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Firm Performance and IT Investment Relative to E-Business in Rubber Industry

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Abstract

USA small and medium firms facing a more competitive environment in the Internet era have no choice but to rely more on IT to improve the quality of their products and management practices. IT seems already to play a crucial role in the development of new opportunities including E-Business. The growth in IT investment indicates an increased awareness of the importance of adopting new technologies to remain competitive and take new challenges.

The main research hypotheses stipulate that the investment in IT will have a direct impact on firm's performance that certain organizational and personal factors will interact to affect the overall performance. This study cited Regress, Factor Analysis, Discriminant Validity Analysis, Skewed, Path Coefficients and Varimax Rotation to test hypothesis.

The results of this study, besides testing the instrument for assessing IS variables in the context of a developing economy, land support to prior research findings. User satisfaction with IS had a significant impact on performance. The direct impact of IT investment on performance was not detected. This study found an indirect effect of investment in IT on performance. Many other IS variables did affect performance.

1. Introduction

E-Business is expected to experience fast growth over the next several years. Forrester Research, Inc. of Cambridge, Mass., forecasts that revenues generated by e-Business will be as much as $6.9 trillion by 2003. By 2002, e-tailing, a category of e-Business that involves the purchasing of consumer goods and services online, will be a $41 billion business, compared to a forecasted $12 billion in revenues at the end of 2000, according to Jupiter Communications, Inc., a New York market research firm [1]. A study done by the University of Texas revealed sales revenue over the Internet in 1998 was more than $300 billion and employed more than 1.2 million workers [2]. These figures are increasing rapidly. Figures from Forrester, Gartner, IDC, Jupiter and others all predict that worldwide business-to-business (B2B) e-Business will exceed $13 trillion by the year 2003 [3].

The expanding literature on electronic commerce is primarily focused on business-to-consumer (B2C) e-Business, although business-to-business (B2B) e-Business has a larger potential impact on the economy [4,5]. Predictions for worldwide e-Business exceed $3 trillion in 2003 with growth rates exceeding 100% per year. GartherGoup estimates that worldwide B2B e-Business will surpass $7.29 trillion in 2004, close to 7% of the forecasted total global sales transactions [6]. Vennat (2000) says, " The beauty of e-commerce is that a business does not have to be big to win big. Information technology allows companies of all sizes to improve productivity and extend their reach to a broad customer base; innovation is the name of the game". It is crucial to study the efficiency and effectiveness of investing in Information Technology (IT), specially focusing on e-Business in selected industries.

1.1 Theoretical Foundation

To examine the contribution of IT to output, it is helpful to work within the well-defined framework of the theory of economic production. This theory postulates that the output of a firm is related to its inputs (one of which will be IT) via a production function and predicts that each input should make a positive contribution to output. Also, the marginal cost of each input should, on balance, be offset with production of at leas equal benefit.

1.2 Definition of Terms

1.2.1 E-Business

Numerous definitions have emerged since the introduction of e-Business. Experts define e-Business as the integration of business processes; enterprise applications, relationships and organizational structure to create a high-performance business model, capable of delivering differentiated business value [7,8,9,10]. The implementation of e-Business applications includes the reengineering of business processes and the use of the Internet technology to disseminate information electronically [8]. Wigand [11] views e-Business as the seamless application of Internet technology alone the entire value chain of business processes, enabling the accomplishment of business goals.

1.2.2 Small Business

The U.S. Small Business Administration (SBA) guidelines use annual sales volume and/or number of employee, depending on the industry, for classifying businesses as to size. Under the SBA guidelines, a small business could have fewer than 100 to as many as 1500 employees, or annual sales from $2.5 to $17 million, depending on the industry [12]. The standard most often cited by the SBA's Office of Advocacy for the public at large is fewer than 100 employee [12]. Weinstein [13] used $10 million as the sales breakpoint for small business. In some studies, a small or medium size firm in

the manufacturing or service sector is defined as having between 20 and 100 employees [14,15]. The definition was based on Miller and Toulouse (1990) where companies with fewer than 100 employees were included in their study. Jones [16] combined employee and sales limits to define a small business as one with annual sales of no more than $10 million and fewer than 100 employees. That is the definition used in this study.

2. Research Questions

Several researchers [17,18,19,20], some of whom did not explicitly address the "Productivity Paradox", reported that investment in IT did not produce expected gains in productivity. However, several other researchers [21,22,23,24,25,26,27,28,29,30,31] have noted the existence of a relationship between IT investment and an increase in productivity. Thus, the author has conflicting findings. Clearly, the business value of computers is an area where many unanswered questions and ambiguous results exist. It is hoped that this study will be a small step towards remedying this situation by attempting to answer two questions. The first question will address the "Productivity Paradox". The second question will attempt to identify areas of IT investment that are associated with corporate productivity.

3. Results and Analysis

Approach of this paper could be qualified as an effectiveness-oriented approach [32] since this study concerned with issues of information content quality, IT support, use of systems, and impact on user and organizational performance. The rubber industry composition of the SMEs, which were included as potential respondents, is provided in the following table. Table 1 also shows the industry composition of the responding and the non-responding factions in the survey.

Table 1: Industry composition of sample population and respondent population

Industry/Rubber	Number in Sample	%	Number of Respondents	%	Number of Non-Respondents	%
Local	231	66.9	126	61.7	105	74.5
Export	114	33.1	77	38.3	37	25.5
Totals	345	100.0	204	100.0	141	100.0

A t-test was run to determine whether there was a statistically difference between the respondent population with in each group. For each case the hypotheses can be stated as:

H_0: $u_1 = u_2$

H_1: $u_1 \neq u_2$

The test run is a two-tailed t-test, which tests the null hypothesis that there is no difference in the mean scores of the two groups. Controlling the type I error at $\alpha = 0.05$, with $n_1 + n_2 - 2$ degrees of freedom, the critical t for both groups (with more than 120 member each) is 1.96. The corresponding decision rules are:

If $t < |1.96|$, conclude H_0

If $t > |1.96|$, conclude H_1

The respondent population is statistically not different from the non-respondent population on the characteristic used to select companies within the rubber industry. Not surprising since this study had a response rate of more than 50%. Based on the results of these tests, it seems unlikely that the study conclusions project any significant bias due to non-response.

3.1 The Rubber Industry: Descriptive Statistics

Based on the rate of return recorded by the surveyed companies the performance of the company statistics from 1997 to 2001are shown in the Table 2.

The investment in IT in 2001 was increased to new levels. The average investment was approximately USD$52,640 with a maximum reaching USD$100,000.

More statistics will be shown as the author studied each individual variable in the context of its relations with other study variables.

3.2 Assessment of the Measurement Model

To assess company performance, the author used two measures: the first, perceptual, based on the assessment of company's performance in comparison to its competitors as perceived by the respondent. The second, financial-oriented, was based on the rate of return over a five-year period. In order to generate one measure the author loaded the variables into one factor as reported in table 4. Based on previous research [33] only measures with loadings higher than .70 were included in the final measure. This is considered to be high loading since the item explains almost 50% of the variance in a particular measure.

To the question: compared to your closest competitor how do you evaluate the performance of your company? The answers in Table 4 show that the respondents had a skewed perception in compared to their closest competitors.

The majority of respondents (94%) perceived their company performance as the same or higher than that of their closest competitor. This perception couldn't be supported by the measure of performance based on the financial information provided by the same respondents.

3.3 Investment in IT Relative to E-Business

Investment in IT for 2001 ranged from USD$3,000 to USD$540,000. The majority of investment was made for the acquisition of inexpensive components to maintain or improve existing systems. One the other hand, 25% of the surveyed companies invested more than USD$23,000 each in IS. This is a significant amount and indicates that the management expects an improvement in the business functions of the company.

Table 2: Average firm performance (financial statement in USD$1000)

	N	Minimum	Maximum	Mean	Std. Deviation
Financial Information (Performance 1997)	78	3.00	550.00	50.1231	145.30674
Financial Information (Performance 1998)	90	.14	650.00	51.4960	160.94306
Financial Information (Performance 1999)	96	1.10	590.00	45.5375	141.43396
Financial Information (Performance 2000)	96	2.30	580.00	45.8931	138.79276
Financial Information (Performance 2001)	96	2.60	540.00	43.1188	129.15950
Valid N (listwise)	78				

Table 3 summarizes investment in IT for 1997-2001.

Table 3: Average firm IT investment relative to e-business (USD$1000)

	N	Minimum	Maximum	Mean	Std. Deviation
Investment in Computer Technology (Cut Operating Costs)	132	0	80	24.86	20.392
Investment in Computer Technology (Increase Sales or Market Share)	132	0	75	22.50	20.005
Investment in Computer Technology (Do Other Functions)	132	10	100	52.64	25.700
Valid N (listwise)	132				

Table 4: Perceived performance (compared with competitors in robber industry)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	12	5.9	6.9	6.9
	4	24	11.8	13.8	20.7
	5	60	29.4	34.5	55.2
	6	42	20.6	24.1	79.3
	7(Superior)	36	17.6	20.7	100.0
	Total	174	85.3	100.0	
Missing	System	30	14.7		
Total		204	100.0		

3.3.1 IT Use by Business Function

Table 5 reports that administrative use of IT is most common with more than 60% of moderate or extensive use of computers to generate reports, manage data, and control activities. The electronic communications, mainly e-mail, was used with 76% of the companies reporting an extensive use of this communication tool while e-Business was used with only 20%.

3.4 Correlation Between IT Investment and Performance Relative to E-Business

There is not a strong correlation between the independent study variables, which indicates that they measure different attributes. All correlations indicated are significant at $p = 0.1$.

3.5 Hypothesis Testing

The statistical analysis, as indicated above, followed a two-step procedure. The path coefficients for the model were calculated. Second, path coefficients that were not statistically significant were removed where theoretically justified. Because coefficients change when a variable is deleted from an equation, it was sometimes necessary to repeat the second step in order to delete new coefficients that had become non-significant. Following Pedhazur [34], this second step was performed until an optimal model was obtained. In other words, a model in which no path coefficients could be deleted without significantly losing to the data. The procedure was applied first to the whole sample, then to each of the sub-samples. The final models along with direct, indirect and total effects coefficients are presented in the following figures and tables.

Hypothesis 1: Investment in IT has a significant and positive impact on:

$H_{0\text{-}1a}$ -- user satisfaction

$H_{0\text{-}1b}$ -- perceived ease of use

$H_{0\text{-}1c}$ -- perceived usefulness

Total effect of Information Technology Investment on:

Table 5: Use by function

Task	Almost Never		Moderate		Almost Always	
	Count	%	Count	%	Count	%
1. Report Production	24	12	60	29	120	59
2. Letters & Memos	31	15	89	44	84	41
3. Data Mgmt	12	6	31	15	161	79
4. Decision Making	78	38	78	38	48	24
5. Trend Analysis	90	44	37	18	77	38
6. Planning/Forecasting	69	34	49	24	86	42
7. Problem Solving	79	39	60	29	65	32
8. Budgeting	76	37	54	27	74	36
9. Activities Control	65	32	42	21	97	47
10. Electronic Communications	30	15	18	9	156	76
11. E-Business	132	65	30	15	42	20

Table 6: Correlation among study variables

	Usage	Utilizatio-n	Ease of Use	Useful-ness	Isuppor-t	Esuppo-rt	Itrainin-g	Etrainin-g	Satisfa-ction	Attitude	Itinvt	Perform-ance
Usage	1											
Utilization	0.331	1										
Ease of Use	0.215	0.2392	1									
Usefulness		0.2609	0.3268	1								
ISupport			0.3004	0.3035	1							
Esupport	0.455	0.2221	-0.2481		-0.3944	1						
Itraining	0.163		0.2766	0.3659	0.4005	-0.1128	1					
Etraining	0.298	0.2747	0.3005	0.2601	0.1515	0.3401	0.1522	1				
Satisfaction	0.251		0.3637	0.4131	0.2059	0.1767	0.1931	0.2462	1			
Attitude	0.191		0.1542	0.2057	0.1440	0.2145	0.1969	0.4083	0.2233	1		
ITinvt	-0.33	-0.098			0.3296	-0.400				-0.2803	1	
Performance	0.327		0.2352		-0.2607	0.2084	-0.2233		0.3295	0.1675	-0.1776	1

Table 7: Effect of information technology investment on satisfaction, ease of use and usefulness

	Total effect	= Direct effect +	Indirect effect	T	P
User Satisfaction	2.05074998	2.002637	0.048112975	2.219	0.0568
Ease of Use	0.454284	0.454284	-	1.455	0.1726
Usefulness	0.081744	0.081744	-	0.178	0.8948

Table 7 presents the results for the Path Analysis of the effect of IT Investment. The data support the first proposition, that is the investment in IT has a significant and positive impact on user satisfaction (t = 2.22, p = .06). The data also support the second proposition that investment in IT will positively affect perceived ease of use. However data do not support the third proposition which implies that the perceived usefulness will increase with the increase of IT investment. When the data are analyzed using the whole sample there is a negative relationship between investment in IT and the perceived ease of use. However, a more detailed analysis produced some additional and interesting results. Indeed, when the author looked at the overall relationship between the IT investment and the perceived ease of use the author found that there was a slightly positive relationship though not significant.

Hypothesis 2: Training has a significant and positive impact on:

$H_{0\text{-}2a}$ -- users satisfaction

$H_{0\text{-}2b}$ -- perceived ease of use

$H_{0\text{-}2c}$ -- perceived usefulness

Total effect of Training on:

Table 8: Total effect of training

	Total effect	= Direct effect +	Indirect effect	T	P
User Satisfaction	0.99506758	0.819548	0.175519583	4.952	0.000
Ease of Use	1.033253	1.033253	-	5.554	0.000
Usefulness	1.13409516	1.038476	0.095619158	5.475	0.000

The data provide support for Hypothesis 2, which stated that training will affect positively and significantly user satisfaction, perceived ease of use and usefulness. In fact, a direct positive and significant effect of training was found in the three variables. There was, however, no significant indirect effect of training on the perceived ease of use.

Hypothesis 3: User satisfaction, Perceived ease of use, and Perceived usefulness will have a significant and positive impact on:

a- IT utilization

b- Organizational usage

$H_{0\text{-}3a\text{-}a}$ -- User satisfaction will have a direct positive impact on IT utilization.

$H_{0\text{-}3a\text{-}b}$ -- User satisfaction will have a direct positive impact on organizational usage of IT.

Total effect on Utilization of:

Table 9: Total effect on utilization

	Total effect	= Direct effect +	Indirect effect	T	P
User Satisfaction	-0.349955	-0.349955	0	5.875	0.0000
Ease of Use	0.28600735	0.19454	0.091467352	3.003	0.0231
Usefulness	0.44549908	0.361929	0.083570079	5.905	0.0000

The data do not support the first proposition, which stated that users satisfaction will impact positively the utilization of computers. However, it showed that ease of use and usefulness, as hypothesized, will impact positively and significantly the utilization of IS. Moreover, positive indirect effects were also detected in the case of ease of use and usefulness.

$H_{0\text{-}3b\text{-}a}$ -- Perceived ease of use will have a direct positive impact on IT utilization.

$H_{0\text{-}3b\text{-}b}$ -- Perceived ease of use will have a direct positive impact on organizational usage of IT.

$H_{0\text{-}3c\text{-}a}$ -- Perceived usefulness will have a direct positive impact on IT utilization.

$H_{0\text{-}3c\text{-}b}$ -- Perceived usefulness will have a direct positive impact on organizational usage of IT.

Total effect on Usage of:

Table 10: Total effect on usage

	Total effect	= Direct effect +	Indirect effect	T	P
User Satisfaction	0.251258	0.251258	-	3.621	0.0204
Ease of Use	0.25042154	0.180112	0.070309538	2.451	0.0358
Usefulness	0.14951917	-0.119122	0.049602827	-2.141	0.0000

The level of IT usage was significantly related to user satisfaction and the perceived ease of use that provides partial support for hypothesis 3. However, usefulness did have the positive impact expected on usage. It rather had a 'mild' negative impact at –0.1495. Therefore indicating that perceived usefulness doesn't play the expected role found in previous studies.

Hypothesis 4: IS support will have a significant and positive impact on IT Utilization

Total effect of IS Support on:

Table 11: Total effect of IS support

	Total effect	= Direct effect +	Indirect effect	T	P
IT Utilization	0.12507037	0.160289	-0.205359373	2.273	0.0451

Data do not provide support for Hypothesis 4. On the contrary, it shows a negative impact of support on IT utilization (t = 2.27, p = .05). The degree of influence is not important but is significant.

Hypothesis 5: Users attitude will have a significant impact on organizational usage.

Total effect of Users Attitudes on:

Table 12: Total effect of users attitudes

	Total effect	= Direct effect +	Indirect effect	T	P
Organizational Usage of IT	0.189115	0.189115	-	2.749	0.0268

Data provide support for the proposition that user attitudes have a positive impact on IT usage.

Hypothesis 6: IT utilization will have a significant and positive impact on performance.

Total effect of IT Utilization on:

Table 13: Total effect of IT utilization

	Total effect	= Direct effect +	Indirect effect	T	P
Performance	0.13015271	-	0.130152706	2.614	0.0238

IT utilization did not have a significant direct effect on performance. But, the author could not reject the hypothesis that there is a significant and positive impact of IT utilization on performance since there is an indirect and positive impact of utilization on overall performance. Thus, the author could safely confirm that the data support Hypothesis 6.

Hypothesis 7: Usage will have a significant and positive impact on performance.

Results in Table 14 support total effect of organizational usage on performance.

Data support the proposition linking usage to performance. The results in Table 29 provide additional support, where User Satisfaction was linked to usage that, in fact, could indicate a relationship between satisfaction and performance. The relationship confirmed in the overall model.

Hypothesis 8: Performance is positively correlated with the degree of investment in IT.

Total effect of Information Technology Investment on:

Table 14: Total effect of organizational usage

	Total effect	= Direct effect +	Indirect effect	T	P
Performance	0.983211		-	3.185	0.0217

Table 15: Total effect of information technology investment

	Total effect	= Direct effect +	Indirect effect	T	P
Performance	0.02446	-	0.02446	2.771	0.0245

Data do not provide a strong support for the hypothesis. There is a weak relationship that wasn't significant between the investment in IT and the performance.

3.6 Overall Model

Table 16 summaries the results reported above for the relationship of independent variables to performance.

Table 16: Total effect on performance relative to e-business

	Total effect	= Direct effect	+ Indirect effect	T	P
Investment in IT	0.02446	-	0.02446	-	-
Training	0.16610886	-0.250544	0.164435142	-3.741	0.0201
Experience	0.16958303	0.201633	-0.03204997	3.178	0.0218
Support	0.30099592	-0.30418	0.08318408	-4.489	0
Ease of Use	0.36050275	0.227269	0.133233752	3.163	0.0219
Usefulness	0.06342629	-	0.06342629	-	-
Satisfaction	0.37255624	0.285189	0.087367239	3.947	0.0001
Attitudes	0.28629	0.28629	-	3.939	0.0001
IT Utilization	0.13015271	-	0.130152706	-	-
Organizational Usage	0.39377	0.39377	-	5.811	0

4. Limitations and Assumptions

A limitation involves the external validity. While the respondent companies surveyed were adequate in number and presumably representative of the population of interest, generalizability is limited to only SMEs in the rubber industry. Since the population sampled was SMEs in the rubber sector, very limited conclusions can be made about SMEs in general.

The findings of the study, thus, apply only to SMEs in the rubber sector. To improve the quality of the data collected where possible measurements should be taken from users as the computers are introduced and then take additional measures as they use the computers more extensively.

5. Findings of the Study

5.1 IT Investment

Investment in IT in the rubber industry is limited both in absolute and relative terms. The average investment over a period of five year was USD$52,640. The trend seems to be an increased investment, however, it cannot be statistically confirmed. A strong relationship was found between the investment in IT and the perceived usefulness. The direct effect, at 0.192787 ($p < 0.005$), indicates that users perception is affected by the investments made in a particular year. This could in turn have an effect on performance through and increased use of IS. In fact, the author found that there is a significant relationship between the perceived usefulness and IT utilization, which corroborates prior findings. Furthermore, the negative relationship, found between the investment in IT and the ease of use, could be explained by the fact that users are resisting change. Thus, perceiving that the new systems will be more complicated and add to their daily tasks a new task: learning how to use the new tools. Another explanation could originate from accounting reporting rules where, due to investment, the overall results of the company, especially on the year of investment, could be affected negatively. This in turn will affect the attitudes of the users toward the source of the sub-performance e.g. the investments made in IT.

The author cannot compare the investment made in other industries, but the author could affirm that even within the rubber industry there were many differences between companies. There should be guidelines of the minimum investment made in IT as a proportion of the revenue if this sector is to become more competitive. On the other hand, the investment in IT is more restricted than expected. No major investments in a production related IT were reported.

5.2 Organizational Performance

A measure such as ROA, the ratio of profit to total assets, may be limited in several instances. Large investments in technology may have a negative impact in a particular year. Knowing the year in which the investment was made is crucial. If profits do improve measurably, changes are not expected to be detected until the system is fully operational, which presumably occurs in the period following the implementation of the system.

Support, contrary to what the author hypothesized, had a negative impact on performance. This could be explained by the fact that companies performing poorly would push strongly the introduction or the use of IT as a way to improve their performance. This additional effort would be perceived by the users as an indicator of poor performance rather than a tool to improve performance.

5.3 Perceptual Variables

The findings indicate that the perceived ease of use is a key variable linking the exogenous variable such as IT investment and computer usage. The importance of the perceived ease of use is further illustrated by its direct effect on the perceived usefulness that in turn affects satisfaction, which has a direct effect on system usage. Moreover, the direct positive effect that training has on the perceived ease of use suggests that training enhances a user's self-efficacy and help un-thwart the use of computers. This encompasses the importance of training and suggests that those programs should emphasize individual's self-confidence and perception regarding an information system. Experience in using computers has a positive impact on system utilization indication that it is important that users gain experience, through training for example, to be inclined to use more adequately the IT available. Nonetheless, experience didn't affect the perceived ease of use, which could be interpreted that experience, with a direct effect on the perceived

usefulness, does not affect the perception of how easy it is to use IT.

The total effect of the perceived ease of use is greater than that of perceived usefulness on usage. This supports the findings of Igbaria et al., [33] that were inconsistent with prior research. This may indicate that users in SMEs are inclined to accept IT based on the ease of use rather than the usefulness. These findings corroborate the fact that the perceived ease of use has a direct impact on computer usage that was greater than that of the perceived usefulness. A plausible interpretation of these results is that users are ready to face some difficulties to get the information they need. But if the difficulties they have to face are high, or perceived so for that matter, they will seek other sources to meet their information needs regardless of the perceived usefulness of the system. This emphasizes the importance of perceived ease of use in developing new systems for SMEs.

Following Igbaria et al. [33], the author suggest that a possible explanation for the importance of the perceived ease of use is the lack of experience on the part of the users. Our survey indicates no significant relationship between experience and ease of use. Furthermore, experience had a negative direct impact on usage. Suggest that usage of the system decreases with experience though utilization was positively affected. This could be explained by the fact that users become more efficient, know exactly what information they need and how to get it without spending much time using the system. The effect of the perceived ease of use is that early in the use of the system, especially in a SME environment, its effect becomes non-significant after a prolonged exposure [33].

Consistent with most prior research [33], a positive relationship was found between support and perceived ease of use. This could be explained by the fact that users in a developed environment are more inclined to accept the technological innovation and introduction. The fact that management supports, or provides the support for, the use of IT makes that technology to become perceived as easy to use.

DeLone (1988) found that the availability of technical support, mainly for training purposes, did not result in greater IS success in a small firm context. Since most of the companies in the present study didn't have internal support for their information systems, it may be the external support did not meet their specific needs. This indicates the importance of having and developing an adequate information systems support for SMEs. It remains that, consistent with our hypothesis 4 support of the IS function has a positive and direct effect on computer utilization.

5.4 Time Lag between IT Investment and Performance Relative to E-Business

In general, the findings of this research, if limited to being a cross-sectional, demonstrate a lack of direct relationship between the investment in information technology and company performance. It was found however a positive relationship, though statistically weak, that indicates the possibility of a causal relationship. As Weill [31] suggested, the author performed an analysis of the expected relationship using a time lag of 1 year to 5 years. Following Weill [31] regression analyses were performed.

$$RP_n = b + b_1X_n + b_2X_{n-1} + \ldots + b_6X_{n-5}$$

Where RP_n = Rate of return for year n; b_j = regression coefficients; X = investment in IT (predictor variable).

The results are indicated in the following table:

Table 17: Results of regression analyses for rate of return

Dependent	Independent Variables						R^2	P
	IT Invt 01	IT Invt 00	IT Invt 99	IT Invt 98	IT Invt 97	IT Invt 96		
RR01	0.00403					-0.0017	0.21	0
RR00		-0.00081					0.05	0.006
RR99	.		0.00373				0.03	0.0023
RR98								

*Non-significant coefficients were not indicated.

The five possible outcomes were tested as well as interaction between different year investments. The results of the five regression analyses are presented in Table 17. The standardized b, R^2, and p value were reported. All interaction terms were not significant, which could indicate or be explained by the absence of a coherent IT strategy with in the sampled SMEs. Moreover, the results of the regressions were not satisfactory. Limited effects were found as resulting from IT investment. In the sample firms, most of the significant coefficients indicated a negative relationship between the investment in IT and the performance measured by the rate of return.. The time lag for detecting any effects didn't show any significant changes in the results. Actually, most results indicated that the effects were perceived the same year the investments were made. The effects faded away or were non-significant in the subsequent year.

Investment in IT, or any combination of it thereof, did not appear to have any significant direct influence on the performance. To understand the reason for the negative correlation between investment in IT and performance one can infer that respondents' high awareness of financial performance hampers their assessment of the effects of IT investment. This high level of emphasis on

financial performance may affect the perception of the benefits that result from investing in IT and the use of IS.

6. Recommendations

6.1 Recommendations to Managers

The research model has a number of implications for the managers in the rubber industry. The results confirmed that computer usage has a significant impact on company performance relative to e-Business. This suggests that practical steps should be taken to increase the use of the IT to both make those investments profitable and increase the efficiency in the data processing. Training was found to have an important impact on both the perceived ease of use and usefulness suggesting that users should have access to adequate if not extensive training before being introduced to new systems. Researchers can help define training programs aimed at increasing the awareness of the importance of the IS in general and the particular software introduced. Ease of use has a direct effect on usage, as well an indirect effect via usefulness and satisfaction. This suggests that efforts to improve the perceived ease of use should be deployed through training and familiarization sessions.

A possible strategy could involve the creation of an IT training center for all the rubber industry under the auspices of their federation. This will allow for the sector to have its own center that will respond to the needs of the member companies. This center could be created with the cooperation of the vendors and suppliers of the technology used in the industry. Training, through attitudes, will have a positive impact on performance.

Finally, investment in IT had a significant influence on perceived usefulness. This was the only significant link through which IT investment positively influenced the company performance. This suggests that efforts to improve perceived usefulness have a strong impact on firm performance in SMEs. This could be achieved through extensive training which could be used to influence the perceived usefulness by increasing the possible uses of IT and the ease with which the IT will be used [33].

The fact that the investment in IT has a negative impact suggests that either the respondents were reporting the year where such investment occurred, which could have put some strains on the finances of the company, or that the investment in IT implied the introduction of new procedures yet to prove their efficiency.

6.2 Towards an Understanding of IT Investment Relative to E-Business

Investing in IT is seen more and more as a necessity to keep the organization afloat and competitive. What are the implications of such investment? One should caution that those implications resulting from the study findings could not apply to all organizations across the industrial spectrum. Thus, the author would outline the following implications:

- Investment in IT should be considered in enhancing efficiency and usefulness.
- To improve organizational performance, IT investment should include training for users of the IS.
- When evaluating the impact of IT investment on organizational performance, performance measures such as return on investment, sales by total assets, and return on sales, should be considered. Subjective measures of performance such as comparisons to competition performance should be limited.
- Measures, such as IT budget as percentage of revenue, percentage of IT spent on training, should be considered as measures of IT investment.

Previous studies have commented on the relationship between IT investment and organizational performance, but none, to our knowledge, has provided evaluation of this relationship.

7. Conclusion

This study represents a careful and systematic effort to examine the impact of IT investment and other technology related variables on company performance relative to e-Business. It incorporates a number of features including behavioral variables and behavioral intention variables, and a relatively large sample size, which lends significant strength to the study.

The research model was built based on an extensive review of relevant literature. The study is among the few that addressed the issue of use of IT in the context of small business. It extended the existing research by including the company performance in the model. The author did not limit the study to the technology acceptance or the success of the use of IS but the author went beyond to explore the effects of the IT investment on performance.

In conclusion, the main contribution of this study was to highlight the complexity of the IT investment question and hopefully reveal the shortcomings of many of the far reaching statements found in the decision-makers circles. A second implication is that new insights may be found by approaching the question of returns to IT expenditure from another perspective. This may help us understand what factors influence firm benefits from IT expenditure. SMEs appear to use IT mainly to increase efficiency rather than for strategic development in e-Business.

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