

**Small Islands, New Technologies and Globalization:
A Case of ICT Adoption by SMEs in Mauritius**

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Objectives

- International Comparison of ICTs Adoption by SMEs in Developing Countries

- To investigate the impact of ICTs in augmenting global competitiveness

- To identify and analyse factors that influenced the degree of the adoption of ICTs



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Sample Size and Product Profile

Country	Sample Size	Product Profile of Firms
Costa Rica	68	Food & Beverages, Rubber & Plastic Products, Apparel, Chemicals & Chemical Products, and Machinery & Equipment
Jamaica	60	Services, Apparel, Elec. & Electronics, Traders, and Manufacturers of Handicraft Products
Mauritius	60	Garments, Chemical, Rubber & Plastic Products, Paper Products, Services, and Automotive Components
India	63	Garments and Auto-component Manufacturing Firms
Malaysia	67	Hardware & Machinery, Chemical & Pharmaceuticals, Wood Industry, Elec. & Electronic, Garments, and Food & Beverages



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Degree of ICT Adoption (in % of firms)

Country → Technologies	Costa Rica	Jamaica	Mauritius	India	Malaysia
Email 1	92.60	78.33	43.33	85.71	98.50
Internet 2	91.20	55.00	43.33	85.71	98.50
Web 3	66.21	25.00	16.71	39.68	97.01
Portal	52.92	Nil	10.00	12.70	74.63
MIS 4	50.00	46.67	Nil	100.00	91.04
CAD/CAM	4.40	28.33	Nil	26.98	95.52
CAE	4.40	18.33	Nil	Nil	34.33
FMS	42.6	10.00	Nil	Nil	95.52
NCMT	50.00	10.00	30.00	Nil	95.52



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Causes of ICT Adoption

Country →	Costa Rica	Jamaica	Mauritius	India	Malaysia
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Causes	Costa Rica	Jamaica	Mauritius	India	Malaysia
MAN_CTRL 1	3.75*	4.08*	4.13*	3.56	3.60*
INCR_STO	2.97	2.43	1.66	-	3.57
INCR_EXPO	2.70	2.75	1.34	-	3.49
EXTR_COM 2	3.63**	3.18	2.16	3.75*	3.57**
INTR_COM	3.29	2.66	2.22	3.37	3.31
EFFI_PROD 4	3.59	2.57	2.75	3.53	3.57
FLEX_DESN	2.95	2.65	2.31	3.30	3.48
MKT_INFO 3	3.56	3.74**	3.19**	3.65**	3.12
COST_RED	3.05	2.15	1.47	-	3.52



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Impediments of ICT Adoption

Country → Impediments	Costa Rica	Jamaica	Mauritius	India	Malaysia
COM_SPEED	2.70	1.97	1.57	1.95	1.86
COM_COST	2.08	4.17*	4.00*	2.02	1.63
PHY_INFRA	2.10	-	1.85	3.90*	1.75
SKL_MANP	2.13	-	2.52	1.90	1.68
NON_UTLTY	2.63	-	2.39	2.16	1.56
INTRNT_FEE	1.78	-	3.80	1.97	1.65
INTRNT_SPD	2.75	1.21	1.74	2.17	1.42



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Consequences of ICT Adoption

Country →	Costa Rica	Jamaica	Mauritius	India	Malaysia
Consequences					
PROD_GAIN	3.09	1.91	1.98	-	3.14
DESKILLING	3.11	2.53*	1.02	-	3.31
LAB_REQ*	2.00	1.89	2.74*	-	2.00
LEAD_TIME 1	3.74*	1.72	2.04	3.10	3.40*
FLEXIBILITY	3.03	1.85	1.72	2.97	3.32
REOR_MGMT 2	3.33	2.00	2.53	3.22*	3.32
MECHE_ASM	2.26	1.67	1.17	3.22*	3.37
AFT_S_SUP	3.19	1.90	1.62	2.25	3.32



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Variables

MDEDU: 1-> Primary; 2-> Secondary; 3-> Diploma Holders ; 4-> Degree Holders

Size: Total Workforce; **FIRM_AGE:** Age of firms in years

Other Variables:

TECH_COL: Technological Collaboration (Bi)

Opinion Variables:

Cost of Communication (CoC), Benefits of ICT Use (EFFI, PROD_GAIN),
Mode of Knowledge Acquisition (LEARN),
Sources of Competitiveness (MARK_NET),
Consequences of ICT Use (PROD_QUAL) (1-5)



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Type of ICTs and their Level of Adoption

No ICTs Using Firms: Firms were not using any kind of ICTs included in the analysis

Firms Using ICTs in non-Production Processes: Email, Internet, Web enabled, and Portal

Firms Using ICTs in Production and non-Production Processes: Email, Internet, Web enabled, Portal, and NCMT



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Sample and Methodology

Sixty SMEs; November 2004 - February 2005

Analysis of Variance and Ordered Probit Analysis

$$Z = \beta_0 + \beta_1 MDEDU + \beta_2 SIZE + \beta_3 FIRM_AGE + \beta_4 COC + \beta_5 LEARN + \beta_6 PROD_GAIN + \beta_7 TECH_COL + \beta_8 MARK_NET + \beta_9 PROD_QUAL$$

$$y=0 \text{ if } z \leq 0,$$
$$y=1 \text{ if } 0 < z \leq \mu_1,$$

and

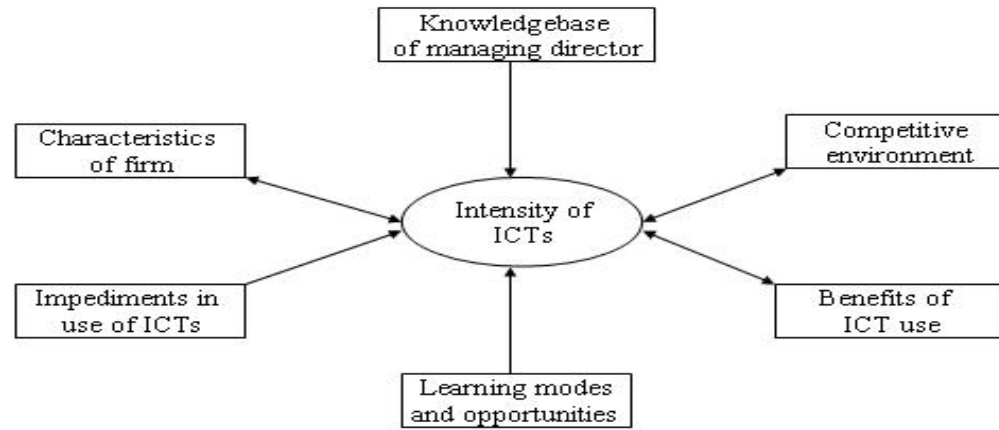
$$y=2 \text{ if } z > \mu_1.$$



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Theoretical framework



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Analysis of Variance

Variables	Mean score			F-value	Sig.
	ICT_no	ICT_np	ICT_p		
General Characteristics					
1. Education of owner (MDEDU)	1.73	2.29	2.00	2.432	0.098 ^c
2. Total employees (SIZE)	6.50	6.40	13.78	3.954	0.025 ^b
3. Age of firm in years (FIRM_AGE)	12.65	11.13	16.11	1.516	0.228
Impediments in ICT use					
4. Cost of communication (CoC)	4.48	3.33	3.67	10.717	0.000 ^a
Mode of learning					
5. Learning by doing (LEARN)	2.58	3.14	3.89	4.978	0.010 ^b
Benefits of ICT use					
6. Efficiency in production (EFFI)		2.00	2.33	5.385	0.027 ^b
7. Increase in productivity (PROD_GAIN)	1.00	2.13	2.94	10.467	0.000 ^a
Sources of competitiveness					
8. Technological collaboration (TECH_COL)	1.04	1.00	1.67	6.911	0.002 ^a
9. Market network (MARK_NET)	1.77	3.07	2.47	2.662	0.079 ^c
10. Product quality (PROD_QUAL)	4.62	4.80	4.67	0.730	0.486

Note: a → 1%, b → 5% and c → 10% level of significant



Sectoral Distribution of ICT Adoption

Sectors	Type of ICTs used				
	Email	Internet	Portal	Web-enabled technologies	NCMT
Garments	13 (41.9)	13 (41.9)	3 (9.7)	7 (22.6)	4 (12.9)
Chemical, Rubber And Plastic	2 (22.2)	2 (22.2)	1 (11.1)	1 (11.1)	1 (11.1)
Paper products and Printing	8 (80.0)	8 (80.0)			3 (30.0)
Automotive	3 (30.0)	3 (30.0)	2 (20.0)	2 (20.0)	10 (100.0)
Total	26 (43.3)	26 (43.3)	6 (10.0)	10 (16.7)	18 (30.0)

Note: Figures in parentheses are percentage of users of a particular ICT tool



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Probit Analysis Results

Independent Variables	Dependent variable: IT_TYPE			
	Eq. I	Eq. II	Eq. III	Eq. IV
Intercept	-0.930	1.673	-1.522	-0.374
MDEDU	0.352 (1.721) ^c			
SIZE		0.039 (2.044) ^b		
FIRM_AGE	0.033 (1.825) ^c			
COC		-0.409 (-2.334) ^b		
LEARN				0.351 (2.988) ^a
PROD_GAIN			0.405 (2.777) ^a	
TECH_COL			1.058 (1.716) ^c	
MARK_NET				0.195 (1.753) ^c
PROD_QUAL				-0.208 (-0.600)
Observations	52	53	52	55
Parameter (μ_1)	0.738 (4.232) ^a	0.869 (3.842) ^a	0.979 (4.047) ^a	0.768 (4.194) ^a
Log Likelihood	-53.848 [0.099]	-50.696 [0.0007]	-46.014 [0.000]	-52.669 [0.005]



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Note: a \rightarrow 1%, b \rightarrow 5% and c \rightarrow 10% level of significant

Conclusions

- Managing Director's knowledge base and academic background plays an important role in the adoption of ICTs
- Firm characteristics such as age and size also influenced ICTs adoption
- Communication cost and physical infrastructure emerged as major impediments in the adoption of ICTs
- Productivity gains were realised by advanced ICT using firms
- Use of ICTs has no negative impact on employment
- Successful adoption of ICTs necessitates reorganisation of managerial functions
- Learning by doing has emerged as the best mode of knowledge acquisition and effective use of ICTs
- Technological collaboration also influenced the adoption of ICTs