e-Commerce Investments from an SME perspective: Costs, Benefits and Processes

Sandra Cohen and Georgila Kallirroi
Athens University of Economics and Business, Greece
scohen@aueb.gr

Abstract: The scope of this paper is to investigate whether SMEs take into consideration the cost dimensions (tangible and intangible, direct and indirect) and follow the investment appraisal techniques proposed in literature as relevant and suitable in relation to e-commerce adoption. More specifically, we analyse the importance placed by the EC adopters on specific cost elements, types of budgets and investment appraisal techniques in relation to EC decision. Furthermore, we aim at understanding the reasons, both quantitative and qualitative, that drive SMEs to embark on such an investment. Our empirical evidence is based on the responses to questions found on a structured questionnaire answered by Greek firms that have already adopted EC. Our findings indicate that cost, in general, is not a major issue for Greek SMEs when deciding to implement EC, while the strategic benefits they aim at gaining from EC applications play a critical role in the adoption decision.

Keywords: e-commerce, IT investment, SMEs, IT costs, IT investment appraisal, Greece

1. Introduction

Information and communications technologies (ICT) are radically changing the competitiveness of organisations. Electronic commerce (EC), defined as the use of electronic methods, means and procedures to conduct various forms of business activity in cyberspace (Brian, 1998) has become a priority for many corporations within the context of ICT, since managers see it as a way to overcome certain limitations of the traditional distribution channels. In this paper we take into consideration all the perspectives of EC that have been defined in recent literature, i.e. the communication, the business process, the service and the online perspective of EC[i]. EC has reduced the cost of trading among companies and in the same time has helped them tighten their relationships and collaboration. Through EC, companies are now able to connect with their trading partners for "just in time production" and "just in time delivery" (Ngai and Wat, 2002). The coordination of strategic movements has been improved and the response to customers' needs has become faster, more flexible and of higher quality. Moreover the World Wide Web has given the opportunity to firms, irrespective of their size, to enter the fields of international marketing and trade their products and services on a global scale regardless of geographical, national, financial or other limitations. e-Commerce has the ability to change the way companies compete with one another, since the new technologies influence the strategic plans of organizations and they offer competitive advantages on both local and global level (Doukidis et al., 2001). According to Currie (2000), the cost/performance benefits of e-commerce can be categorized in four (4) groups. The first group relates to the reduction of external and internal communication expenses, the second to the revenues generated either from current business or from new initiatives, the third to the tangible benefits, such as reduced costs and more flexible working practices, and the final group refers to intangible benefits such as enhanced competitive positioning and enhanced customer relationships.

Thus, small and medium sized companies, SMEs[ii], that have limited opportunities and strengths when trying to compete against the big multinational corporations may find a way to overcome the obstacles incurred by their small size through the multiple benefits that EC offers.
Although EC is considered to be one of the main forces towards a new business environment, there is limited empirical evidence in relation to the extant evaluation process regarding its implementation. Even though many organizations have adopted EC, a lot of them are unaware of the total costs associated with this investment, as web technology is relatively new (Avram, 2001; Larsen and Bloniarz, 2000). However, according to Porter (2001), no organization should embark on the undertaking of an EC project without understanding the costs and performance of such issues. The scope of this study is to investigate whether SMEs take into consideration all the cost dimensions and follow the investment appraisal techniques proposed in literature as relevant and suitable in relation to EC adoption. More specifically, we analyze the importance placed by EC adopters on specific cost elements, types of budgets and investment appraisal techniques in relation to the EC project. Furthermore, we aim at understanding the reasons, both quantitative and qualitative, that drive SMEs to embark on such an investment.

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The structure of the paper is the following. The second section is devoted to analysing ICT and EC from a SME perspective. The third section refers to specific cost issues that have been presented in literature as relevant to EC investments. The fourth section outlines the investment appraisal techniques that on theoretical grounds are applicable for ICT investments. In the fifth section the methodological aspects of our empirical survey are analyzed. The sixth section is dedicated to the presentation of the empirical evidence regarding the financial aspects of EC adoption in Greek SMEs. Finally, in the last section, a discussion of the main conclusions of our research is undertaken.

2. ICT and EC in SMEs

In most developed countries SMEs constitute a highly dynamic and important sector of the economic activity that, nevertheless, has to deal with high competitive pressures and scarcity of resources. Information and communication technologies (ICT) offer SMEs significant opportunities to grow and to compete in the current business environment. There are several studies indicating that Information Systems can add value to SMEs. Heeks and Duncobe (2001) refer to the way that companies in developing countries can use IT/IS in order to build businesses. Domaracki (2001) explains how the differences in technology acquisition between large and small enterprises are smoothing out and thus the gap is being bridged. Blili and Raymond (1993) recognize the need for SMEs to use IT as a means of integration within the industry supply chain and of cost minimization. However, as presented in Levy and Powell (1998), the flexibility that characterizes SMEs in relation to their responsiveness to customers' requirements is not reflected in IS adoption or use. This is mainly due to the fact that SMEs consider IT projects to be investments that absorb a significant part of their constrained resources rather than an opportunity for growth. Moreover, SMEs fail to identify the change in organizational and management structures that may be required due to IT adoption as they do not usually incorporate an IT strategy approach that would permit a thorough examination of these aspects (Levy and Powell, 2000). Levy, Powell and Yetton (2001; 2002) have recently developed a focus-dominance model that explains how SMEs use information technologies to accomplish different goals. Their model refers to four different scenarios within a matrix that correspond to a combination of customers' dominance level within the market and the strategic focus of the company.

Internet in general is usually considered as an opportunity for smaller firms to reduce transaction costs and level the playing field (Evans and Wurster, 1997). Often cited benefits include expanding the scope of marketing, wider and richer communications, reaching new markets, reducing the cost of operations and partnering with suppliers and other collaborators. However, there are also certain limitations that make the adoption of EC by SMEs more difficult and hazardous. The cost of in-house EC applications development can be very high and mistakes caused by the lack of experience and know-how may result in delays. Moreover, security and privacy aspects should be dealt with caution especially in the Business to Customers area. Therefore the EC industry has a very long and difficult task of convincing customers that online transactions and privacy are in fact secure. In addition customers in many cases do not trust an unknown, faceless seller, paperless transactions and electronic money. Finally, many legal issues are unresolved and in several circumstances government regulations and standards are not yet refined enough to deal with the intricacies of EC (Turban et al., 2002).

A few studies (Kleindl, 2000; Steinfield and Whitten, 1999) have identified possible shortcomings that smaller businesses can experience due to internet usage. Competitive threats may increase as the new medium allows larger firms to mimic the traditional strength of SMEs in serving niche markets, developing customer intimacy and exploiting local knowledge. For example, a regional firm, which previously had limited local competition, may be confronted with new threats from across the country or the globe. The new technology may also increase competitive rivalry and the pace of competition by reducing barriers to entry and increasing the rate of product and process innovation (Drew, 2003).

In literature, there are several empirical studies that deal with the level of EC adoption by SMEs (Damaskopoulos and Evgeniou, 2003; Santarelli and D'Altri, 2003, Doukidis et al., 2001). The above-mentioned surveys, as well as the European E-business Report (2002/2003), reveal that the full implementation of e-business solutions is still in its infancy for the majority of SMEs. A recent research performed by the Information Society (2003) in relation to internet usage and EC activities of SMEs in Greece, revealed that SMEs with more than 11 employees use Internet at a rate of 92%, 82% of them have at least one PC and 48% have a presence in the World Wide Web. The relevant figures in EU for the year 2002 were 94%, 83% and 52%, respectively. However, IT/IS usage is relatively

low for Greek SMEs in total (PC usage 34% and internet usage 18%) due to the low level of electronic processes in small businesses (1 to 5 employees), which account for almost 95% of the total SMEs population[iii].

3. e-Commerce cost implications

Electronic commerce is part of investments in information and communications technology (ICT). Since literature is mostly focused on the evaluation of ICT projects we will concentrate on the basic elements of this procedure having in mind that they are also applied to EC project evaluation[iv]. According to Hinton and Kaye (1996), the evaluation of information technology investments relies on the satisfactory assessment of costs and benefits. However, all costs and benefits in these applications cannot easily be allocated. This is mainly due to the fact that there are two categories of costs and benefits when it comes to information technology (IT) applications, the tangible and the intangible ones. The tangible costs and benefits address the parts of an investment decision, which the manager can easily identify and attach a quantifiable value to. These elements have a historical cost in accounting terms and usually have some physical form. On the other hand, the intangible elements refer to the costs of an investment, that commonly do not have a physical form and are accounted for in terms of some expected future value rather than a past cost. It is the intangibility associated with IT investments which creates problems for the organization in initially justifying and later assessing the costs and benefits of their spending (Ward et al., 1990).

Except for the tangible and intangible cost elements there are direct and indirect elements of cost as well. Direct costs are those factors that can be easily attributed to the implementation and operation of an e-commerce application or of an IT system in general. These costs are often underestimated and go beyond the obvious hardware, software and installation costs. Direct costs may also include unexpected additional accessories, consultancy support, etc. However, the indirect costs associated with the adoption of EC projects are usually the most significant ones. Indirect costs can largely be divided into human and organizational factors with one of the largest indirect human costs being that of management time (Irani et al., 1997). On the other hand one of the most significant indirect organizational costs relates to the transformation from old to new work practices and any influence of the system on work activities (Love et al., 2004). Because of the existence of such hidden costs most companies tend to underestimate the total cost of the IT projects with 30-50% of costs occurring out of the official IT budget (Hochstrasser, 1992). It has also been estimated that support costs represent 73% of total costs of an IT investment (Gartner Group, 1995).

Another particularity of investments in EC-IT is the dependency, legacy and heritage as described by Hinton and Kaye (1996). Certain attributes are lost when an organization moves from a human dominant system to a technology dominant system. The flexibility and organizational behavior associated with the human systems are traded for the mechanistic attributes of the technological system. While the benefits of automation are initially appealing to organizations, the costs associated with the incapacity to adapt systems to a changing business environment are not considered. It is suggested that dependency occurs when organizations throw away a significant part of the human elements of a system and therefore become more and more reliant to the system itself with the risk of not being able to overcome a possible system failure. Without the effective control of costs an EC project is likely to become a “sinkhole”. In order to effectively control the costs of an EC project an understanding of the total lifecycle cost of an information system investment is needed. According to Whelan and McGrath (2002), even though the start up cost of a website is quite small, the ongoing development and maintenance costs can be excessive. Thus, management must ensure that the full lifecycle costs, including all potential hidden costs, are identified.

4. Investment appraisal techniques and E-commerce

As we have already mentioned in the second section, EC is part of investments in information and communications technology (ICT). ICT investments have special characteristics (i.e., high risk, long term results, large proportion of intangible/hidden costs and benefits), which make the use of traditional appraisal techniques difficult, and the reliability of the outcome most uncertain (Millis and Mercken, 2003). Techniques such as payback period, accounting rate of return, and various discounted cash flows methods, such as net present value (NPV) and internal rate of return (IRR) have been heavily criticized. These methods have been accused that they have a rather narrow perspective, do not include non-financial benefits in the analysis, overemphasize short-term results, wrongly assume preservation of the status quo, treat inflation in an inconsistent manner and finally that they promote non-value-adding behaviour (Adler, 2000).

In order to overcome these problems, there have been proposals in literature for alternative appraisal techniques that better suit investments in IT projects. A first alternative suggests that managers should estimate the intangible costs and benefits of a project using different scenarios and include these estimations in the calculation of NPV. This would allow a sensitivity analysis for the realization of these hypotheses (Willcocks, 1994). A second alternative is the strategic fit approach, originally proposed by Porter (1985), which explicitly addresses the strategic dimensions of the competitive advantage perspective of an IT project. According to this approach, investments in information technology should be evaluated primarily in terms of their contribution to the competitive advantage of a firm adopting them (Millis and Mercken, 2003).

Another approach for the evaluation of IT projects is the information economics method, introduced by Parker and Benson (1987). Information economics in essence uses a process of assigning point-rating scores to assess the investment benefits and strategic relevance of IC technologies (Millis and Mercken, 2003). One of the most recent developed investment appraisal techniques is based on the concept of expert systems and fuzzy logic techniques (Irani et al., 2002). There are also alternatives that deploy both the traditional and the modern appraisal techniques. The most common one is the balanced scorecard developed by Kaplan and Norton (1992). Finally, Farbey et al. (1993) and Farbey et al. (1994) have attempted to develop a procedure that could match the proper IT evaluation procedure to a number of dimensions, such as the evaluation constraints, the role of IT, the dependence of IT projects on other projects, the uncertainty of the investment as to objectives and as to cause and effect. However, despite the advantages that the sophisticated methods have over the traditional ones, these adjusted techniques are seldom used in practice (Ballantine and Stray, 1998).

5. Research design and data collection

The sample surveyed included mainly SMEs Greek companies that had already implemented E-commerce. These companies were identified by a thorough investigation of relevant Greek sites on the Internet. In our analysis we focused on the Business-to-Consumer (B2C) nature of transactions, i.e. the retail transactions with individual shoppers. Furthermore we mainly included companies that combine an online presence with their physical retail stores ("brick-and-mortar" stores). This strategy of having both an off-line and online presence is found in literature as "click-and-mortar" model or it is sometimes called "brick-and-click" (Turban et al., 2002). As the nature of the survey was to monitor the investment appraisal process that is related to EC implementation and the financial implications of such a decision we excluded from our sample all the companies that were solely hosted in shopping portals[v]. The reason for this exclusion was that these companies had not actually undertaken an EC project, but they had rather developed an informative page for their presentation on the Internet. In these cases, the customers were not able to place orders directly to the company but only through the host's site address. The final sample included 162 SMEs. Except for the SMEs companies, we also developed a small sample of larger Greek companies (non – SMEs) in order to control whether there are any significant differences among SMEs and non – SMEs as far as financial considerations regarding EC are concerned. This sample consisted of a smaller number of firms (29 companies) as this type of companies was not the main target group of the analysis.

We did not expect to find differences among SMEs and non – SMEs in their perceptions of the benefits deriving from EC as such differences are not justified on both empirical and theoretical grounds. However, we expected to find that non-SMEs, given that they have more financial resources and are able to attract more educated personnel, apply more sophisticated management accounting practices and financial appraisal techniques in comparison to SMEs. Numerous studies have witnessed that large firms are more apt to management accounting innovation adoptions (Innes et al., 2000). Furthermore, Love and Irani (2004) have found that there are significant differences between firm size (calculated as turnover and number of employees) and the evaluation process followed for IT investments. The field survey was conducted via questionnaires from June to October 2003. We contacted all the sample companies by phone before sending them the questionnaire in order to inform them about our research and ask for their contribution. Forty one (41) SMEs and 5 non-SMEs refused to participate in the survey for a variety of reasons. A five-page questionnaire mostly including questions rated in Likert scale was then sent only to the companies that agreed to participate in the survey. Thus, 145 questionnaires were sent mainly by e-mail and only in a few occasions by fax to 121 SMEs and 24 non-SMEs. After a follow up phase of telephone calls, 50 firms returned the questionnaire completed. The overall response rate was 34.5% (31.4% for the SMEs and 50.0%

for the non-SMEs). Two questionnaires were completed only partially and therefore were excluded from the analysis. Thus, the final sample contains 48 companies, 36 Greek SMEs and 12 Greek non – SMEs.

6. Survey results and descriptive statistics

6.1 Sample statistics

The companies that participated in the survey belong to the following sectors:

Table 1: Final sample composition

Sector	Number of firms SMEs	Non-SMEs	Percent %
Information Technology	14	1	31.3
Wholesale –Retail	13	2	31.3
Telecommunications	2	3	10.4
Financial services	1	3	8.3
Tourism	1	3	8.3
Other	5	0	10.4
Total	36	12	100.0

As indicated in Table 1 above, the different sectors are not evenly distributed in the final sample. However, the initial sample had a similar pattern. The majority of the sample Greek companies have introduced EC during the last 4 years as shown analytically in the following table (Table 2). This finding indicates that the introduction of EC has been rather delayed in relation to the pace of its development in other European countries. Nevertheless, it follows the trend in relation to Internet penetration in Greece (Doukidis et al., 2001).

Table 2: Year of EC introduction

Year of e-commerce introduction	Number of firms	Percent %
Before 1999	4	9.3
1999	9	20.9
2000	11	25.6
2001	10	23.3
2002	9	20.9
Total	43	100.0

N = 43

6.2 EC contribution to revenues and costs

The analysis of the data revealed that EC sales account approximately for the 9.5% of the total revenues of SMEs sample companies (Table 3).

Table 3: Percentage of EC sales to total revenues

N = 17	Median	Mean	Standard deviation
% of total revenues that is due to sales through Internet	3.00%	9.53%	18.27%

Our evidence does not deviate significantly from the findings presented in the European E-business Report (2002/03). This research that included 9,264 SMEs from the 15 countries members of the EU indicates that only 13% of the sample companies used EC for selling purposes. Moreover, forty five percent (45%) of these companies reported that the share of goods and services sold online was less than 5% of their total revenues while another 25% experienced EC sales revenues that lay between 5 to 10%. In our analysis, 58.8% of SMEs achieved EC revenues less than 5% of their total revenues and in 23.6% of the cases EC revenues fell between 5%-10% of their total yearly turnover. Almost half of SMEs (47.1%) spend amounts that fall between 2% to 4% of their year expense budget for EC purposes (Table 4). This finding is consistent with the level of revenues that is generated from e-commerce. This consistency is also statistically significant. The correlation between the % of total revenues that is due to sales through Internet and the % of total budgeted expenses that are dedicated to e-commerce on a yearly basis is statistically significant at 1% significance level (spearman correlation = 0.741, p-value = 0.001). Moreover, this finding is close to that reported by Damaskopoulos and Evgeniou (2003) in a recent research that was based on a sample of more that 900 SMEs in 4 countries of Eastern Europe and Cyprus. Their empirical evidence showed that the majority of SMEs in their sample dedicated less than 5% of the yearly operational budget for EC support. However, the more developed countries, Slovenia and Cyprus, had the lowest expenditure rates.

Table 4: Percentage of total yearly budgeted expenses dedicated to EC

% of total budgeted operating expenses that are dedicated to EC on a yearly basis	Number of firms	Percent %
2-4%	8	47.1
4-6%	1	5.9
6-8%	3	17.6
8-10%	3	17.6
>10%	2	11.8
Total	17	100.0

The majority of SMEs sample companies (64.7%) have a separate department that deals with e-commerce. The average number of employees

working in these departments is 3.6 employees. The human resources that are dedicated to EC (i.e. number of employees devoted to the EC department) are also statistically related to the % of total revenues that is due to sales through Internet. More specifically a statistically significant correlation at 5% significance level exists between these two variables (spearman correlation = 0.619, p-value = 0.014). From the analysis presented above, it is evident that Greek SMEs try to balance the resources they devote to EC in relation to the revenues they obtain from this way of making business.

6.3 Importance of EC's investment appraisal questionable areas

Before analysing the importance of specific cost elements and budgets in relation to the EC adoption decision, we asked the companies to present their opinion of the significance of a number of parameters. These factors have been encountered in literature as "grey zones" that trouble companies when analysing and appraising the EC prospect. Through these questions we identified indirectly the importance of cost issues in relation to the investment decision. The parameters that should be considered carefully due to their importance during the investment appraisal process according to our sample views are the following (Table 5):

Table 5: Important factors during the EC appraisal process

Items	N	Mean	Std.Dev
The benefits from EC are visible only in the long run	48	3.65	1.176
EC benefits are mainly of qualitative nature	48	3.40	1.047
Need for continuous upgrades of EC systems	48	3.08	1.145
Traditional investment appraisal techniques are not applicable to EC	48	3.04	1.148
A part of the total cost of EC is not easily quantifiable	48	2.94	1.060
The lack of historical data makes EC appraisal difficult	48	2.92	1.127
EC creates unbudgeted expenses for system support during its operation	46	2.74	1.124
It is difficult to calculate the cost of capital for EC assessment	48	2.54	1.071
It is difficult to monitor EC implementation progress	47	2.36	1.258

The scale is 1 = very small significance to 5 = great significance.

From the analysis of Table 5 above, it is clearly inferred that Greek companies do not perceive issues that are related to cost, in general, as issues that should be dealt with exceptional consciousness during the investment appraisal process, as they grade them as of medium importance. More specifically, the theoretically justified inadequacy of traditional investment appraisal techniques (mean value 3.04) and the non-easily quantifiable EC costs (mean value 2.92) do not trouble significantly Greek companies. Also, the unbudgeted expenses that appear for EC support during its operation (mean value 2.74) and the difficulties regarding the cost of capital calculation (mean value 2.54) are ranked even lower in significance. As all companies that participate in our survey use EC already, they have probably answered this question on the basis of their experience. So, it seems that they did not encounter significant problems with the issues mentioned above in relation to their EC project. However, the significance of the proposition that the total cost of EC is not easily quantifiable is statistically related, at 5% statistical level, to the year of EC adoption. In other words, earlier adopters consider this parameter more significant in relation to more recent ones (spearman correlation =-0.304, p-value=0.047). Probably as time passes companies become more familiar with all cost parameters that are related to EC and they are able to quantify greater parts of its total cost, a situation that could have been vague some years ago.

6.4 EC success factors

The following Table 6 presents the importance given to a number of factors that, according to the respondents, play an important role in relation to EC adoption and implementation in a successful manner.

Table 6: Evaluation of success factors for the EC appraisal process

Issue	N	Mean	Std.Dev
Proper selection of the planning and development team	48	4.27	.792
EC application development by experienced personnel	47	4.26	.736
Alignment with corporate strategy	48	4.19	.842
Top management support	48	4.13	.937
Rational allocation of resources	48	3.92	.846
Systematic personnel training	48	3.90	.928
EC follow up at frequent intervals	48	3.85	.825
Clear mechanisms of evaluation and reward	47	3.51	.906
Accurate cost estimation	48	2.85	.989

The scale is 1 = very small significance to 5 = great significance.

As indicated in Table 6 above, Greek firms implementing EC consider rational allocation of resources as an important success factor (mean value 3.92) but allocate less than medium importance to the accurate estimation of cost (mean value 2.85). These findings are in alignment with the fact that EC cost per se does not trouble significantly Greek companies that apply EC as long as its application provides a balanced dedication of resources.

6.5 Analysis of EC costs

The analysis of the responses revealed the degree of significance that is given to numerous cost parameters that are related to EC. The answers given are consistent with the overall attitude of Greek companies towards EC. They do not consider, as shown already by the presiding answers, that EC, as an investment, is extremely resource demanding. A possible explanation for that may be that EC applications in Greece, as they account only for a small proportion of total revenues and yearly budget costs, are not difficult applications and thus the cost of their initial implementation as well as their maintenance is not exorbitant. Greek companies devote resources primarily to software (mean value 3.75) and planning and development (mean value 3.67). On the contrary, they consider the costs that are related to personnel training (mean value 2.83) and consultancy (mean value 2.83) of being less than medium significant.

Table 7: Significance of cost items

Cost items	N	Mean	Std.Dev.
Initial software cost	48	3.75	1.042
Planning and development costs	48	3.67	.953
Possible failure cost	48	3.54	1.237
Maintenance and upgrading cost	48	3.40	.939
Initial hardware cost	48	3.23	1.057
Cost of top management involvement	46	3.04	1.095
Cost related to depend-ency on new technologies	47	2.85	1.122
Consultancy cost	47	2.83	1.148
Personnel training cost	46	2.83	.973

The scale is 1 = very small significance to 5 = great significance.

The cost items presented in Table 7 can be categorized into three groups on the basis of factor analysis. These three groups account for the 68.97% of the total variance of the answers to the relevant question (Table 8).

Table 8: Factor analysis of cost parameters

Factors*	Factor loading	% of variance explained by each factor	Cronbach's alpha
Factor 1: EC Preparation and maintenance cost		*30.35%*	0.7789
Consultancy cost	0.811		
Maintenance and upgrading cost	0.803		
Personnel training cost	0.755		
Planning and development costs	0.720		
Factor 2: Direct implementation cost		*20.83%*	0.7896
Initial software cost	0.909		
Initial hardware cost	0.832		
Factor 3: Indirect organizational costs		*17.78%*	0.6006
Cost of top management involvement	0.866		
Cost related to depend-ency from new technologies	0.625		
Possible failure cost	0.457		
Total variance explained		*68.97%*	

*The factors were identified by using the principal component analysis extraction method and the varimax with Kaiser Normalization rotation method. The KMO measure of sampling adequacy is 0.713 and the Barlett's test of sphericity is 124.930 (sig. 0.000). Also, the conventional recommendation of five observations per parameter is met. The factors were also tested for reliability using Cronbach's coefficient alpha (α). An α value of 0.60 or above indicates a reliable measurement instrument (Bagozzi, 1994). The factor analysis revealed that the costs that are relevant to EC could be categorized into three groups. The first group that was given the name "Preparation and maintenance cost" contains all costs that are relevant to the preparation of EC introduction as well as its maintenance. The second group, which was called "Direct implementation cost", is composed of all the direct initial EC adoption costs, i.e. direct software and hardware acquisition and installation costs. Finally, the third factor that was named "Indirect organizational costs" contains costs that are related to influences caused to the organization by the EC. The first and the second factor above

correspond to the direct costs in relation to EC. The third factor is related to the indirect cost. From another point of view, the first two factors contain the cost parameters that are usually identified as tangible costs while the third shares features in the intangible cost category. As discussed in section 2, the dedication of resources during the life cycle of an EC project differs. The perceptions of Greek companies implementing EC in relation to this issue (Table 9) are very close to those already depicted in recent empirical surveys. More specifically EC adopters perceive EC implementation phase as the most demanding one (65.0%) followed by the EC operation and maintenance phase (57.5%), while the takeout phase is considered to impose a minor financial burden on the company (10%).

Table 9: Cost requirements through EC life cycle phases

Phase	% of respondents*
EC implementation	65.0%
EC operation and maintenance	57.5%
EC development and maturation	45.0%
Idea generation and investment appraisal	37.5%
Acquisition of the necessary equipment	32.5%
EC retraction	10.0%

*Respondents could give multiple answers to the question. N = 40

6.6 Investment appraisal techniques used

We investigated the techniques used by the sample companies during the EC investment appraisal process. As EC investment is an ICT investment we expected the implementation of a suitable method to evaluate such a long-term project. However, we expected differences between SMEs and non-SMEs as to the sophistication of the techniques adopted. More specifically, we hypothesized that SMEs would apply less sophisticated investment appraisal techniques in comparison to the non-SMEs mainly due to limitations that SMEs usually experience in relation to the knowledge prerequisites and the financial means that are related to these methods. The most common investment appraisal technique used in order to assess EC projects for the total sample companies (Table 10) is the cost-benefit analysis followed by Internal Rate of Return method (IRR), the Payback Period method and the Net Present Value method (NPV). However, as expected, the selection of investment appraisal method is influenced by the firm's size. SMEs use more often cost-benefit analysis in comparison to non-SMEs (statistical significant difference at 1%). On the other hand, non-SMEs tend to use more frequently IRR (statistical significant difference at 1%). Thus, SMEs companies prefer less sophisticated and easier to apply investment appraisal techniques such as cost-benefit analysis and payback. Non-SMEs, as they employ personnel adequately experienced and educated in financial appraisal methods, apply more frequently discounted cash flow methods such as IRR and NPV.

Table 10: Investment appraisal techniques used

Investment appraisal technique used	Total sample % (Rank)	SMEs % (Rank)	Non – SMEs % (Rank)	Difference between SMEs and Non-SMEs* t value (prob. value)	Difference between SMEs and Non-SMEs * Mann – Whitney U test, z score (prob.value)
Cost - benefit analysis	79.2% (1)	68.4% (1)	31.6% (4)	3.669 (0.001)	-2.030 (0.042)
IRR	33.3% (2)	19.4% (3)	75.0% (1)	4.025 (0.000)	-3.499 (0.000)
Pay back period	31.3% (3)	30.6% (2)	33.3% (2)	0.176 (0.861)	-0.178 (0.859)
NPV	18.8% (4)	13.9% (4)	33.3% (2)	1.265 (0.225)	-1.479 (0.139)

*As the number of observation within each sub-sample (SMEs and non-SMEs) is rather small we used both parametric (t test of equality of means) and non parametric (Mann – Whitney U test) tests in order to assess the existence of statistically significant differences between the two groups. The results of the tests are consistent.

7. Budget development and follow up

Table 11: Budget time frame

Budget time frame	SMEs (% of SMEs)	Non -SMEs (% of non - SMEs)	Total (% of total)
1 semester	1 (4.2%)	0 (0.0%)	1 (2.9%)
1 year	12 (4.2%)	3 (27.3%)	15 (42.9%)
2 years	5 (50%)	4 (36.4%)	9 (25.7%)
3 years	5 (20.8%)	2 (18.2%)	7 (20.0%)
3 to 5 years	1 (4.2%)	2 (18.2%)	3 (8.6%)
Total	24 (100.0%)	11 (100.0%)	35 (100.0%)

Table 12: Frequency of budget follow up

Frequency of budget follow up	SMEs (% of SMEs)	Non SMEs (% of non SMEs)	Total (% of total)
Every month	6 (25.0%)	2 (18.2%)	8 (22.9%)
Every trimester	11 (45.8%)	4 (36.4%)	15 (42.9%)
Every semester	4 (16.7%)	3 (27.3%)	7 (20.0%)
Once a year	3 (12.5%)	2 (18.2%)	5 (14.3%)
Total	24 (100.0%)	11 (100.0%)	35 (100.0%)

It should be mentioned that 74.5% of the respondents had developed a budget prior to EC adoption (66.7% of SMEs and 100.0% of non-SMEs). The development of an EC budget is significantly statistically related to the type of the firm. Non-SMEs tend to develop budgets more systematically than SMEs (t= 4.183, p-value = 0.000). The range of these budgets covers a period from 6 months to 5 years. The most common time frame for these budgets is one year (42.9%) and the period that is commonly used for its follow up is one trimester (42.9%). Both the budget time frame and the frequency of budget follow-up do not differ, at a statistically significant level, between SMEs and Non-SMEs. Table 11 and Table 12 present more details regarding the budget time frame and its follow up frequency.

The follow up of the budgets in the majority of the sample companies (65.7% of the cases) reveals the existence of variances. The occurrence of these variances is more frequent for SMEs in comparison to Non-SMEs (t = 2.661, p-value = 0.012). Non-SMEs, due to their familiarity with budgets in a variety of occasions regarding their business activities, are probably more experienced in developing accurate forecasts. However, only 31.4% of the respondents reported that these variances were due to cost issues and more specifically to cost issues that were not included in the initial budget. Change to the primary plans regarding the EC implementation is considered to be a more important driver for these discrepancies (46.4%).

7.1 Qualitative reasons for EC adoption

Finally, we asked respondents to select from a given list the motives as well as the expected benefits that had driven them to EC adoption. As shown in Table 13, Greek companies do not perceive cost reduction as a main driving force for EC introduction (37.5%). Even though cost reduction is a popular justification in relation to IT investments in general (Hinton and Kaye, 1996) this is not the case as far as EC is concerned according to our sample companies. Other reasons, that are mainly strategically oriented, have driven Greek companies to undertake this investment as presented in Table 13.

Table 13: Motives for EC adoption

Motives	% of respondents
Preservation of competitive position	75.0%
Entering into new markets	62.5%
Technological modernization	58.3%
Differentiation	37.5%
Cost reduction	37.5%

N=47

Moreover, cost reduction, in relation to production, selling, administrative and order handling costs, was ranked again as having medium importance in relation to other more quantitative and customer oriented benefits (Table 14). Similar conclusions have also been reported in Paris et al. (2004) in relation to a survey of “brick and mortar” organizations.

Table 14: Perceived benefits for EC adoption

Perceived benefits	% of respondents
Facilitation of customer informing	83.3%
Means of entering new markets	81.3%
Approaching new customers	75.0%
Acquisition of competitive advantage	66.7%
Increase of sales	58.3%
Reduction of operating costs	54.2%
Exploitation of new distribution channels	52.1%
Flexibility in customer service	52.1%
Quality in customer service	50.0%
Reduction of selling and administrative costs	47.9%
Reduction of order handling time	45.8%

N=48

As an epilogue, we can claim that both motives and benefits presented by Greek companies in relation to EC adoption are comparable to those reported in other recent studies (Damaskopoulos and Evgeniou, 2003; Santarelli and D'Altri, 2002, Doukidis et al., 2001).

8. Summary and discussion

In this paper we studied the significance of cost issues as a dimension of the overall assessment of an EC project by Greek SMEs. More specifically, we investigated the importance placed by EC adopters on specific cost elements (tangible and intangible, direct and indirect) in relation to EC and the cost requirements during the investment's life cycle. Also, we analyzed the time frame and the follow up of the cost budgets used by EC adopters. Furthermore, we studied the investment appraisal techniques used by SMEs for evaluating EC. In order to identify whether SMEs differentiate from non –SMEs, i.e. larger Greek companies, we also used a small control sample in order to test for significant variations to numerous issues presented above.
The majority of Greek companies that have introduced EC have done so during the last 4 years. This finding indicates that the introduction of EC has been rather delayed in relation to the pace of its development in other European countries. Greek SMEs that apply EC gain approximately 10% of their revenues from sales through internet. They also devote an analogous portion of their yearly budgeted operating expenses to EC. This relation, that is statistically significant, raises a number of issues. A first interpretation is that Greek SMEs companies appear to be realistic in their expectations in relation to EC and tend to balance the resources they devote to EC to the revenues they obtain from this way of making business. On the other hand, this relation may signal that Greek SMEs have a significant potential to increase their EC revenues by dedicating more resources to EC.

Greek companies do not perceive issues that are related to cost, in general, as issues that should be dealt with exceptional consciousness during the investment appraisal process, as they grade them with medium importance. However, this attitude is not homogeneous through time. Probably, as time passes, the cost parameters that are related to EC become more transparent and the vagueness of several cost items related to EC is resolved. Moreover, Greek companies do not perceive EC as an investment that is extremely resource demanding. A possible explanation for this may be that EC applications in Greece, due their small scale, as only a small proportion of yearly budget costs is devoted to them, are not difficult applications and thus the cost of their initial implementation as well as the cost of their maintenance is not excessive.

Greek EC adopters are aware of the fact that EC has different resource requirements during the different phases of its life cycle. They also anticipate that EC is related to both direct and indirect costs as well as tangible and intangible costs but they usually rank direct tangible costs as being more significant. This is not in alignment with IT literature where it is clearly stated that the intangible costs are far greater than the visible ones (Hinton and Kaye, 1996). As far as investment appraisal techniques are concerned, SMEs prefer less sophisticated and easier to apply techniques such as cost-benefit analysis and payback. Non-SMEs, as they employ personnel adequately experienced and educated in financial appraisal methods, apply more frequently discounted cash flow methods such as IRR and NPV. This finding is partially consistent with international practices, where discounted cash flows techniques are perceived more difficult and thus are used to a lesser extent for ICT investments (Ballantine and Stray, 1998). The majority of Greek companies develop a budget prior to EC adoption. The range of these budgets covers a period from 6 months to 5 years. The most common time frame for these budgets is one year and the period that is commonly used for its follow up is one trimester.

Cost reduction has not been considered as the main driving force in relation to the introduction of EC. On the contrary, other more qualitative and customer oriented benefits have driven Greek firms to adopt EC. Thus, as already indicated in other studies (Remenyi et al., 2001), EC is perceived rather as a strategic issue and within this context operational aspects such as costs are somewhat downplayed. Finally, from the analysis above we can conclude that Greek SMEs are aware of the whole range of EC perspectives as they use it as a tool for communicating purposes, for business process improvement, for service amelioration and for online transactions. The conclusion that can be drawn, as a synopsis of the survey results, is that Greek SMEs can adopt EC without incurring unbearable costs. Moreover, these costs are rather easily quantifiable, manageable and controllable and above all revenues counterbalance them. However, even though in quantitative terms EC is not a major tool for cost reduction, it provides significant recourses and qualitative benefits that can help SMEs to become more competitive in the market overcoming the limitations of their size.

Our findings are based on the analysis of an adequate sample of SMEs and a small sample of larger companies implementing EC. The analysis of the two sub-samples (SMEs and Non-SMEs) has not revealed any statistically significant differences that could induce noise in the empirical evidence, apart from the expected variation in the use of investment appraisal techniques and the frequency of budget development. Moreover, our analysis in relation to the actual financial resources devoted to EC and the revenues steaming from it is exclusively concentrated on SMEs in order our findings to be comparable with other SMEs studies. Thus, the fact that the sample is not homogeneous does not undermine the relevance of our conclusions. However, a limitation in our research is the small number of observations in absolute terms. Also, the composition of the sample due to the uneven representation of different sectors may induce some sort of bias to the conclusions.

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[i] As presented in Turban et al. (2002) EC can be viewed in various perspectives. These perspectives are the communications perspective (i.e. the delivery of goods, services, information, or payments via computers networks, or by any other electronic means), the business process perspective (i.e. the application of technology towards the automation of business transactions and work flow), the service perspective (i.e. the use of EC as a tool that addresses the desire of firms, consumers and management to cut service costs while improving the quality of goods and increasing the speed of service delivery) and finally the online perspective (i.e. the capability of buying and selling products and information on the Internet as well as providing other online services).

[ii] According to the definition of the European Commission (1996) a small and medium sized company is characterised by three major factors. Firstly it should employ less that 250 employees, secondly its annual turnover should not exceed the amount of €40 millions and finally it should not belong by a percentage of 25% or more to another company or companies that are not defined as SMEs.

[iii] According to the data provided by the Greek Organisation of Small and Medium Sized Enterprises and Handicraft (EOMMEX, 2003) SMEs in Greece account for the 99.5% of the total population of firms as well as the 87.5% of private sector workforce employment.

[iv] However, from another point of view an EC project could be considered as a business project which encompasses IT features.

[v] Shopping portal is a site that has organised links to e-tailers, often with comparisons, reviews, or shopping tools for consumers. Many shopping portals are targeted towards a specific market niche (Turban et al., 2002).

