2000

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Abstract

The extent to which information technology (IT) is used strategically is measured in a sample of 147 small Slovene firms. Slovenia is interesting from a small business perspective, because from 1990, when the transformation of its economy started, the number of small business has increased almost 6 times (from almost 6.500 to nearly 35.000 in 1998). The results have shown IT industry leadership and also IT's role in a firm to be the strongest predictors in the strategic usage of IT. It was also found that IT is particularly well utilized in firms emphasizing innovation and, to a lesser degree, an efficiency strategy. Firms pursuing a low-cost strategy were the least likely to utilize IT strategically.

1. Introduction

1.1. General Background

A large volume of popular and scholarly information systems (IS) literature suggests that information technology (IT) is playing an increasingly critical role in the design and implementation of business strategy. IT has been described as facilitating organizational transformation, increasing market share, and heightening customer service because it provides information and communication channels among various participants in a way that has altered the basis for industry competition [4],[5],[10],[23],[24].

Indeed, case studies support the idea that IT helps firms in developing and implementing strategy, and yields direct economic benefit [3],[27]. Increasingly affordable computers and software make strategizing with IT tools accessible to many small- and medium-size enterprises (SMEs) [2]. Yet previous studies suggest that up to two-thirds of SMEs relegate IT to performing routine operations only [10],[21],[16] rather than leveraging it to help advance the firm' strategy [26],[17].

There is a sizeable body of literature examining IT diffusion [20],[12], the growth of IT adoption and IS planning in firms [9],[28],[4], and the increasing proficiency or literacy of IT users [25],[14]. Few of these research streams, however, directly address the *strategic* use of IT which is where much of the theoretic potency of IT application lies.

For the purposes of this study, strategic IT will be defined as: *The use of IT to aid in the development, definition, evaluation, and/or direct implementation of organizational strategy.*

The purpose of this study is to identify whether small business in various sectors of Slovenia's transitional economy, leverage IT for strategic advantage.

1.2. Slovenia's Economic Transformation

Although small, Slovenia leads many Central and Eastern European (CEE) transitional economies in economic growth and productivity. Slovenia's small firms have played an important role in this transition. The number of Slovene small firms has increased six fold since 1990, when the transformation of Slovenia's economy began. Structural differences between Slovenia's small firms'

sectors and those of Western Europe, as well as year-to-year indicators, suggest that transition is still taking place among small firms.

For example, although there is a fair amount of variability in the employment share of small firms in Western Europe (ranging from Spain's high of 81.1% down to Belgium's low of 56.2% [11]—they are considerably higher than Slovenia's 24% [19]. The sectors represented by small firms differ as well. For example, although only 10% of Western Europe's new small firms have been in the area of manufacturing and construction, these sectors constitute 42% of new small firms in Slovenia [6]. Slovene small business is likely to grow increasingly significant since they are growing in number, spawning new jobs and economic growth.

As small firms jockey for positions of leadership in their respective industries, IT offers a possible advantage for the growing Slovene small firms. The question is, is IT being leveraged to that end?

3. A Model of Intra-Firm Strategic IT Usage

Based on the general background, a theoretical model and two accompanying hypotheses can be generated regarding possible influences and outcomes of strategic IT usage in small firms. We focus on two intra-firm characteristics in particular—the linkage of strategy and IT, and the firm's IT experience and investment.
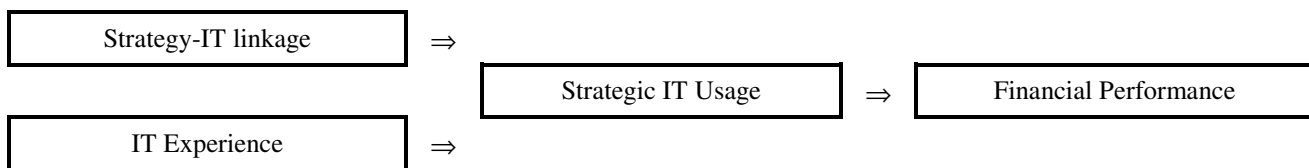

Figure 1: An Intra-Firm model of Strategic IT usage

3.1. Strategy-IT Linkage

If managers view IT as an expense rather than an investment, they likely will see its impact in affecting strategy—or in paying ongoing dividends for the firm—as low. Second, IT may be perceived by managers on a continuum from being largely irrelevant or being integral to a firm's strategy. If IT is not viewed as potentially facilitating the formation, evaluation, or implementation of firm strategy, it is unlikely that IT will be leveraged strategically [29]. Following this reasoning, we hypothesize that:

H1: *IT will be leveraged strategically in firms where:*
   a) *IT is viewed as a strategic investment, and;*
   b) *IT's role is perceived as being integral to strategy.*

3.2. IT Experience

Small firms historically have lagged behind large firms in innovation and the adoption of IT. Additionally, research in IT use and diffusion suggest that experience that may affect the strategic utilization of IT. Thus, our second hypothesis is:

H2: *IT will be leveraged strategically and profitably:*

a) *longer a firm has used IT*
b) *higher the percentage of IT users in a firm*
c) *more IT experts there are among employees, and*
d) *more a firm is viewed as an IT leader in its industry.*

4. Sample

In this study, the criteria for defining a small business were adopted from the Agency for Payment System (APS) [1] of Slovenia. A small business is one that satisfied at least *two* of the following—It has *50 or fewer employees*, *fixed assets* should of *0.5 million Euro or less*, and *annual sales* of *1 million Euro or less*.

To further focus the sample we employed two additional criteria. We selected firms with an annual revenue of more than *0.1 million Euro* to exclude firms which probably cannot afford IT, and *10 or more employees* to exclude micro firms.

The names and the addresses of small businesses that fulfill the above criteria were obtained from the Agency for Payment System (APS) of Slovenia. Nonprofit organizations, publicly-owned businesses, and wholly-owned subsidiaries of large businesses were excluded from the survey sample, leaving a sample of 974

businesses or 2.84 percent of all small business in Slovenia.

Surveys were sent to all 974 small firms. Of these, 161 surveys were returned, giving a response rate of 16.5 percent. Responses from 14 businesses were discarded because they had incomplete data, resulting in a final sample of 147 usable questionnaires.

To insure that the respondents were similar in characteristics to the population, these final 147 firms were compared to the 974 in terms of the number of employees, income, and income per employee. (Data on all firms were obtained from the APS.) T-tests showed no significant differences on any of these measures (income: t = 0.65; p = .52; employees: t = 0.30; p =.76; income per employee: t = 0.72; p = .47).

Table 1 presents the sample characteristics. On average, small businesses in the sample had 29 employees and mean annual sales per employee of $8,950. The average firm had 5.8 years of computer experience, and on average, about 50% of the firms' employees are computer literate. In 32 (21.7%) firms there is no one person responsible for IT.

Table 1: Characteristics of the Sample

Characteristic	Choices	Frequency	Percent
Sector	Manufacturing	68	46.3
	Trade	42	28.6
	Business Services	26	17.6
	Construction	11	7.5
Years in business	>7 years	25	17.0
	<7	122	83.0
Operating at a profit or loss	Profit	127	86.4
	Breakeven	1	.7
	Loss	19	12.9
Number of full-time equivalent employees	10-20	80	54.8
	21-30	22	15.1
	31-40	16	10.9
	41-50	13	8.9
	51-	16	10.3
Profit-loss/employees	- 5,000	17	11.6
	5,001-10,000	43	29.2
	10,001-20,000	49	33.3
	20,001-30,000	21	14.3
	30,001-	17	11.6
Computer usage in the firm	>8 years	44	29.9
	6-7	27	18.4
	4-5	43	29.3
	<3	33	22.4
Employees, who are IT users	86%-100%	40	27.2
	41%- 85%	33	22.4
	11%- 40%	38	25.9
	0%- 10%	36	24.5
Employees, who are responsible for IT	15%-100%	35	23.8
	6%- 14%	35	23.8
	1%- 5%	46	31.3
	0%	31	21.1

5. Measures, Results and Discussion

5.1 Measures/Variables

5.1.1. Grouping Variables

The firms of all respondents fell within one of four categories: Manufacturing ($n = 68$), trade (import-export) ($n = 42$), business services (accounting, consulting, etc.) ($n = 26$), and construction ($n = 11$). The last group was not split out for separate analyses due to its small size.

5.1.2. Independent Variables

Strategy-IT Linkage —To test the link between IT and strategy, respondents were asked to answer two questions — one on whether expenditures for IT were viewed as expenses or investments, and the other which asked respondents to indicate whether IT was viewed as integral to strategy or merely supportive of operations.

IT Experience — Respondents were asked in four questions how many years they had used IT, the percentage of employee IT experts, the percentage of employee IT users, and their view on whether the firm was an IT industry leader or laggard. The overall role of IT was adapted from Grover [13]. Other items were generated for the present study.

5.1.3. Dependent Variables

Strategy - Strategy is measured by 11-item measures using scales developed by Covin et al. (1994) and Kim and Choi (1994).

IT Usage - IT usage is measured with an adaptation of a 6-item measure of IT applications within functional areas developed by Cragg and King (1993).

Strategy-IT Usage—We asked respondents to identify the degree to which they use IT to perform different functions. This list of functions could then be compared across different strategies and industries as explained in the section below.

Financial performance—Respondents were asked to evaluate their relative standing on financial performance compared to their competitors. This was used rather than absolute financial measures to avoid complications of inter-industry differences, government factors, and market conditions. Financial Performance was measured by an 11-item scale that includes traditional economic measures such as sales, revenue, profit, and so on. We asked respondents to indicate how important a set of financial measures is in their firm and the degree of satisfaction with firm performance on these outcomes.

5.2 Results and Discussion

5.2.1 Correlations among Independent Variables

Correlations among the Strategy-IT Linkage variables and the IT Experience variables (see Table 2) suggest that firms with a high percentage of IT users also tended to have a relatively large percentage of IT experts. Additionally, firms which were perceived as being in a role of IT leadership tended to be IT users for a longer period of time, have a large number of IT users and viewed IT as an investment rather than an expense.

Table 2. Intercorrelations among Strategy-IT and IT Experience variables

Questions	Mean	s.d.	9	10	11	13	15
9. Years using IT	2.44	1.14					
10. Employee IT Experts	2.50	1.07	.08				
11. Employee IT Users	2.48	1.14	.12	**.35****			
13. IT Investment Attitude	1.61	.53	.06	.11	.14		
15. IT Industry Leadership	2.57	.82	**.18***	.02	**.21****	**.28****	
16. IT Company Role	1.89	.89	-.03	.11	.02	.01	.00

Significant correlations are in boldface: *$p \leq .05$; **$p \leq .01$

5.2.2. Strategic IT Usage and Financial Performance by Economic Sectors

Strategic IT Usage score (a dependent variable)—To identify the strategic use of IT in various firms in similar sectors, we began by performing a principle components analysis (Varimax with Kaiser Normalization method) on various IT applications—such as in research and development, finance and accounting—to identify the IT applications that fit together for a sector of the economy.

Since we weren't satisfied with the percent of the explained variance of the first component for the research variable "Firm IT usage" (37.3%) and factor analysis revealed more than one underlying dimension for a construct, the factor was further examined. An eigenvalue of 0.9 or above was used as a criterion to estimate the number of factors underlying the construct. Because the construct had 3 interpretable dimensions (which altogether explain 66.6% of the variance), reliability was computed for each dimension.

Table 3 shows that 3 factors emerged which we labeled as follows:
- Factor 1: Manufacturing — because research and development and production functions have high coefficients
- Factor 2: Trade — because marketing and sales and transportation functions have high coefficients, and
- Factor 3: Business services — because personnel and human resources and finance/accounting have high coefficients in contrast with marketing/sales

Table 3: Principle Component Analysis for Firm IT Usage

Firm IT Usage:	Factor 1 Manufacturing	Factor 2 Trade	Factor 3 Business Services
Research and development	**.92**		
Purchasing/Procurement	.35	.35	
Production	**.72**	.32	.29
Marketing and Sales	.20	**.85**	-.10
Inventory (warehousing)			.21
Transport		**.80**	.22
Personnel/Human Resources	.28	.11	**.81**
Finance and Accounting			**.85**
Eigenvalue	*2.98*	*1.41*	*.94*
Percentage of common variance explained	*37.29*	*17.58*	*11.71*
Cumulative percent of variance explained	*37.29*	*54.88*	*66.59*

$n = 147$, Factors in boldface have significant factor loadings $\geq .70$.

Next, we reasoned that firms in manufacturing, trade, and business services which are using IT strategically will score high in the use of items under the factor items which matched their respective industry. To determine whether this is the case, respondents were separated into four groups according to industry (respondents only indicated four industries—manufacturing, trade, business services, and construction).

For those who identified their firms as "manufacturing," the weight for each factor item in Table 3 was multiplied by each respondent's estimate of his/her firm's particular use of that form of IT. In other words, manufacturing firm X's utilization of IT in research and development was multiplied by .92 (Table 3, manufacturing column, line 1); its purchasing and procurement usage was multiplied by .35, and so on. Responses to all the factor items for manufacturing firms were summed to produce a dependent variable measure of strategic IT applications. The same procedure was completed for trade and business service firms. We did not test the construction firms due to their small sample size and due to the fact that the factor analysis of IT applications did not produce a corresponding factor. In each industry, the higher the strategic IT usage score, the more IT usage coincided with elements common to that particular economic sector.

Since the variable "overall financial performance" correlated significantly with most of the other financial performance indicators, we decided to use it as the sole dependent variable measure of financial performance.

We attempted to predict these two dependent measures—strategic usage and financial performance—in stepwise multiple regression equations. For all three economic sectors, one to three factors out of six successfully predicted actual strategic IT use and financial performance (see Table 4). The strongest predictor was IT Industry Leadership (the perception that the firm was an industry leader in utilizing IT), suggesting that managers accurately assessed their firm's relative position of IT application and that of their competitors as well.

The view of IT's relative contribution to firm strategy was predictive in manufacturing and trade firms, and the length of time that a firm utilized IT was predictive for trade firms. The other measures of IT diffusion and experience did not correlate with strategic IT usage.

Table 4: Regression Results for Strategic IT Usage in Manufacturing, Trade, and Business Services

		Dependent Variable							
		Strategic IT Use				Financial Performance			
Step	Independent Variable	Adj. R^2	β	*t*	*F*	Adj. R^2	β	*t*	*F*
	Manufacturing Firms (n=68)				9.52***				4.26*
1	IT Industry Leadership	.06	.25	10.17***		.05	.25	-2.06*	
2	IT Company Role	.11	.25	10.27***					
	Trade Firms (n=42)				8.35***				7.95**
1	IT Industry Leadership	.08	.26	7.24**		.15	.41	-2.82*	
2	Years Using IT	.11	.19	–3.19*					
3	IT Company Role	.14	.17	2.35*					
	Business Service Firms (n=26)				9.00**				4.78*
1	IT Industry Leadership	.06	.25	-3.00**		.14	.42	-2.19*	

*$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

5.2.3. Strategic IT Usage and Financial Performance compared to Firm Strategies

To refine our measure of strategic applications, we attempted a refinement of the measurement of a firm's strategy. We performed a principle components analysis on 10 aspects of strategies (adapted from Kim and Choi [15]), indicated by respondents to be important in their firm. (Although small firm strategies have been explored previously, strategies can be quite divergent. Additionally, we were unsure how similar strategies in Slovenia were to those in other countries.) Three types of generic strategies emerged as follows (Table 5):

- Factor 1: Innovative — high in research and development and new product/service development.
- Factor 2: Efficient — high in automating functions and efficiency, and
- Factor 3: Low Cost — high in low-price competition and fairly high in low-cost production.

Table 5: Principle Component Analysis for Firm Strategies

Strategy	Factor 1: Innovative	Factor 2: Efficient	Factor 3: Low Cost
Unique product or service	.49	.16	-.16
Customer Service	.46	.18	
Low-price Competitor	-.11	-.22	**.86**
Low-cost Producer	.13	.46	**.71**
Product /Service Quality	.61	.29	.12
Automating Functions	.16	**.86**	
Efficiency	.21	**.82**	
Research and Development	**.84**	.11	
Employee Education and Training	.63	.26	
New Product/Service Development	**.73**	-.15	
Eigenvalue	*3.18*	*1.40*	*1.19*
Percentage of common variance explained	*31.82*	*14.00*	*11.87*
Cumulative percent of variance explained	*31.82*	*45.81*	*57.68*

n = 147, Factors in boldface have significant factor loadings ≥ .70.

We then attempted to predict each strategy using the firms' IT applications (see Table 6). The Innovative strategy was strongly associated with research and development and with marketing and sales. The Efficient strategy was associated with IT applications in purchasing and procurement whereas the Low Cost strategy was associated only with applications in personnel and human resources. Possibly this was because IT applications are not being purchased in keeping with the low-cost/low-price strategy, or it could suggest that IT applications are simply not being leveraged strategically.

Firms valuing innovation appear to be leveraging IT most effectively. Still, other areas of strategic IT application could be heightened (e.g., personnel and human resources on high cost, difficult to attract and retain, creative employees)

Table 6: Stepwise Regression Results for Strategies

		Innovative			Efficient			Low Cost		
Step	Ind. Variable	Adj. R^2	β	t	Adj. R^2	β	t	Adj. R^2	β	t
1	R&D	.15	.25	4.22***						
2	Marketing /Sales	.23	.25	3.79***						
	F		21.41***							
1	Purchasing/Procurement				.10	.33	2.73**			
	F					7.47***				
1	Personnel/Human Resources							.07	.27	2.15*
	F								4.64*	

Dependent Variable (spanning Innovative, Efficient, Low Cost)

$*p \leq .05; **p \leq .01; ***p \leq .001$

6. Conclusion

The results suggest that Slovene small firms indeed are using some applications of IT strategically and that strategic IT usage is associated with two or three factors. The hypothesis addressing strategy-IT linkage (H1) was partially supported. Viewing IT as a strategic investment (H1a) did not significantly contribute to strategic IT usage. But the perception of IT's link to strategy did make a difference—when IT was perceived as being integral to a firm's strategy, it contributed to strategic IT usage in manufacturing and trade firms. Neither viewing IT as a strategic investment nor perceiving IT as integral to strategy significantly affected the financial performance of the sample firms.

The second hypothesis addressed the link between IT experience and strategic and profitable IT usage. Here again, partial support was found. The percentage of IT users (H2b) and experts (H2c) in the firm had no significant influence on whether IT was strategically or profitably utilized. The length of time IT has been used in a firm (H2a) was a significant contributor among trade firms but not among manufacturing or business service firms. Whether a firm was viewed as an IT leader (H2d) in its industry was the strongest predictor of strategic and profitable IT usage. This was true among manufacturing, trade, and business service firms.

Additional analyses show that firms adopting a low-cost strategy are the least likely to use IT strategically whereas firms emphasizing innovation and, to a lesser extent, an efficiency strategy, use IT more strategically.

Findings from this study can help small business increasingly leverage IT for competitive advantage, specifically as they face marketplace dynamics such as the following:

- In the near future, an additional 20% of the current Slovene workforce will be employed in the business sector; many will need additional IT expertise.
- In more developed markets, business services firms are very strong IT users, which is not yet the case in Slovenia. This likely will change as the small business sector matures in Slovenia.
- Global trends, such as usage of the Internet, e-commerce, and networked cooperation among firms

will likely have a big impact on small Slovene firms in the near future. These changes definitely impact attitudes toward IT and its usage.

Weaknesses of the present study include the following. First, we assumed that the common utilization of IT applications in economic sectors was an indicator of areas of strategic importance. There may be some multicollinearity present across the variables. Additionally, environmental variables (e.g., the degree of rivalry, the number of competitors, etc.) might be tested in further research, as might the reasons why small firms' managers/owners do and do not utilize IT strategically. Last, managers' opinions of IT strategic applications can deviate from actual usage. This is especially so in the rapidly changing environments such as that of Slovenia.

7. References

[1]   Agency for Payment System of Slovenia, *Bulletin on the Business Results within the Economy of Slovenia,* Agency for Payment System of Slovenia, Ljubljana, 1998.

[2]   K. Baker, and S. Baker, "The 1996 Business Strategist's Software Dictionary", *Journal of Business Strategy*, 17(1), 1996, pp. 41-52.

[3]   A. Baura, C.H. Kriebel, and T. Mukhopadhyay, "Information Technologies and Business Value: An Analytic and Empirical Investigation", *Information Systems Research,* 6, 1995, pp. 3-23.

[4]   F. Bergeron, L. Raymond, M. Gladu, and C. Leclerc, "The contribution of information technology to the performance of SMEs: alignment of critical dimensions", *6ᵗʰ ECIS Proceedings*, Volume 1, 1998, pp. 173-187

[5]   Bhide, "How Entrepreneurs Craft Strategies that Work", *Harvard Business Review*, 1994, March-April, pp. 150-161.

[6]   Blennerhassett, L., and E. Galvin, E. "The Strategic Dimension", In J. Peppard (ed.), *I.T. Strategy for Business*, Pitman Publishing, London, 1993, 26-52.

[7]   Carmines, E.G., and R. A. Zeller, *Reliability and Validity Assessment,* Sage, Beverly Hills, CA, 1981.

[8]   J.G. Covin, D.P. Slevin, and R.L. Shultz, "Implementing Strategic Mission: Effective Strategic, Structural and Tactical Choices", *Journal of Management Studies*, 31, 1994,pp.481-504.

[9]   P.B. Cragg, and M. King, "Small-Firm Computing: Motivators and Inhibitors",*MIS Quarterly*,1993,March,pp.47-60.

[10] S. Dutta, and P. Evrard, "Information Technology and Organization within European Small Enterprises", *European Management Journal*, 17(3), 1999, pp. 239-251.

[11] Eurostat, *Enterprises in Europe: SME Database Data, 1990-1995*, Luxembourg, Eurostat, 1999.

[12] D. Fink, "Guidelines for the Successful Adoption of Information Technology in Small and Medium Enterprises", *International Journal of Information Management*, 18(4), 1998, pp. 243-253.

[13] V. Grover, "An Empirically Derived Model for the Adoption of Customer-based Interorganizational Systems" *Decision Sciences*, 24(3), 1993, pp. 603-640.

[14] M. Igbaria, N. Zinatelli, and A.L.M. Cavaye, "Analysis of Information Technology Success in Small Firms in New Zealand", *International Journal of Information Management*, 18(2), 1998, pp. 103-119.

[15] Y. Kim, and Y. Choi, "Strategic Types and Performances of Small Firms in Korea", *International Small Business Journal*, 13(1), 1994, pp. 13-25.

[16] A. Langley, and J. Traux, "A Process Study of New Technology Adoption in Smaller Manufacturing Firms", *Journal of Management Studies*, 31, 1994, pp. 621-652.

[17] D. Lesjak, "Evaluating (Current and Future) Impacts of Information Technology Usage" In: *Advances in Management*. Windsor, Ontario, Canada: The International Institute for Advanced Studies in Systems Research and Cybernetics, 1993, pp. 143-148.

[18] Loehlin, J. C. *Latent Variable Models: An Introduction to Factor, Path, and Structural Analysis*, Laurence Erlbaum Associates, 1998.

[19] Ministry of Small Business and Tourism, *Small Business in Slovenia*, Ministry of SB&Tourism, Ljubljana,1999.

[20] G.C. Moore and I. Benbasat, "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation", *Information Systems Research*, 2(3), 1991, pp. 192-222.

[21] R. Moreton, "Transforming the Organization: The Contribution of the IS Function" *Journal of Strategic Information Systems*, 4, 1995, pp. 149-163.

[22] Nunnally, J.C., *Psychometric Theory*, McGraw-Hill, New York, 1978.

[23] Peppard, J., Using IS/IT to Gain Competitive Advantage. In Peppard, J. (ed.), *I.T. Strategy for Business*, Pitman Publishing, London, 1993.

[24] M.E. Porter and V.E. Miller, "How Information Gives You a Competitive Advantage". *Harvard Business Review*, 4, 1985, pp. 149-160.

[25] R.K.Jr. Rainer and A.W. Harrison, "Toward Development of the EUC Construct in a University Setting", *Decision Sciences,* 24 (26), 1995, pp. 1187-1201.

[26] L.W. Rue and N.A. Ibrahim, "The Status of Planning in Smaller Family-Owned Business" *Family Business Review*, 9(1), 1995, pp. 29-43.

[27] S. Taylor and P.A. Todd, "Understanding Information Technology Usage: A Test of Competing Models", *Information Systems Research*, 6, 1995, pp. 144-152.

[28] T.S.H. Teo and J.S.K. Ang, "Critical Success Factors in the Alignment of IS Plans with Business Plans", *International Journal of Information Management*, 19(2), 1999, pp. 173-185.

[29] C. Wiseman, C., "Foreword" in C. Ciborra, and T. Jelassi (eds.), *Strategic Information Systems: A European Perspective*. Chichester, John Wiley , UK, 1994