information about the role of (R&D) efficiency and technicality for which one can expect reward in the hereafter through the economic evolutions for specialized research sector. That is from the estimation of an effects of the efficiency changes and technical changes, due to (R&D) in researcher's company in Iraq on the annual product measured by the value-added in it, on the economic growth, and on technological progress measured to it.

The study come out amongst the sequent that the research efficiency is positive's effects on the objective economic variables, which are the production, growth, and progress, unlike the effects of the development efficiency on it. While developmental technicality had positive's effects on the economic growth only.

