Dissertation

“How benefits, costs, risks, business related aspects and owner aspects affect the evaluation of Information Technology system that used by very small enterprises in Greece”

Postgraduate Student
Athina Chatzimarkou
(000491898)

Supervisor
Dr. Efstathios Dimitriadis

February, 2010
Acknowledgements

I would like to thank from the bottom of my heart the people that supported me most during this master programme.

I would like to start with my family, my husband, mother and sister for all their support and love.

My friend Despoina for all her help and proofreading

And my supervisor in this dissertation Dr. Efstatios Dimitriadis for all his help, support, guidance and understanding.
# Contents Table

### Introduction

Chapter 1: Information Technology and Small Enterprises

1.1 History of Information Technology
1.2 Information Technology
1.3 Information Technology Costs
1.4 Small Enterprises
1.5 SMEs Economy and Management Issues
1.6 How SMEs Currently Use Information Technology
   1.6.1 Low Users
   1.6.2 Medium User
   1.6.3 High Users
1.7 Productivity Problems among SMEs
1.8 Potential Benefits of information technology on SMEs

Chapter 2: Literature Review

2 Introduction
   2.1 Benefits management
      2.1.1 Strategic objective
      2.1.2 Tactical objective
      2.1.3 Pecuniary Objective
   2.2 Costs
   2.3 Risk
   2.4 Business related aspects
   2.5 Owner characteristics

Chapter 3: Research Methodology

3.1 Introduction
3.2 Survey and Data Collection
3.3 Measurement of variables
3.4 Measures Validation
## Chapter 4: Data Analysis - Results

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Sample’s Characteristics</td>
<td>42</td>
</tr>
<tr>
<td>4.2 I.T Satisfaction</td>
<td>44</td>
</tr>
<tr>
<td>4.3 ANOVA Analysis</td>
<td>45</td>
</tr>
<tr>
<td>4.3.1 ANOVA Analysis for Respondents Characteristics</td>
<td>45</td>
</tr>
<tr>
<td>4.3.2 ANOVA Analysis for Business Characteristics</td>
<td>47</td>
</tr>
<tr>
<td><strong>Conclusions</strong></td>
<td>49</td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>52</td>
</tr>
<tr>
<td><strong>Appendix</strong></td>
<td>60</td>
</tr>
</tbody>
</table>
Introduction

Whatever is related with computers technology such as networking, hardware, software, the Internet, or the people that work with these technologies could be referred as Information Technology or I.T. The computer programming, network administration, computer engineering, Web development, technical support, and many other related occupations constitute a part of I.T.

The I.T has brought up one of the major fundamental changes in our times and brings huge possibilities and changes in our society as a total.

The use of Information Technology (IT) is so extensive, that it is hard to imagine organizations in some developed or developing countries, which do not use any form of Information Technology.

Initially only the big enterprises were using I.T systems whereas nowadays also the very small enterprises use a kind of financial system because they wanted to take the advantage that I.T systems could offer.

The evaluation of Information Technology system is critical for the successful adoption and implementation of Information Technology system. Information Technology represents significant financial investment for many organizations.

The aim of this study is to examine how the owners or the users of I.T systems of very small businesses evaluate the benefits, costs and risks of an investment in information technology. Moreover, aims to explore differences linked to the business related factors and owners characteristics.

The dissertation consists of four chapters. In the first chapter a reference takes place in the history and in the development of I.T.

In the second chapter the factors that affecting the satisfaction from the I.T system, such as benefits, costs and risks are described.

The third chapter refers to the research methodology that has been used and in the four chapter the results from the data analysis are presented.

Finally there are the conclusions, the limitations and the proposals for further research.
Chapter 1:

Information Technology

and

Very Small Enterprises
1.1 History of Information Technology

Since the implementation of new computer-based information systems introduces changes to the organization and is considered to be a difficult task, there is a large body of ICT research literature focused on identifying the factors that appear to be conducive to either success or failure of these projects (Yoon & Clevenson, 1996). Considering that ICT success is the outcome of successful ICT implementation, the issue of developing implementation strategies to assess ICT success has received considerable attention in the literature. In an attempt to identify ICT success factors, researchers have adopted various organizational behavior theories. One of these theories is the Lewin's (1947) Organizational Change Theory, which was the theoretical basis for this study.

Lewin's (1947) Organizational Change Theory developed a scheme of organizational and social changes by viewing change as a process including three distinct stages: unfreezing; moving; and refreezing. By having each stage concerned with changes in the balance of forces in the organization, Lewin's theory states that the success of implementing a change is affected by the degree to which the three stages promote or resist the new changes. The three-stage model originally specified in Lewin's Organizational Change Theory has been refined in subsequent research.

For example, Schein (1964) proposed different operational mechanisms to measure the three stages. Kolb and Frohman (1970) built on and extended the Lewin/Schein organizational change model and proposed a seven-stage model to describe the change process in the field of business consulting. Other organizational change models include Nolan's (1979) empirical MIS growth model. Early studies by Zand and Sorensen (1975) on Lewin's Organizational Change Theory viewed the implementation of computer-based information systems as bringing changes into organizations. They utilized the change process models that resulted from Lewin's theory.

The Zand and Sorensen study found that the organizational change stage most strongly associated with overall IS implementation success is refreezing. Their survey data of nearly 300 Management Information Systems (MIS) projects showed that
activity conducive to MIS implementation (changes) required at each of the three stages (unfreezing, moving, and refreezing) was associated with overall project success. They also found a tendency of poor performance of one stage to be followed by a poor performance at later stages. Ginzberg (1981) study further reaffirmed Zand and Sorensen's results. Both studies found management behavior and attitude to be a significant success factor for the implementation of IS applications and that an appropriate climate for change is a contingency for user participation in IS implementations. Hence, by utilizing the Lewin's approach, IS researchers are able to view IS managers as "change agents," rather than technicians, whose behavior and attitude affect user participation and commitment in the implementation of computer-based information systems.

Other IS researchers, as Tait and Vessey (1988), considered the implementation of computer-based information systems as bringing changes to the organization. The aforementioned researchers supported Zand and Sorensen's (1975) and Ginzberg's (1981a) findings that user participation and management attitude and behaviors affect the successful implementation of computer-based information systems.

1.2 Information Technology

The term information technology has currently been used in reference to a multitude of technologies related to computers, computer networks, software systems, and electronic communications within a business context. Information technology (IT) according to Chaffey and Wood (2005) is “technology resources used for business information management”. The fact that information technology implementation is considered a positive accomplishment by SMEs is a common axiom. However, the perception of how extensive these benefits really are and in what areas they take place varies considerably from firm to firm. One could categorize such perception into two types: (1) primary benefits, including the first and easiest tasks to be benefited from information technology, such as better internal communication and better external communication with buyers and suppliers; and (2) secondary benefits, increasing turnover or broadening the customer base (Foley and Ram, 2002).

In the second case, the secondary benefits are more difficult for SMEs' managers to notice as they require the integration of various aspects of information technology and the understanding of many technologies that must be orchestrated to
achieve goals. Therefore, when vendors engage in educating SMEs about the benefits of information technology, they enable these companies to see ahead and be more flexible about investing in future technologies. This study examines not only the benefits but also the costs.

Examples of information technology include e-commerce and e-business. Although other studies use such terms as if they were equal, in reality there are important differences to be considered. E-commerce can be seen as one of the aspects involved in a much broader concept called e-business. Spurge and Roberts from the Oxford Brookes University (UK) developed interesting definitions of e-commerce and e-business. E-commerce is "the buying and selling of goods and services on the Internet and provides the ability to perform transactions involving the exchange of goods or services between 2 or more parties using electronic tools and techniques" (Spurge and Roberts, 2004).

On the other hand, e-business is defined as "more sophisticated than e-commerce, it has a much wider integrative purpose within an organization. It has implications that are inward as well as outward facing (Internet, Intranet and Extranet) to conduct business, including buying and selling, connects key players to critical business systems and allows access to the information they need" (5). Spurge and Roberts also say that business transactions over the Web can be divided into two categories: (1) Business to Consumer (B2C) involves mainly online transactions with consumers such as retailing; and (2) Business to Business (B2B) solutions increase the support between businesses while reducing the need for telephone calls and faxes" (2004, 4). Another category that can be identified but is not mentioned in Spurge and Roberts is Consumer to Consumer (C2C). Such businesses facilitate the interaction among consumers. Some examples are e-Bay, e-Harmony, and PayPal.
1.3 Information Technology Costs

According to Dixon et al. (2002), some of the common barriers for information technology adoption by SMEs include the following.

- Lack of knowledge about the potential of information technology: "Many SMEs are unaware of the potential of information technology to enhance their business operations, or they consider that these technologies are not applicable to the products and services they offer, or the manner in which they choose to do business."

- Some very specialized businesses do not need information technology as much: "Some SMEs occupy small and clearly defined niche markets, sometimes entirely local, that do not need the global connectivity available through the Internet. These are niches where word-of-mouth acts as the guarantee of quality, service and reliability, and these are businesses where trust and stability underpin successful operations."

- Security concerns: "There are at the very least perceptions of unresolved security and privacy issues associated with the use of the Internet. These problems are most acute in relation to making payments online, and they discourage small firm take-up of this technology and way of doing business."

- Lack of skills: "Some may have information technology enthusiasts as owner-managers, but the majority of firms do not. The lack of staff to implement information technology is a separate aspect of this same deterrent. It may well be difficult or too expensive for an SME to hire people with the necessary technical expertise to pursue an information technology strategy."

- Direct Costs: "The high initial set-up costs and perceived on-going costs of information technology and e-business can act as a barrier to take-up among SMEs. These firms can find that they cannot finance the necessary additional investment. Equally, that investment might not be cost effective, and it might be better for the firm to outsource its IT activities."

Lack of disposable resources for experimentation: "Some SMEs will be restricted in their ability to evolve their information technology provision because of a legacy of IT sunk costs. Most small firms do not have the luxury of resources for experimentation in the IT area. Their investments need to work for them and cannot
be quickly written down. To adopt new IT solutions and e-business models, they need to be able to integrate this new provision with their existing provision. Where this is not possible, that existing equipment is a formidable barrier to progress.” (Dixon, et al., 2002)

Since 2002, technology has evolved rapidly and, nowadays, some services and equipment can be obtained for a very low cost. For instance, funds for connectivity may no longer be rated as a significant barrier to the adoption of information technology because of its relativity low cost. As an example, as of March 2006, the price of a business plan for cable Internet through Comcast was a one-time installation fee of $250.00, in addition to a monthly subscription of $160.00. This plan provides the services listed below, which are sufficient for an SME to take full advantage of the basics of the Internet:

- 100 percent Pure Broadband Connection
- Up to 7 Mbps downstream
- Up to 768 Kbps upstream
- 1 dynamic IP address
- 1 or 5 true static IP addresses to support on-site server or remote workforce
- Local area network ready with included router
- Software firewall included
- Ant-virus software for up to 25 users included
- Up to 20 Business E-Mail addresses
- 24/7 priority business-class support (Comcast, 2006)

In summary the costs of implementing information technology for SME enterprises include the lack of funds, the lack of knowledge/skills, the lack of understanding relative to the business, the lack of employees, the lack of standard operating procedures, the lack of long-term strategy, the lack of specific enough software and the lack of clear Information Systems (IS) plan.

1.4 Small Enterprises

There is not one official definition of SME that is pursued by the scientific community as a whole. Organizations and countries have dissimilar definitions of what composes a medium-sized business. The World Bank, for instance, classify
medium-sized enterprises as those having up to three hundred employees and total assets and total sales of up to $15 million (World Bank 2004). In a study composed by the United Nation's International Labor Organization (ILO) in 1992, more than fifty terms of SMEs were identified in seventy-five countries. Some parameters tend to coincide, such as number of employees, revenue, and type of ownership. According to the European Union Commission Recommendation from May 6, 2003, SMEs are enterprises that meet all the following criteria: no more than 250 employees; no more than fifty-million Euro turnover (balance sheet total of less than 43 million Euro); and no more than 25 percent of the company's shares owned by another enterprise.

In some countries and in specific industries, the criteria to define SMEs go beyond the simple metrics listed above. For instance, the total assets, payment capacity, or the tonnage of vessels may be taken into account. Although there are studies trying to define SMEs in a qualitative way as opposed to quantitative analysis, the most common parameter in defining SME measures them by size. Companies are clustered by number of employees, size of equity, annual revenue, etc. The boundaries for a company to be called SME vary from place to place according to its economy size. The APEC Center for Technology Exchange and Training for Small and Medium Enterprises has catalogued the "SME Profile" from several countries, in a document authored by Dr. Chris Hall of the Pacific Economic Cooperation Council.

For the purpose of this research, SMEs were defined based on the European Union Commission Recommendation. The sizes of the companies were measured using two components: number of employees and annual revenue.

1.5 SMEs Economy and Management Issues

According to a study from 2002, the 3.7 million SMEs in the UK at that time contributed to 40 percent of the GDP and accounted for 55 percent of the workforce (Dixon et al., 2002). Currently, almost every economy faces two key policy priorities: how to create jobs and how to continually create an internationally competitive industrial structure. SMEs have been widely regarded as being good at creating jobs, and as an important element in creating international competitive advantage. It has also been long recognized that SMEs require an appropriate policy and business environment if they are to make an effective contribution to these areas (Hall, 2003).
In Europe, there are currently nineteen million SMEs, and the European Union is fully aware of the importance of these companies to the spread of technology use. It is known that if they are to become a highly competitive knowledge-based community, they must facilitate the means for companies to have access to information technology. According to a 2002 EU report, in most EU member states SMEs make up to over 99 percent of the enterprises and generate a substantial share of the European GDP. The document also states that SMEs are a "key source of new jobs as well as a fertile breeding ground for entrepreneurship and new business ideas" (European Commission, 2002).

In the United States, however, until recently, little had been known about the extent to which SMEs participate in the digital economy. Recent findings have been consistent with findings from the European states. SMEs in the United States have shown to be less engaged in the digital economy than their larger counterparts. They have invested less per employee than large firms, and the level of engagement has been highly variable between firms and sectors, reflecting the heterogeneity of this type of enterprise (Buckley, 2002).

One cannot apply results from studies about information technology in large corporations to the SME context, because there are significant primary differences (Dixon et al., 2002): Larger companies often use information technology to communicate across different organizational levels and divisions, whereas SMEs often use information technology to promote less formal communication.

Often, SMEs use information technology as tools for specific standard tasks, such as administration and accounting, and rely on off-the-shelf solutions. Large corporations, on the other hand, tend to require custom solutions. For this reason, SMEs have the ability to "get by" without optimizing the use of technology while large enterprises cannot afford not to be on the top of what technology can provide.

Some types of differences are not only observed between large companies and SMEs. SMEs are diverse in size, maturity, type of business, and revenue, making it hard to define "one-size-fits-all" policies. Therefore, the goals of technology adoption have not been the same even across SMEs of the same size.

Buckley and Montes have illustrated the diversity of SMEs by stating that "A venture capital funded application software development start-up in Silicon Valley
that has 5 people on staff is a fundamentally different type of firm than a 15-year-old small town antique shop with a 5 person staff. Both firms have the potential to use and benefit from the Internet, but they face different opportunities and different constraints" (2002, 10).

1.6 How SMEs Currently Use Information Technology

Several studies have shown a tendency to classify SMEs into three groups according to the level of information technology usage: low users, medium users, and high users. Alan Southern and Fiona Tilley (2000) have defined the characteristics of these groups as follows:

1.6.1 Low Users

This group ranges from firms that do not have any information technology implemented to companies that have stand-alone personal computers. The likely primary reason for the introduction of information technology into these firms is automation of office functions. This step would come before any integration with main business processes such as production, billing, etc. In fact, the very concept of information technology does not fit realistically well with the mental concept held within these firms. One distinguishing characteristic of this group is how information technology is truly separated from day-to-day business activities. When information technology implementation planning is even brought up, it is approached with extreme caution. Experimentation is out of the question and any equipment or software acquisition must be well justified on a strong ground of need. In many cases, companies feel that having technology would be a good idea, but they don't see the details of how that would be accomplished, or create an information technology implementation plan.

1.6.2 Medium Users

The major difference between this group and the Low Users group is that here someone in the firm, such as the owner-manager, has begun to develop a better understanding of information technology. The managers in these firms are used to thinking about how technology would help business processes. There is a greater level of understanding about technology in comparison to the Low Users group. Computers
are usually interconnected through a local area network. There is evidence of greater planning and the delegation of information technology responsibilities. Experimentation with email and Internet websites are likely to occur.

1.6.3 High Users

Companies in this group have a much more comprehensive understanding of how technology can be used and how it can help the organization. It is not uncommon to see an information technology manager in these firms, and there is some level of information technology planning taking place. This planning evolves from an initial conception of how technology can fit within the business, to the notion of how technology can actually shape the development of the business. Not only do firms utilize technology in a known way, but they also often create innovations in technology use. Examples are the utilization of Voice Over IP technology for worldwide communication (VOIP), website driven e-commerce, utilization of Electronic Data Interchange (EDI), and highly collaborative environment.

1.7 Productivity Problems among SMEs

SMEs face some specific problems that lead to lower productivity when compared to their larger counterparts. Many of these problems are inherent to the very nature of SMEs and are difficult to overcome, but some of these issues could be addressed with a more appropriate use of information technology planning. MacGregor and Vrazalic (2005) have summarized these characteristics into internal and external features of SMEs. Internal features are

- **Features related to management, decision making and planning processes**
  1. SMEs have a centralized management strategy with a short range planning perspective or SMEs have poor management and business skills
  2. SMEs exhibit a strong desire for independence and avoid business ventures which impinge on their independence
  3. SMEs owners often withhold information from colleagues
  4. Decision making processes in small businesses are intuitive, rather than based on detailed planning and exhaustive study
  5. SMEs owners have a strong influence in the decision making process
6. Family values and concerns may intrude with the decision making processes of small businesses

7. SMEs have informal and inadequate planning and record keeping processes

- **Features related to resource availability**
  1. SMEs face difficulties obtaining finance and other resources, and as a result have fewer resources
  2. SMEs are more reluctant to spend on information technology and therefore have limited use of technology
  3. SMEs have a lack of technical knowledge and specialist staff and provide little information technology training for staff

- **External features are**:
  1. Features Related to Products/Services and Markets
  2. SMEs have a narrow product/service range
  3. SMEs have a limited share of the market (often confined towards a niche market) and therefore heavily rely on few customers
  4. SMEs are product oriented, while large businesses are more customer oriented
  5. SMEs are not interested in large shares of the market
  6. SMEs are unable to compete with their larger counterparts

- **Features Related to Risk Taking and Dealing with Uncertainty**
  1. SMEs have lower control over their external environment than larger businesses, and therefore face more uncertainty
  2. SMEs face more risks than large businesses because their failure rates are higher
  3. SMEs are more reluctant to take risks

1.8 Potential Benefits of information technology on SMEs

Some of the issues pointed out in the previous section contribute to lower productivity level, for example, by having inadequate record keeping and lack of planning, SMEs lack the ability of standardizing processes or foreseeing common and repetitive problems. Technology could play an important role in solving problems of this nature. For instance, MacGregor and Vrazalic (2005) suggest that SMEs are
product-driven as opposed to customer-driven. A relatively simple information technology solution, such as the use of a CRM (Customer Relationship Management) system coupled with e-mail and web presence, could help the company to get to know customers better in a formal and dependable way. It is expected that not every information technology implementation will be useful to SMEs.

MacGregor and Vrazalic (2005) also show the benefits and drawbacks that e-commerce brings to SMEs. Such advantages were observed in Australia, but one can infer that they are also true to companies in the United States. Some of the potential benefits mentioned by MacGregor and Vrazalic (2005) are:

- Increased sales
- Access to new customers and markets
- Improved competitiveness
- Lower administration costs
- Lower production costs
- Reduced lead time from order to delivery
- Reduced stock levels
- Increased internal efficiency
- Improved relations with business partners
- Improved quality of information in the organization

And the following are some of the drawbacks pointed out by MacGregor and Vrazalic (2005):

- Deterioration of the organization's relations with business partners
- Increased costs
- Increased need for computer maintenance
- Doubled work
- Reduced flexibility of the work
- Increased security concerns and issues
- Dependability on e-commerce
One must be careful when analyzing the relationship between the potential benefits of information technology for SMEs, and the rate at which information technology is being implemented in SMEs. If much benefit is made available by little investments, all SMEs would be adopting information technology, and this is not the case. It is important to acknowledge that many studies list all the benefits of information technology, but neglect explaining how SMEs must proceed in order to achieve these rewards. Therefore, SMEs that lack knowledge on the pathway to information technology adoption refrain completely from adopting it, as they hesitate to spend their limited capital to experiment.
Chapter 2:

Literature Review

2. Introduction

Many researchers (Love et al., 2004) have demonstrated that the adoption of IT systems has given competitive advantage to the enterprises. The Greek state
recognized the vital role of SME enterprises in the economy encourage them to adopt and invest in new technology.

The benefits from the use of I.T are many and indicatively we will refer “the reduction of marketing cost”, “the improvement market share of service quality and data management”.

There are also expanses that refer to “the hardware accessories”, “training of employee”, “consultancy support e.c.t”.

Finally, there are risks about the “reluctance of employees to adapt to change”, “technical uncertainty and lack of knowledge”, “training expenses on staff that leave the organization e.c.t”.

The use of IT systems needs identification and consequently management and control of benefits, costs and risks (Love et al., 2004). The level of adoption and the degree of satisfaction from I.T systems depend on some factors related to the owner and businesses characteristics (Palvia and Palvia, 1999). The same factors affect the lived experience by the owners or users of I.T systems of small businesses.

2.1 Benefits management

Benefits management includes a spectrum of administrative activities with a view to reassure that the organization achieves the benefits that are being expected from an IT investment and also can recognize and manage unexpected benefits. The realization that planned benefits can only achieved if they are managed actively in the organization is something very new, and started to become more intense in the late 80’s and early 90’s. According to Leyton (1995) benefits management process is established in the frame of operational change. Following this process IT and change management ideas are constituted in order to be able to support the change, the new organizational and enterprise dissimilarities are being supported by IT and all these dissimilarities are being “realized”. On the other hand Ward et al (1996) brings a quite similar message but focuses mostly in the profits. In this process the likely profits are determined, for realizing them a plan has been devised, the plan is performed and the outcomes are revised and appraised. The most significant characteristic trait of this
model is the exterior loop, that recognizes and resupplies the process. In the NHS, the benefits management is a significant part of IT management. Various directives incorporate proposals for manipulating profits as a component of process making operational arguments, taking it established and managing project implementation. The previous determination of profits is needed for cost-benefits analysis.

Peters (1994), has divided the benefits that came up from the adoption of new technology to “direct benefits” and “intangible benefits”. Benefits of IT according to Demmel and Askin (1996), are distinguished as “strategic”, “tactical” and “pecuniary”. Farbey et al. (1995) and Irani and Love (2001) have categorized IT benefits as “strategic”, “tactical” and “operational”.

2.1.1 Strategic objective 16

The strategic objective concerns the planning that is executed by an enterprise before the realization of any action. The characteristics that determine this aim are internal relations, place of market, mission, organization, public relations and technology. The strategic objective is a qualitative measure. The characteristics of this aim are created by the ideas that are presented in the reports internal relations are the features that turn around the people that constitute the enterprise-employees. This feature is illustrated by the questions such as moral of employees, the growth of employees, the quality of life of work, the systematic abstention of work, and the use of dexterities of employees (Troxler and Blank, 1987).

The second strategic feature is the market position. Market position approached by examining how the enterprise is faced and the products that manufactures with regard to the remainder world. Market position is illustrated by the share of market, the requirement, the evaluation of competition, the infiltration in the market, the liability, and the faculty of survival (Noble, 1990).

These questions are focused in the way which the enterprise stands for its market where it desires to go and eventually where it can go. The goal is the road map of enterprise for the future. It is illustrated by the five-year report that is often performed by most of the enterprises, and potentially even a report of 10 years longer. The questions that constitute the mission are how well the enterprise is executing in
comparison with the running report, the development of enterprise, the economic possibility of realization of objectives, and the factory. The organization determines the structure of the enterprise (Works, 1985).

This feature illustrates how well the enterprise handle its action, how the enterprise corresponds in changes, and the general management of information. Subjects such as the doubling of operations and obstacles between the departments are contained in this aim. The public relations are a feature that transmits the processes of enterprise in the exterior world. This feature is illustrated from the picture of the enterprise, the prestige of enterprise, and the service. The final attribute of strategic aim is technology. This feature examines the place that the enterprise is in comparison with AMSTs, and where it would wish it to be. Subjects such as the production of scientific information, the technological place, and the availability describe the technology.

2.1.2 Tactical objective

The tactical objective contains those qualitative questions that result from the actions or the processes of the enterprise. They are the actions received that serve the aim that is reported by the strategic objective. The features that illustrate this aim are design, flexibility, completion, equipment, and producibility (Kaplan, 1986).

The attribute of design determines those aspects of enterprise that are included in the design of a product. Design is determined by subjects such as efficiency, the characteristic traits, the years of lead, and the standardization. The flexibility examines how well the enterprise accepts the dissimilarities. This feature is determined by the subjects as the variability, the answer in the change, the size batch, and the time tolerances. The AMSTs are characterized by their flexibility. The flexibility can be considered in the total terms as low, medium, or high. The low flexibility is fixed as having a line autonomous stand alone in the machine of cells that is not interlinked. Each cell can only handle specific parts of a family (Troxler and Blank, 1987).

The medium flexibility brings the interconnection a step further and connects the analysed data in the machine cells with the carriers or the lines of towage. The
elementary logic of control is adopted, which optimizes the routings of parts via the cells. Certain cells rake the faculty to handle more than a single part of a family, however organization of operators can be required. The high uses of flexibility interlinked, cells of general aim that can be checked in the real time. The attribute of completion concerns the interaction between the processes and the departments in an enterprise. Subjects such as the communication, the doubling, the synergism, the requirements of elements and the usefulness of elements describe the completion (Noble, 1990).

The material examines the control and the locomotion of product via the environment of manufacture. Subjects such as the control planning, programming, accelerating cover the material attributes. The features of personnel examine the aspect of persons that are required in order to hold the processes on the aim. The requirements of faculty and the training of persons with the press (direct/indirect) persons that are required for the objective are sketched out. The subjects of human factor as the planning of labor spaces and the safety of employees are included. The final feature of regular objective is producibility. This feature examines how the product is produced, the subjects include the consequence, the compatibility, feasible, the reliability, the faculty and the exterior contact (Works, 1985).

2.1.3 Pecuniary Objective

The third aim examines the economic attributes (expenses) that are included in the decision of AMST, and will be reported as pecuniary objective. The features that constitute the pecuniary objective are operation and maintenance, installations and equipment and product.

This interruption follows the wide categories that are illustrated by Fleischer (1982), the operation and the maintenance are the expenses that are linked with the processes of enterprise. Contained in this feature operating labor the work of maintenances, the overtimes, the turnover of work, the systematic abstention from work, the training, the direct and indirect expenses, the supervision, the organization, the tools and the supplies of maintenance, the rates of production, the safety, and the documentation.
The attribute of installations and equipment includes the expenses that are undertaken because of the natural resources of enterprise. The feature is constituted by the following expenses: “equipment”, “installation”, “tooling”, “hardware development”, “software development”, “spare parts”, “space”, “safety equipment”, “energy”, “depreciation” and “taxes”.

The last attribute of pecuniary objective is product. These are the products that are immediate related with the products that the enterprise manufactures. The examples of expenses that are contained under the features of products are “design”, “changes”, “inventory”, “engineering”, “quality”, and “sales”.

2.2 Costs

The information systems have often important consequences for the content and the form of work in the organizations. These consequences are not only visible based on money but also in the altered terms of work, new beginning, and much more. The financial consequences are the consequences that can express their self in monetary terms.

On the other hand for the non-financial it is used the contribution.

A consequence is being considered as an event when it results from the import of the information system, beginning from the decision to advance the investment. A system of information is fixed as all the components provide together the essential information. According to Brussaard (1993) the components are “the hardware and the software, the people and the procedures with which they work, and the data that are processed by the system”.

The economic and not economic consequences determine together the value of system information. Benefits are linked with the positive consequences of information systems investments and the sacrifices that are needed for the negative consequences. As far as the economic consequences is concerned a further discrimination becomes between the efficiency and return.

The return is determined by the evaluation of financier flows.

The positive, entering flows are earnings and the negative, coming out flows are expenditures.
The efficiency from the opinion of profits (positive) or losses (negative) is fixed as the registration of accountancy of yielding and costs.

Economic evaluation of proposed investment is constituted by an analysis of the return and not on the profitability (Brealey and Myers, 1988; Fox et al., 1990).

In many researches risk is approached as a separate criterion, in others risk measures the uncertainty (that appears when the expected expenditures are higher or earnings lower).

Dissimilar authorities have given a general idea for the methods that can be used for the evaluation of IS investment. Renkema (1993) establishes approaches that include financial consequences and 3 non financial consequences. This leads to the 4 approaches that are referred below:

- The financial approach.
- The multi-criteria approach.
- The ratio approach.
- The portfolio approach.

These dissimilar approaches were examined detailed. Every approach is constituted by many methods. In order to understand the methods and the approaches on the basis of characteristics a division of methods was perceived. The requirements of a method were:

- To be accessible and sufficient documented
- To be well structured
- They should be reviewed often and to be used in practice Renkema (1997).

2.3 Risk

Programs of IT are famous for their high rate of failure. Taking into consideration this, the organizations should improve their capability to handle the dangers in order the programs to be delivered successfully (Hartman, and Ashrafi, 2002; Willcocks et al., 2001). According to McFarlan (1981) and Willcocks and Margetts (1994) risk is reported in such consequences as failure to get some, or many of them, from the expected profits because:

- Implementation expenses that are higher than the ones that were anticipated
- The performance of systems considerably under the estimate; and
- Systems hardware and software inappropriateness

The management of risk is a vital procedure for the establishment of a sufficient delivery of programs of IT, nevertheless there are elements that the lack of determination and management of risk is an important factor in the failure of the program and more indicatively for the SME (Baccarini et al., 2004), which often put up with restricted IT faculties and the poor comprehension of IT and the risks that are included (Caldeira and Ward, 2003). The evaluation of risk at the duration of justification process gives the opportunity to managers to determine outcomes that can badly manipulate behavioural, structural, and strategic factors in the organization (Jiang and Klein, 2001; Lyytinen and Keil, 2000) Moreover, it is significant to examine the risk of violation of safety of computers and the expenses of interruption that the organization will have to manage (Birch and McEvoy, 1996; Dhillon and Backhouse, 1996).

Every human action contains risk (Wider and Davis, 1998) and project contains risk as well because it involves uncertainty and can be very risky (Chapman 1998; Conroy and Soltan, 1998; Mac et al., 1998; PMI, 200; Czuchry and Yain, 2003). If we approach risk in terms of projects then project risk occurs when there is a negative impact on projects and when it’s approached in terms of likelihood and consequence. (Wideman, 1992; Carter et al.,1993; Chapman, 1998).

Indicatively, risk in projects is constituted by the following processes: (Standards Australia, 1999):

1. Establish context
2. Identify risks
3. Analyze risks
4. Evaluate risks
5. Treat risks
6. Monitor and review
7. Communicate and consult

The only way to deal risk is by using the most efficient strategies, according to Zhi (1994) there are four main strategies which are:

- **Avoidance**: Occurs by not selecting the activity that may have risk
- **Reduction**: Is the most well known and sufficient strategy of risk management
➢ **Transfer**: When risk is tried to be reassigned or to be transferred in other parts.

➢ **Retention**: Occurs with the acceptance of risk and the penalty that may take place.

The most important action that the managers should do is to recognize the risks that are linked with the IT implementation. According to the standards Australia 1999 there are 27 risks that have been recognized from the literature and have been categorized. These risks are:

1. **Commercial and legal relationships**

   “Inadequate to third party performance” occurs when the contractor cannot find the most appropriate solution for the project that he is in charge for. (Krasner, 1998).

   “Litigation in protecting intellectual property” occurs when the property is not well protected and results competitors to copy the product. (Krasner, 1998).

   “Friction between clients and contractors” occurs when there is a lack of understanding and cooperation (Jones, 1993).

2. **Economic circumstances**

   According to Jones (1993) “changing market conditions” occurs when business wants to change consumers or to advance the software engineering. (Jones, 1993; King, 1994).

   “Harmful competitive actions” occurs when the competitors succeed in finding software solutions quicker, their software to be more functional, low costs and to release the same product in the same markets (Thomsett, 1989; Jones, 1993).

   “Software no longer needed” occurs when the software cannot be absorbed by the management. (Engming and Hsieh, 1994).
3. Human behavior

“A personal shortfall” occurs when the staff that is working in a project is not well qualified (Engming and Hsieh, 1994).

“Poor quality of staff” occurs when there is not so experienced staff linked with the hardware operating systems and database managements (Fuerst and Cheney, 1982; Nelson and Cheney, 1987).

4. Political circumstances

“Corporate culture not supportive” occurs when the management is weak and the objectives are not clear (Leitheiser and Wetherbe, 1986; Engming and Hsieh, 1994; Irani and Love, 2001).

“Lack of executive support” occurs when the objectives are accomplished because of management politics (Barki and Hartwick, 1989).

“Politically-motivated collection of unrelated requirements” occurs when the requirements are in a grouped project that becomes impossible to meet the objectives (Krasner, 1998).

5. Technology and technical issues

“Inadequate user documentation”. According to Boehm (1989) occurs because of the lack of user documentation.

“Application software not fit for purpose” occurs when the users are complaining that the software provided does not give them the opportunity to fulfill their tasks (Baronas and Louis, 1988).

“Poor production system performance” occurs when the software does not meet the aims that it was designed for (Jones, 1993; Glass, 1998).

“Technical limitation of solution reached or exceeded” occurs when there are project delays (Boehm, 1989; Jones, 1993).
“Incomplete requirements” occur when the information that should be gathered in the first phase was inefficient that had as a result the project to not meet its objectives. (Shand, 1993; Engming and Hsieh, 1994).

“Inappropriate user interface” occurs when the chosen software interface does not meet the requirements. (Jones, 1993; King, 1994).

6. Management activities and controls

“Unreasonable project schedule and budget” occurs when there are many limitations that concern the program, cost or level of performance (Boehm, 1989; King, 1994; Turner, 1999).

“Continuous changes to requirements by client” occur when the stakeholders adjust the software based on the life-cycle (Jones, 1993; King, 1994; Clancy, 1994).

“Lack of single point accountability” occurs because of the software projects that are leaded from different person that do not have any responsibility for deliverables (Boehm, 1989).

“Poor leadership” occurs because of the role of the managers that are responsible only for the project team and not solve problems (King, 1994; Clancy, 1994).

“Developing wrong software functionality” occurs when the software is constructed and functioned in a wrong way (Boehm, 1989).

“Lack of formal change management process” when there are adjustments to system specification without a review.

Individual activities (Jones, 1993; Davis and Olson, 1984; Cunningham, 1999).

7. Individual activities

“Gold plating” occurs when the team is concentrated in examine and create extreme levels of the projects aims. (Boehm, 1989; Turner, 1999; Cunningham, 1999).
“Unrealistic expectations” occur when the vendor promises amount of items that cannot be delivered. (Maish, 1979; Ginzberg, 1981; Thomsett, 1995).

An extensive and different range of IT projects risks has been determined. Nevertheless, a classification of more serious risks is required in order to regulate them. Moreover, types of risk treatment choices are required by IT program managers in order to deal with risks that could prevent the program attribution. A project has two processes: (PMI, 2000; Thomsett, 2001)

- Project management processes: These illustrate, organize and fulfill the work of the project. The project management processes are appropriate to most projects and contain the management range, cost, time, quality, risk communications, human resources, and procurement.
- Products processes: These are the technical processes that clarify and create the project’s product and adjust with the nature of program.

### 2.4 Business related aspects

Palvia and Palvia (1999) have used four factors in order to examine the degree of adoption and satisfaction from IT systems. These factors are: type of business, business size, profitability and location. Love et al. (2005) suggested that there is significant difference between type of business and the amount they invest in Information Technology. According to Palvia and Palvia (1999), business size had not impact on the Information Technology investment levels in small and medium-sized enterprises. Moreover, Love et al. (2005) found that Information Technology investments did not considerably vary with firm size. The location (urban or rural) plays an important role στην δυνατότητα προμήθειας of hardware, software, and supporting resources for very small and small businesses. However, Palvia and Palvia (1999) did not find any association between location and IT satisfaction.

### 2.5 Owner characteristics

The owner’s or user’s characteristics that play important role in the opinion’s formation about benefits, costs and risks are: the gender, age, education and
computing skills. The way of using computers differs from men to women. According to Palvia and Palvia (1999) and Love et al. (2005), gender had an important impact on some factors such as, “improved quality of output”, “training and education”, “improved control of cash flow”, “improved communication”, “improved management of data” and finally on “improved availability to exchange data”. Palvia and Palvia (1999) proposed that according to all these factors women presented more gratified in relation with men. Palvia and Palvia (1999) and Love et al. (2005) found that age had an impact on the following factors: “training and education”, “improved quality of output”, “improved control of cash flow”, “improved availability to exchange data”, “improved management of data”, and “improved communication”. On the whole, young owners feel much more satisfied than their older colleagues. According to Palvia and Palvia (1999), there is no relationship between factors of evaluation of IT system and education. Moreover, Love et al. (2005) proposed that there is strong association between security risk factor and Information Technology investments and education. According to Palvia and Palvia (1999), owners who said that they have a very good level in computing skills felt much more satisfied in relation with those that they did not have a very good level in computing skills. Furthermore, computing skills had a significant affect on “ease of use” and “improved management of data”.

Operational Benefits

Strategic Benefits

Business related aspects
Fig. 1. The model based on Love’s et. al. (2005) and Palvia and Palvia’s model (1999)
Chapter 3:

Research Methodology

3.1 Introduction

The very small and small business constitutes the core of Greek economy while they constitute almost 95% of the total number of enterprises and occupy an important number of workforce. According to Kyriazopoulos and Terzides (2000), small business are characterized those that have less than ten employees. The I.T is extensively used by medium and large enterprises but the very small and small
enterprises use also I.T systems in order to improve their productivity and services. The degree of satisfaction from own I.T system, the efficiency from I.T system and the impact of personal and business related factors on satisfaction are the main objectives of this study.

To reach the objectives a research was realized the details of which are analyzed below.

3.2 Survey and Data Collection

The research was conducted during the months of September and October in 2009. The research instrument that was used was a questionnaire that was created for the needs of the research. Population of the research constituted the total number of very small and small enterprises of prefectures of Kavala, Dramas, Serres and Thessaloniki which use the same I.T System. The enterprises were separated in commercial, manufacturing and services. As sampling method for collecting the data, the random sampling method was used and the questionnaires were completed by personal interviews by the users of I.T systems who are in the most of cases the owners. Usually the completion of questionnaire is completed with the presence of the researcher, while in many cases the questionnaire was given and returned after certain days. Totally, the enterprises that accepted to participate in the research reached 237. The sample of enterprises is not satisfactory in order to be characterized as representative but it is enough for the reliability of statistical techniques that were used.

3.3 Measurement of variables

The questionnaire that was used is constituted by two parts.

In the first part is reported the characteristics of enterprises and the individual characteristics of the owners of the enterprises and was adopted by the work of Palvia and Palvia (1999). As characteristics of the enterprises the type of enterprise, the size and the location where they activate were selected. The type is the services, commercial and manufacturing. The size is divided in very- very small with 1-2
employees, very small with 3-5 employees and small with more than 5 employees. The location of enterprises is characterized as urban and rural. Moreover, a question was made concerning the profitability of the business. As owner characteristics the gender (male, female), the age (<=40, >40), the educational level (Elementary, High school, University/MSc/PhD) and the previous experience in the use of I.T systems (poor, average, good).

The second part of the questionnaire refers to I.T benefits, costs and risks. All the questions were adopted by the work of Love et. al (2005). The I.T benefits are divided in strategic, tactical and operational benefits with 9, 9 and 13 questions respectively. The I.T costs are divided in direct costs with 9 questions and indirect costs with 12 questions. Finally, the risk factor is constituted by 11 questions. All questions of second part are statements in which the respondents were called to state their degree of agreement in a Likert scale of 5 points (1=strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree).

The questionnaire was translated in Greek language and a great effort was made in order all the significances to be attributed in the right way in order to be comprehensible from their respondents.

Table 3.1: Factor’s Description

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sub factor</th>
<th>No of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>Strategic</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Tactical</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Operational</td>
<td>13</td>
</tr>
<tr>
<td>Costs</td>
<td>Direct</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Indirect</td>
<td>12</td>
</tr>
<tr>
<td>Risks</td>
<td>Risk</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>63</td>
</tr>
</tbody>
</table>

3.4 Measures Validation

The suitability of the questionnaire is assessed by examine it for content validity, construct validity and reliability.

Content validity is concerned with a test’s ability to include or represent all of the content of a particular construct (Dr. Christopher L. Heffner). In this study, the scale development was founded on the review of the most relevant literature. However, even if all the constructs are validated in previous studies a pilot test in a group of academics and professionals was performed.
Construct validity refers to the agreement between a theoretical concept and a specific measuring device. A complete assessment of construct validity consists of a test for (1) Unidimensionality, (2) Discriminant validity and (3) Convergent validity (Cao and Dowlatshahi, 2005).

The assessment of unidimensionality can be done with two common methods: Exploratory factor analysis (EFA) or Confirmatory factor analysis (CFA). This study employs C.F.A because the items used are adopted by other studies and the constructs are defined a priori.

In confirmatory factor analysis the model must be evaluated for overall fit and measurement fit. For the evaluation of the overall model fit the first test concerned statistical $\chi^2$ and p-value of it. As it is recommended by Hair et. al. (1995), specifically for big samples, the relation of $\chi^2$/df was tested. Then, for the completion of control of total adaptation was evaluated a series of indicators, most important of them are the indicators of R.M.S.E.A. (Root Mean Square Error of Approximation), C.F.I. (Comparative Fit Index), G.F.I (Goodness of Fit Index), Parsimony Normed Fit Index (PNFI) και Parsimony Goodness of Fit Index (PGFI).

For the evaluation of measurement model fit the factor loadings (t- values), the construct reliability and the variance extracted are used.

Initially 3 Confirmatory Factor analyses were realized, one for each structure (benefits, costs, risks). The total of variables that were used was 63. After the removal of 8 variables from the factor benefits, 11 variables from the factor costs and 5 variables from the factor risks because of low loadings it was realized once again Confirmatory Factor Analysis the results of which are presented in the following tables 3.2-3.5.

<table>
<thead>
<tr>
<th>Items</th>
<th>Loadings</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved growth and success</td>
<td>0,54</td>
<td>Strategic</td>
</tr>
<tr>
<td>Reduced marketing costs</td>
<td>0,73</td>
<td>Benefits</td>
</tr>
<tr>
<td>Leader in new technology</td>
<td>0,61</td>
<td></td>
</tr>
<tr>
<td>Market leadership</td>
<td>0,59</td>
<td>Strategic</td>
</tr>
<tr>
<td>Improved customer/ supplier satisfaction</td>
<td>0,80</td>
<td></td>
</tr>
<tr>
<td>Improved customer/ supplier relations</td>
<td>0,70</td>
<td></td>
</tr>
<tr>
<td>Enhanced competitive advantage</td>
<td>0,72</td>
<td></td>
</tr>
</tbody>
</table>
Improved organisational and process flexibility  0,58  
Improved response to changes  0,81  
Improved service quality  0,79  
Improved teamwork  0,86  
Promotes proactive culture  0,92  
Improved integration with other business functions  0,89  
Increased planning times  0,89  
Reduced time to compile tenders  0,73  
Improved data management  0,70  
Improved communication  0,76  
Improved decision-making  0,85  
Reduced paperwork  0,79  
Reduced bottlenecks  0,59  
Reduced rework  0,72  
Improved quality of output  0,67  
Reduced lead times for financial planning  0,51  

Chi square = 676,46  p-value = 0,000  df = 227  χ²/df = 2,98  
RMSEA = 0,082   CFI = 0,91   GFI = 0,89   AGFI = 0,83  

Table 3.3: Confirmatory Factor Analysis Results (Costs)

<table>
<thead>
<tr>
<th>Items</th>
<th>Loadings</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultancy support</td>
<td>0,72</td>
<td></td>
</tr>
<tr>
<td>Installation engineers</td>
<td>0,84</td>
<td></td>
</tr>
<tr>
<td>Networking hardware and software</td>
<td>0,79</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td>0,45</td>
<td></td>
</tr>
<tr>
<td>Employee motivation</td>
<td>0,61</td>
<td></td>
</tr>
<tr>
<td>Changes in salaries as a result of improved employee flexibility</td>
<td>0,60</td>
<td></td>
</tr>
</tbody>
</table>
Staff turnover 0.66  \textbf{Indirect Costs}
Productivity losses 0.53
Strains on resources 0.97
Organisational restructuring 0.96

\textbf{Chi square} = 108.8  \textit{p-value} = 0.000  \textit{df} = 34  \chi^2/df = 3.2
RMSEA = 0.071  CFI = 0.92  GFI = 0.96  AGFI = 0.92

\textbf{Table 3.4: Confirmatory Factor Analysis Results (Risks)}

<table>
<thead>
<tr>
<th>Items</th>
<th>Loadings</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reluctance of employees to adapt to change</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>Technical uncertainty and lack of knowledge</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>Technical uncertainty and lack of knowledge</td>
<td>0.75</td>
<td>\textbf{Risks}</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>Capital outlay with no guarantee of likely returns</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Training expenses on staff that leave the organisation</td>
<td>0.62</td>
<td></td>
</tr>
</tbody>
</table>

\textbf{Chi square} = 25.14  \textit{p-value} = 0.000  \textit{df} = 9  \chi^2/df = 2.79
RMSEA = 0.091  CFI = 0.92  GFI = 0.96  AGFI = 0.87

The results for overall model show good fit for the three models. In particular, even if the value of $\chi^2$ test is statistically insignificant in all the cases, the $\chi^2/df$ is less than the recommended value of three (Bollen, 1989). The R.M.S.E.A indices are near to cut-off point of 0.1 (Sharma, 1996). The C.F.I and G.F.I indices have values greater than 0.9 as suggests (Joreskog & Sorbom (1993). Finally, the A.G.F.I index is more than 0.83 suggested by (Sharma, 1996).

\textbf{Table 3.5: Variance Extracted and Construct Reliability}

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sub factor</th>
<th>Variance Extracted</th>
<th>Composite Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>Strategic</td>
<td>0.44</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>Tactical</td>
<td>0.71</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Operational</td>
<td>0.50</td>
<td>0.88</td>
</tr>
<tr>
<td>Costs</td>
<td>Direct</td>
<td>0.51</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Indirect</td>
<td>0.55</td>
<td>0.87</td>
</tr>
<tr>
<td>Risks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The loadings of the items in its respective construct are statistically significant in the three models. The variance extracted is greater than 50% suggested by Hair et al. (1995) except the construct “strategic benefits” and “risks” which have a value near to 50%. The value of composite reliability exceed the value of 0.8 suggested by Hair et al. (1995) for all constructs.

Totally, the overall and the measurement fit for the three models is satisfactory and then every construct is replaced by the average score of the items from which is constituted.

The evaluation of Discriminant validity was done with the use of average variance extracted. If the correlations between the construct are lower than the square root of average variance extracted then there is evidence for Discriminant validity (Kim et al., 2008). As you can see in the table 3.6, the square root of average variance extracted for all constructs is more than the correlations between the constructs.

### Table 3.6: Discriminant Validity

<table>
<thead>
<tr>
<th>Factors</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. B. Strategic</td>
<td>0.670(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. B. Tactical</td>
<td>0.547</td>
<td>0.841(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. B. Operational</td>
<td>0.658</td>
<td>0.624</td>
<td>0.707(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. C. Direct</td>
<td>0.442</td>
<td>0.363</td>
<td>0.583</td>
<td>0.710(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. C. Indirect</td>
<td>0.508</td>
<td>0.662</td>
<td>0.648</td>
<td>0.339</td>
<td>0.740(^a)</td>
<td></td>
</tr>
<tr>
<td>6. Risk</td>
<td>0.596</td>
<td>0.490</td>
<td>0.601</td>
<td>0.669</td>
<td>0.489</td>
<td>0.670(^a)</td>
</tr>
</tbody>
</table>

\(^a\) Square root of average variance extracted

Convergent validity for a measurement model is present if the loadings of all the indicators are significant into their respective construct (Anderson and Gerbing, 1988). The tables 3.2, 3.3 and 3.4 contain the loadings of all indicators in the respective constructs which are significant at the 0.05 level.

Reliability is the most common used criteria for evaluating research instruments. Reliability measures the internal consistency, and Formell’s composite reliability was used (Fornell and Larcker, 1981) in this study. According to Hair et al.(1995) a
composite reliability greater than 0.7 characterize reliable a construct. As shown in the table 3.5 all the composite reliabilities are greater than 0.7 and thus there is evidence of internal consistency for all the factors.
Chapter 4: 

Data Analysis 

Results 

4.1 Sample’s Characteristics 

In the sample, that consists of 237 businesses, the 59.1% of respondents are males and the 40.9% females. In their big majority (72.6%) are young people till the age of 40 years, half of them are graduates of high education, while a minimal percentage (8.8%) is in elementary education. 44% of the respondents have good experience
31.8%, have moderate experience and only 24.2% have poor experience in the use of I.T systems.

**Table 4.1: Owner Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>59.1</td>
</tr>
<tr>
<td>Female</td>
<td>40.9</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;= 40 years old</td>
<td>72.6</td>
</tr>
<tr>
<td>&gt; 40 years pld</td>
<td>27.4</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>8.8</td>
</tr>
<tr>
<td>High School</td>
<td>41.8</td>
</tr>
<tr>
<td>University/MSc/PhD</td>
<td>49.4</td>
</tr>
<tr>
<td><strong>Previous Experience</strong></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>24.2</td>
</tr>
<tr>
<td>Average</td>
<td>31.8</td>
</tr>
<tr>
<td>Good</td>
<td>44.0</td>
</tr>
</tbody>
</table>

The experience does not depend on gender of respondents but depends on age and educational level of the respondents. As you can see in the table below the sig. of $\chi^2$ test of independence is greater than 0.05 for gender and less than 0.05 for age and educational level. Especially, youngest respondents with university education are more experienced.

**Table 4.2: Chi-Square test of independence**

<table>
<thead>
<tr>
<th></th>
<th>Pearson Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience* Gender</td>
<td>4,550</td>
<td>2</td>
<td>0.103</td>
</tr>
<tr>
<td>Experience* Age</td>
<td>19,044</td>
<td>2</td>
<td>0.000</td>
</tr>
<tr>
<td>Experience* Education</td>
<td>56,983</td>
<td>4</td>
<td>0.000</td>
</tr>
</tbody>
</table>

As far as the characteristics of the businesses is concerned, as it is presented in the table 4.2 43.5% are services, 41.4% commercial and finally 15.1% manufacturing. The most of them have 1-2 employees (58.6%), 35% have 3-5 employees and only 6.4% more than 5 and less than 10. The 74.7% are located in urban regions and the rest 25.3% in rural regions. The 84.4% of the respondents state that the business is profitable and the rest of them (15.6%) that it is not profitable.

**Table 4.2: Business Related Factors**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector</strong></td>
<td></td>
</tr>
</tbody>
</table>

A χ² test of independence was performed in order to realize if the profitability and the sector of activation of the enterprises are dependent variables. The same happened for the profitability and the size of the business. In both cases it was realized that the profitability and the sector, the profitability and the size are variable independent while the value χ² is statistical insignificant as it is shown in the next table.

**Table 4.3: χ² Test of Independence**

<table>
<thead>
<tr>
<th></th>
<th>Pearson Chi-Square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability*Sector</td>
<td>1.294</td>
<td>2</td>
<td>0.524</td>
</tr>
<tr>
<td>Profitability*Size</td>
<td>2.803</td>
<td>2</td>
<td>0.246</td>
</tr>
</tbody>
</table>

The annual turnover, in average, reaches the 236.000 € but there is a difference among the sectors as from the ANOVA analysis results that the sig. of F value is significant at 5% level (Table 4.4). Especially, the commercial sector seen as first with 371.368 € average annual turnover, the manufacturing second (156.428 €) and the services sector last (145.254 €).

**Table 4.4: ANOVA for Turnover (by Sector)**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mean</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>145.254</td>
<td>3.604</td>
<td>0.030</td>
</tr>
<tr>
<td>Commercial</td>
<td>371.368</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>156.428</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**4.2 I.T Satisfaction**

The basic statistics of Benefits, Costs and Risks factors are reported in table 4.5.
Note that values of mean and median equal or less than 3 indicate lack of satisfaction or negative satisfaction, while values greater than 3 indicate high level of satisfaction or positive satisfaction. Thus, as you can see in the table 4.4 the satisfaction, based on mean and median scores, is positive for all constructs. In details, the respondents agree with the fact that the I.T improves the strategic, tactical and operational advantages of the enterprise. They are quite neutral as far as the increase of direct costs is concerned because of the I.T. investments. On the contrary they agree with the opinion that the I.T investments decrease the indirect costs. Finally, they also agree with the opinion that I.T investments decrease Risk.

**Table 4.5: Basic Statistics**

<table>
<thead>
<tr>
<th>Factors</th>
<th>N. of Items</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>C.V</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>8</td>
<td>4,177</td>
<td>0,465</td>
<td>11,13%</td>
<td>4,125</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>7</td>
<td>4,123</td>
<td>0,604</td>
<td>14,66%</td>
<td>4,000</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>8</td>
<td>3,919</td>
<td>0,568</td>
<td>14,49%</td>
<td>3,875</td>
</tr>
<tr>
<td>Direct cost</td>
<td>4</td>
<td>3,302</td>
<td>0,785</td>
<td>23,78%</td>
<td>3,250</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>6</td>
<td>4,048</td>
<td>0,573</td>
<td>14,15%</td>
<td>4,000</td>
</tr>
<tr>
<td>Risk</td>
<td>6</td>
<td>3,822</td>
<td>0,594</td>
<td>15,54%</td>
<td>3,833</td>
</tr>
</tbody>
</table>

From the 8 variables that constitute the factor «Strategic benefits» the “reduced marketing costs” and “improved customer satisfaction” appear to constitute the main motivation factors for the adoption of I.T. system. The mean value of them is 4,36 and 4,23 respectively.

In the construct “Tactical benefits” the variable “improved teamwork” is the most important with a mean value of 4,17.

The variables “improved quality of output” and “improved data management” of the construct "operational benefits” constitute the key motivational factors to adopting I.T systems. Their mean value are 4,21 and 4,03 respectively.

From the construct “direct costs” the variable “consultancy support” appear as the most valuable with a mean value of 3,65.

In the construct “indirect costs” the variables “strains on resources” and “employee training” with a mean value of 4,17 and 4,16 respectively state more than the others that the I.T investments reduces indirect costs.
Finally, in the “risks” construct the “maintenance costs” and “technical uncertainty and lack of knowledge” variables are those that point out more than the other that the information technology investment reduces the risk. Their mean value are 4.23 and 4.19 respectively.

The coefficient of variation for all the factors, except the factors «direct costs» and “risk” has a value less than 15%. This means that the opinion of the respondents is not so different. However, in order to explore in more details the reasons of these differences an ANOVA analysis was performed for all the factors.

4.3 ANOVA Analysis

The characteristics of the respondents (owners or users of I.T systems) that have used in this study are the gender, the age, the educational level and the experience in the use of I.T systems. One-way ANOVA for each of these characteristics was performed. One-way analysis of variance (ANOVA) tests allow you to determine if one given factor has a significant effect on gene expression behaviour across any of the groups under study. A significant p-value resulting from a 1-way ANOVA test would indicate that a gene is differentially expressed in at least one of the groups analyzed.

4.3.1 ANOVA Analysis for Respondents Characteristics

In the first ANOVA the factor variable was the gender of the respondents and dependent variables all the constructs of benefits, costs and risks.

Table 4.6: ANOVA by Gender

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>0.011</td>
<td>0.917</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>0.070</td>
<td>0.791</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>0.643</td>
<td>0.423</td>
</tr>
<tr>
<td>Direct cost</td>
<td>0.674</td>
<td>0.413</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>0.026</td>
<td>0.871</td>
</tr>
<tr>
<td>Risk</td>
<td>0.799</td>
<td>0.372</td>
</tr>
</tbody>
</table>

The results in the table above shows that the gender does not constitute a factor of differentiation because the Sig. of F – value is insignificant (sig.>0.05) for all constructs. This means that for males and females there is not difference in the degree
of satisfaction from benefits, costs and risk. They evaluate the benefits, costs and risks similarly.

In the second ANOVA the factor variable was the age of the respondents and dependent variables all the constructs of benefits, costs and risks.

**Table 4.7: ANOVA by Age**

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>6.128</td>
<td>0.014*</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>3.495</td>
<td>0.063</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>1.255</td>
<td>0.264</td>
</tr>
<tr>
<td>Direct cost</td>
<td>2.693</td>
<td>0.102</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>5.338</td>
<td>0.022*</td>
</tr>
<tr>
<td>Risk</td>
<td>3.277</td>
<td>0.072</td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level.

The age affects in the level of satisfaction on only two constructs. The group of over 40 years old believes more than the group of less than 40 years old that the investments in information technology improved the strategic benefits. The same group of age state that the investments in I.T reduced the indirect costs of business.

In the next ANOVA where the factor variable is the educational level, only “risk” is affected by the level of education. In particular, the respondents with medium educational level are more satisfied than the others.

**Table 4.8: ANOVA by Educational level**

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>1.749</td>
<td>0.176</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>1.987</td>
<td>0.139</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>1.071</td>
<td>0.344</td>
</tr>
<tr>
<td>Direct cost</td>
<td>1.797</td>
<td>0.168</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>1.014</td>
<td>0.364</td>
</tr>
<tr>
<td>Risk</td>
<td>2.580</td>
<td>0.078**</td>
</tr>
</tbody>
</table>

**Significant at the 0.10 level

No association was found between the experience of respondents and the satisfaction from the I.T components. Of course the respondents with good experience are more satisfied but the difference is small and statistically insignificant (Table 4.9).
In summary, the personal characteristics of the respondents do not constitute a factor which affect in the satisfaction from the use of I.T system.

### 4.3.2 ANOVA Analysis for Business Characteristics

The first ANOVA refers to the sector of business. From the results arise that the sector in which the business activate does not affect the degree of satisfaction from the use of I.T system. There is a highest satisfaction in the manufacturing sector but not so significant.

#### Table 4.10: ANOVA by Sector

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>0.800</td>
<td>0.451</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>0.165</td>
<td>0.848</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>0.633</td>
<td>0.532</td>
</tr>
<tr>
<td>Direct cost</td>
<td>0.662</td>
<td>0.517</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>0.208</td>
<td>0.813</td>
</tr>
<tr>
<td>Risk</td>
<td>0.846</td>
<td>0.430</td>
</tr>
</tbody>
</table>

The size of the business was the factor variable in the next ANOVA. Even if all the businesses in the sample are small, they are divided in very-very small, very small
and small. There are no significant differences in the degree of satisfaction among the various sizes, however the very-very small businesses are more satisfied.

**Table 4.11: ANOVA by Size**

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>0.268</td>
<td>0.765</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>0.220</td>
<td>0.802</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>0.313</td>
<td>0.731</td>
</tr>
<tr>
<td>Direct cost</td>
<td>0.410</td>
<td>0.664</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>0.204</td>
<td>0.815</td>
</tr>
<tr>
<td>Risk</td>
<td>0.194</td>
<td>0.824</td>
</tr>
</tbody>
</table>

The business location does not constitute a factor that affects satisfaction from the use of I.T system. There is no difference in anyone component of I.T satisfaction.

**Table 4.12: ANOVA by Location**

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>0.171</td>
<td>0.680</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>0.014</td>
<td>0.906</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>0.302</td>
<td>0.583</td>
</tr>
<tr>
<td>Direct cost</td>
<td>0.679</td>
<td>0.411</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>0.206</td>
<td>0.650</td>
</tr>
<tr>
<td>Risk</td>
<td>0.135</td>
<td>0.713</td>
</tr>
</tbody>
</table>

The profitability of the business is another factor that does not affect significantly the satisfaction of I.T system. The profitable businesses are more satisfied, but the difference is very small.

**Table 4.13: ANOVA by Profitability**

<table>
<thead>
<tr>
<th>Factors</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic benefits</td>
<td>0.983</td>
<td>0.322</td>
</tr>
<tr>
<td>Tactical benefits</td>
<td>1.597</td>
<td>0.208</td>
</tr>
<tr>
<td>Operational benefits</td>
<td>0.308</td>
<td>0.580</td>
</tr>
<tr>
<td>Direct cost</td>
<td>0.087</td>
<td>0.768</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>2.415</td>
<td>0.122</td>
</tr>
<tr>
<td>Risk</td>
<td>0.005</td>
<td>0.946</td>
</tr>
</tbody>
</table>

In summary, the findings of this study show that the business related factors are not associated with the components of I.T satisfaction.

**Conclusions**
The term information technology or IT is used to refer to an entire industry. In actuality, information technology is the use of computers and software to manage information. In some companies, this is referred to as Management Information Services (or MIS) or simply as Information Services (or IS). The information technology department of a large company would be responsible for storing information, protecting information, processing the information, transmitting the information as necessary, and later retrieving information as necessary. In relative terms, it wasn't long ago that the Information Technology department might have consisted of a single Computer Operator, who might be storing data on magnetic tape, and then putting it in a box down in the basement somewhere.

In the 1960s and 1970s, the term information technology (IT) was a little known phrase that was used by those who worked in places like banks and hospitals to describe the processes they used to store information. With the paradigm shift to computing technology and "paperless" workplaces, information technology has come to be a household phrase. It defines an industry that uses computers, networking, software programming, and other equipment and processes to store, process, retrieve, transmit, and protect information.

In the early days of computer development, there was no such thing as a college degree in IT. Software development and computer programming were best left to the computer scientists and mathematical engineers, due to their complicated nature. As time passed and technology advanced, such as with the advent of the personal computer in the 1980s and its everyday use in the home and the workplace, the world moved into the information age.

By the early 21st century, nearly every child in the Western world, and many in other parts of the world, knew how to use a personal computer. Businesses' information technology departments have gone from using storage tapes created by a single computer operator to interconnected networks of employee workstations that store information in a server farm, often somewhere away from the main business site. Communication has advanced, from physical postal mail, to telephone fax transmissions, to nearly instantaneous digital communication through electronic mail.

Great technological advances have been made since the days when computers were huge pieces of equipment that were stored in big, air conditioned rooms, getting their
information from punch cards. The information technology industry has turned out to be a huge employer of people worldwide, as the focus shifts in some nations from manufacturing to service industries. It is a field where the barrier to entry is generally much lower than that of manufacturing, for example. In the current business environment, being proficient in computers is often a necessity for those who want to compete in the workplace.

Small enterprises constitute a motivate force of innovation and creation of places of work in Europe. Their small size renders them to be very sensitive in the industrial transformations and to the environment where they are activated. However, despite their small size and the limited economic resources try to exploit the possibilities that provide them the information technology and for this reason most henceforth enterprises use some, even simple, I.T system.

From the current survey, that took place 237 very- very small and very small businesses which use the same I.T system came up some very important conclusions that concern Greece.

It is very important to report before anything else that the users of I.T System are very experienced. Of course, more experienced appeared to be the younger people with high educational level.

In their majority businesses present profitability, while it is not reported difference in the profitability between the sectors and the size.

The acceptance of the importance of the utilities that comes up from the use of I.T Systems is impressive. This way, it is appreciated that the investments in information technology improve the strategic, tactical and operational benefits for own business. They state also that the investments in information technology reduced the direct and indirect costs. Finally, they believe that the use of information technology in our business reduced the risks.

From the results it is established that the personal characteristics of the respondents do not play very important role in the opinion’s formation. In this case, age constitutes a differentiation factor as far as the importance of the “strategic benefits” and “indirect costs” and the educational level affects the factor “risk”is concerned. In a research of
Palvia and Palvia (1999) the findings indicated more impact, from owner’s characteristics, in the degree of satisfaction.

Also, from the results of the present research does not come up an important effect in business related factors on I.T satisfaction. Respondents from businesses of different sector, size and location state the same degree of satisfaction.

Concluding it is very important to report that very small and usually individual enterprises should adapt the new data of market so that they bear in the competition and survive. The investment of new technologies and the continuously briefing on the developments it is judged as essential.

This research has the following limitations

✓ It is not going to be carried out to the whole Greece. As referred above it is going to cover the municipalities of Kavala, Drama, Serres and Thessaloniki.
✓ The sample size will be sufficient to extract statistically significant results but these results cannot be generalized.
✓ Benefits, costs and risks are dynamic. This means that this research will take place at a particular point in time. This means that Information benefits, costs and risks will be changed in a few years.

In a future research, more variables can be added to the conceptual framework in order to enhance it. Also, the sample can be expanded to small businesses of all Greece. Even more, it can be expanded to larger businesses in order to test the level of evaluation of an Information Technology system of large businesses.
References


   environment. Journal of Systems Management. 41(4), 11-14
   Ltd, in association with Unicom, Henley on Thames.
   information technology benefits, costs and risks for small-to-medium sized
   evaluation: benefits, costs and risks of IT in Australian small- medium- sized
   enterprises.
   Information Systems Management 3, 295– 304.
52. MacGregor, R., and L. Vrazalic, (2005), Role of Small-Business Strategic
   Alliances in the Perception of Benefits and Disadvantages of E-Commerce
   Adoption in SMEs. Ph.D. thesis, University of Wollongong, New South
   Wales, Australia.
   13(1), 39-42.
   allowances of using risk analysis in capital cost estimating: a Hong Kong case
   MIS Quarterly 11(3), 437-49.
   Review, 6(4), 66-70.


Appendix

Questionnaire

Answer putting a √ to the box that it represents you.

A. Personal data

1. Gender :
   Male
   Female

2. Age:
   <= 40 years old
   >40 years old

3. Education level:
   Primary school
   High school
   University/ MSc/ Phd

4. Level of computing skills:
   Poor
   Average
   Good
B. Business related aspects

5. Industry sector:

Service
Commercial
Manufacturing

6. Firm size by number of employees:

1 - 2
3-5
6-9

7. Annual Turnover (Sales): .................. Euro

8. Location :

Urban
Rural

C. Operational Benefits

Information Technology investments:

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Improved data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Improved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11. Improved decision-making
12. Reduced paperwork
13. Reduced bottlenecks
14. Reduced labor costs
15. Reduced rework
16. Improved quality of output
17. Improved ability to exchange data
18. Improved response time to queries
19. Improved forecasting and control
20. Improved control of cash flow
21. Reduced lead times for financial planning

D. Strategic Benefits

Information Technology investments:

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. Improved growth and success</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Reduced marketing costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Leader in new technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Improved market share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Market leadership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Improved customer / supplier satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Improved customer / supplier relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Enhanced competitive advantage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Improved organizational and process flexibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### E. Tactical Benefits
Information Technology investments:

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Improved response to changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. Improved service quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. Improved teamwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. Promotes proactive culture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Improved integration with other business functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Increased planning times</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. Reduced time to complete tenders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Reduced time to prepare cost plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. Improved contract administration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### F. Direct Costs
Information Technology investments increase:

<table>
<thead>
<tr>
<th>Component</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>40. Hardware accessories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41. Processing power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. Consultancy support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43. Installation engineers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. Networking hardware and software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. Overheads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46. Training costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48. Networking security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### G. Indirect Costs

Information Technology investments reduce:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>49. Management and staff resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50. Management time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51. Cost of ownership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52. Management effort</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53. Dedication to explore the potential of the system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54. Employee time in detailing, amending and approving the computerization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55. Employee training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56. Employee motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57. Changes in salaries as a result of improved employee flexibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58. Staff turnover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59. Productivity losses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60. Strains on resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### H. Risk Factors

Information Technology investments reduce:

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>61. Reluctance of employees to adapt to change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62. Lack of Information System infrastructure support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63.</td>
<td>Technical uncertainty and lack of knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64.</td>
<td>Minimal Information Technology expertise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65.</td>
<td>Maintenance costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66.</td>
<td>Uncertainty about how to measure potential benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67.</td>
<td>Uncertainty about how to measure the costs involved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68.</td>
<td>Capital outlay with no guarantee of likely returns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.</td>
<td>Security issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.</td>
<td>Training expenses on staff that leave the organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71.</td>
<td>Theft of software and hardware</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**I. The business is:**

1. Profitable
2. Not profitable