



ICT and SME: role, needs, requirements and purchasing process

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Abstract. After that the first incoming wave of the Internet era is ended, business managers and entrepreneurs are reviewing their ICT selection and investment plans. In particular, an evident discontinuity of data and information currently available, is now addressing researchers and analysts to go through purchasing decisions processes of ICT in SMEs. This paper describe methodologies and results of a research accomplished by the SMEs Observatory of ASAM, Catholic University of Milan, in collaboration with other Italian enterprises, i.e. IBM Italia, Oracle Italia, TC Sistema and Next Partner, the aim of which was to depict the state of the art of ICT in Italian SMEs, in order to identify new possible recent changes in ICT needs and requirements at the beginning of the Post-Internet era, and to catch the decisional processes and the priority selection criteria of ICT budget. The preliminary phase of the research was based on a general survey made on a statistically appropriate sample of SMEs in order to produce a comparative map of technologies and related expenses, i.e. investments and costs. Research methodology and interpretation of results of preliminary phase are herein described.

1 Information and Communication Technology: the current scenario

With the term “Information and Communication Technology (ICT)” we mean all the hardware, software and telecommunication technologies that are used to realize systems for the treatment of information inside enterprises or, more generally, inside a socio-economic context.

Although the first steps of Information Technology goes back to the years of the second post-war period, it is with the constant evolution of the competitive context that conditions arise for a more and more deep and complex contamination between the world of the ICT and the enterprise system.

In recent years, in fact, enterprises have perceived the need to compete increasing their physical borders both in terms of business and in terms of relations inside their supply chain. After that data and information were produced and made digitally available inside the enterprise, the requirement was born to arrange and to share the information in a broader sense, along the whole value chain, internally and externally.

The market of ICT has reached dimensions of great relevance in the global economy. In 1999, ICT had an increase of 9% worldwide and a total value of approximately 1.593 billions of Euro. The global market of ICT showed the

predominance achieved by the United States that, with 564 billions of Euro, keep the leadership; the European market follows with the 30% of the market shares.

Despite of the fast increase reached in some segments of the ICT value chain, the competitiveness of Europe in this sector still marks signs of weakness.

The performance of European countries is considerably lower than that one of the United States and of Japan, both in terms of productivity and in terms of efficiency in many segments of the market.

Although in the countries of the European Union the ICT market in 1999 has reached a value of 470 billions of Euro, approximately 5.8% of the GNP, which is an increase of 12%, the recovery showed in the last five years has concurred to only reduce in part the relevant and historical difference with the United States.

The first four Countries of the Union (Germany, United Kingdom, France and Italy) represent the two thirds of the total value of the European market and the forecasts indicate increasing rates of growth.

The competitive scene of ICT in Italy, which represent the fourth market, reflects the European scene substantially. Although Italy is not far from the medium standards of the other European Countries, results of different researches show that the infrastructural equipment is still under the average¹.

2 Objectives of the research project

Coherently with forwards above indicated and after that the hype cycle of the Internet era is reaching a consolidation phase, current interests of researchers and analysts are addressing new topic issues, concerning current and future ICT expense choices and decisions. Thus the SMEs Observatory of ASAM, Catholic University of Milan, in collaboration with other Italian enterprises, IMB Italia, Oracle Italia, TC Sistema and Next Partners, decided to start a research in this sense, activating an appropriate survey on a relevant number of Italian SMEs.

In particular, the idea of the research project was born because of the evident discontinuity of data and information currently available, with respect to the purchase decisions process of ICT in SMEs.

Coherently with forwards above indicated and after that the post-Internet era is started, the research plan intend to give adequate answers to following key question:

- Which is the state of the art of ICT in Italian SMEs? Where, what and how ICT is used in the SME?
- Which is the ICT budget in the SME? (which investments, which costs)?
- Which are the needs of entrepreneurs? Which decisional processes carry to the definition of ICT requirements? Which criteria for choosing and articulating ICT expenses?

¹ Svimez research, 2000.

- How ICT solutions providers answer to such requirements?
- Which are the future trends and tendencies?

3 Steps of the project

It has been planned to developed such a research in two different phases:

- phase 1: a general survey on a selected sample of companies by means of predisposition and distribution of appropriate questionnaires; 1 questionnaire for the CEO (if any) and/or Entrepreneur, 1 questionnaire for the CIO of the company.
- phase 2: an “in depth” analysis on a restricted number of companies to be accomplished through on site interviews and “ad hoc” studies, in order to identify both successful cases and case histories or even best practices.

At the moment, only phase 1 has been accomplished. Phase 2 will be started in 2003. Thus, contents of this document will address both the methodology chosen and the general preliminary results of phase 1.

4 Methodology: phase 1 contents

The operative steps of the first phase of the project are:

- literature review;
- analysis model and formulation of the research hypotheses;
- selection of the companies sample (database supplied from Dun & Bradstreet);
- definition of the logical and formal structure of the questionnaire to be used in the survey;
- delivery of the questionnaire to the companies;
- collection and standardization of data and information;
- preliminary analysis of data;
- Interpretation and formalisation of survey outcomes and results.

In the following paragraphs the most important aspects of the applied methodology are described. Results of the survey are presented in chapter 5.

4.1 Literature review

The analysis of the literature was developed by collecting and structuring existing contributions in the national and international literature; various sources of information have been used.

At first, articles published in the period 1999-2002 on the most important Italians and international economic magazines have been gone trough; later on, several local electronic databases have been searched for, in order to select other articles and to get useful information and data.

Then, articles have been appropriately structured and categorised in order to have a complete panoramic view of existing studies and information about the subject. In

particular, this literature review put in evidence the absence of consistent information about the global ICT spending, i.e. capital expenditure versus general expenditure, of SMEs in Italy and also showed that a comparative map between spending for “new projects” and “spending for existing projects” had not been taken into account so far.

4.2 Analysis model

Coherently with the objectives of this research, the expenses in Information and Communication Technology have been decomposed in four categories:

1. digital infrastructure;
2. technological services;
3. application solutions;
4. consulting.

So a structured classification gives a clear indication of uses that SMEs make of the ICT; in fact, the four classes of technology are distinguished for their various informative content, and therefore for the crescent added value they create to the enterprise.

Then, it has been chosen to proceed in a further decomposition of such four categories, in order to better go through each specific content.

1. The digital infrastructure refers to the infrastructural, hardware and software, assets of the company, and can be articulated in:
 - computing (mainframes; servers; client workstations and desktop computers; mobile computers; palm computers);
 - printing systems;
 - storage (disk and tape systems);
 - software (groupware & productivity; operating systems; security)
 - networking (gateways, routers, switches, hubs and other devices).
2. A technological service is a finalized activity to design, select, plan, deploy and manage infrastructural assets, in order to support the development of the enterprise business. It is articulated in:
 - base services (survey and analysis of the enterprise infrastructure; configuration and installation; on site support; education; technical hardware and software assistance);
 - services for efficiency recovery (analysis of the total cost of ownership of the investment in technological infrastructures; distributed infrastructure management; technological upgrade management; network and systems remote administration; outsourcing services);
 - security services (risk analyses; analysis of the enterprise infrastructure vulnerability; definition, design and implementation of emergency procedures; remote management of the emergency);
 - services for the access and the availability of data (risk analysis of data loss; solutions analysis of data availability; solutions analysis of data reliability; solutions analysis of messaging infrastructure; solution analysis of videoconferencing infrastructure; solution analysis of mobile user; remote management of systems).

3. Application solutions represent a set of application programs which enable enterprises to integrate their core processes with information and knowledge systems that include economic and financial variables of the enterprise. In other words, application solutions increase the intelligence of the enterprise and its ability to adapt to the changing conditions of market:
 - management and accounting systems;
 - solutions for managing relationships with customers (CRM);
 - resource planning;
 - performances management and measuring;
 - supply chain management;
 - solutions to improve key processes as: integration, cooperation, knowledge and communication.

4. Consulting is finalized to support enterprises in the implementation of new business projects, improving processes and related systems:
 - enterprise diagnosis;
 - business process re-engineering and improvement;
 - organisation analysis and planning;
 - knowledge management;
 - information systems structure and architecture.

This categorisation represents the basic structure used to identify two possible characterizations of ICT expenses:

1. expense for the implementation of new projects (investment);
2. expense for the management of already existing technologies and applications (cost).



ICT expenses

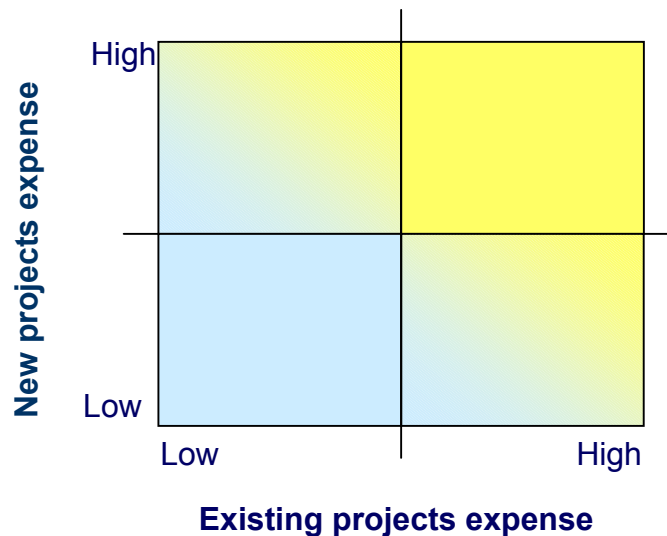
	Expenses for new ICT projects	Expenses for existing ICT
Digital infrastructure		
Technological services		
Application solutions		
Consulting		

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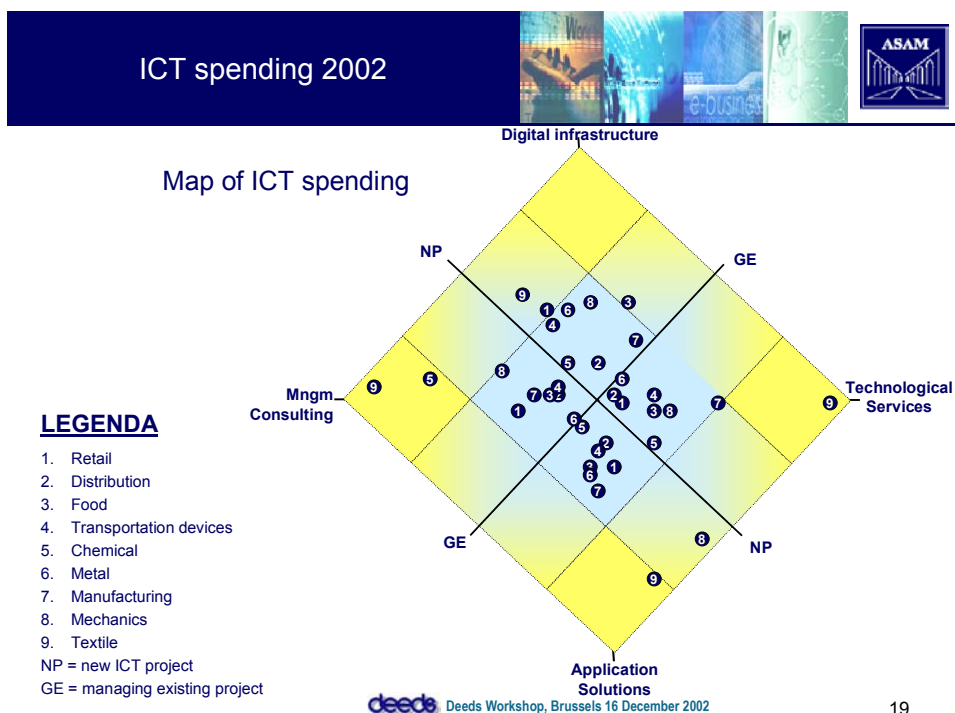
Being inquiring the amount of ICT expenses, distinguished as above described, the main objective of the research, an interpretative model has been constructed, coherent to the formulated hypotheses.

The model, called ' ISSC ', gives a graphical representation of the strategic approach to ICT expenses.

The amount of the expense for every item of the four categories previously characterized, can be analysed through a structured quadrant.



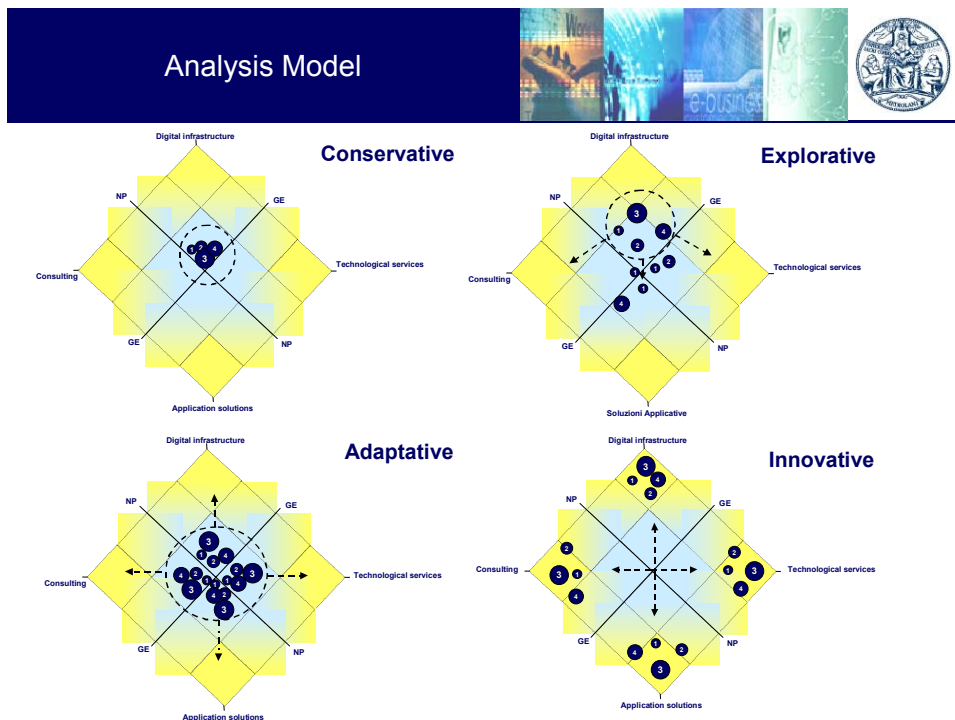
Aggregating all the four categories, the model bring to the following general ISSC quadrant:



where each sector is appropriately positioned in terms of ICT expense for new and existing projects.

The natural consequence of this model is the opportunity to classify each industry sectors in accordance to the “strategic value” of ICT. Following a variant of the Porter-Millar model, it is possible to identify four possible situations, summarised in the following notes

1. Conservative: the sector companies uses ICT in a conventional way, for efficiency purposes and invest mainly in infrastructure and conventional, basic application software (Office automation). ICT expense is low;
2. Explorative: the sector companies use ICT to explore business potentialities, by using some other ICT components. ICT is still low.
3. Adaptative: the sector companies use ICT to improve their capabilities of market response. All ICT components are used, even though ICT expense are not relevant.
4. Innovative: the sector companies use ICT in an innovative way, i.e. they use it as a leverage to make process more effective and to create more value. ICT expense is a consistent item of their profit and loss sheet.



4.3 Selection of the companies sample

The research sample has been chosen starting from a Dun & Bradstreet database, containing around 5.410 Italian SME located in northern Italy. Among these companies only those located around Milano have been considered, taking into account that the area is populated by nearly all existing sectors.

Redemption The research sample composition

INDUSTRY	Number	Participating Enterprises	Redemption
Food	72	14	19%
Textile	33	4	12%
Fashion	20	2	10%
Chemical	52	3	6%
Metal	64	5	8%
Mechanics	115	30	26%
Transportation devices	40	4	10%
Transportation	20	2	10%
Distribution	201	30	15%
Retail	77	10	13%
Total	694	104	15%

INDUSTRIES	MILANO		OUT OF MILANO		Total
	Turnovers <= 125 ml euro	Turnovers > 125 ml euro	Turnovers <= 125 ml euro	Turnovers > 125 ml euro	
Food	14	4	48	6	72
Textile	6	2	22	3	33
Fashion					
Chemical	4	1	13	2	20
Metal	10	3	35	4	52
Mechanics	12	4	43	5	64
Transportation Devices	23	5	78	9	115
Transportation	8	2	27	3	40
Distribution	4	1	13	2	20
Retail	40	10	135	16	201
	15	4	52	6	77
Total	138	38	466	56	694

5 Results

The results herein presented are in a preliminary form yet and take into account only analysis made on the questionnaire delivered to the entrepreneur or the general manager (CEO) of the interviewed companies. They do not consider, at the moment, the contribution stemming from the questionnaire filled by the manager of information system (CIO). It will be taken into account as soon as the related analysis will be accomplished, presumably at the beginning of 2003.

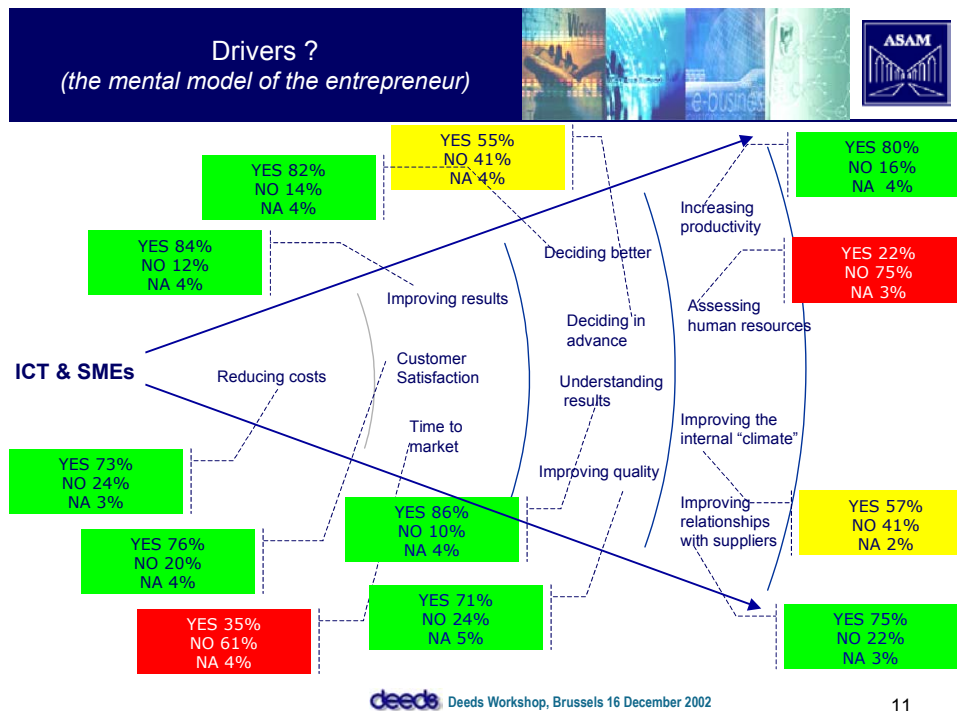
The **set 1** of key issues of the questionnaire to the entrepreneur/CEO (QEO) was aimed to investigate about ICT related needs and the decisional process to define them, as shown in the slide.



- OBJECTIVES
 - Which **needs**?
 - Which **decisional process** to define them?
- WHAT WE ASKED THEM
 - Which **drivers** of the adoption of ICT systems?
 - Which **benefits** achieved?
 - Which the level of your **satisfaction** so far?

The answers given illustrate the entrepreneur perspective of ICT, i.e. real drivers guiding the adoption of ICT, benefits achieved and the overall level of satisfaction.

As far as drivers are concerned, the entrepreneur view can be depicted as in the following scheme, which, as we like to underline, shows the entrepreneur “mental model” of ICT.



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see note below²

As we can see, reducing costs and increasing productivity still remain a strong expectation, related to typical and traditional efficiency-oriented needs.

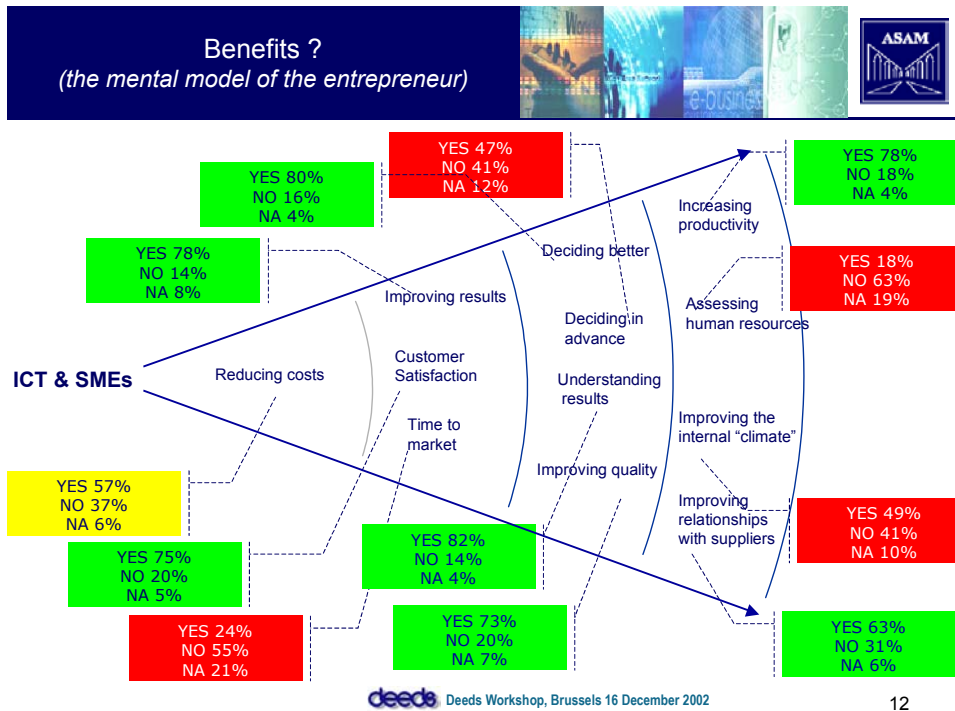
The new fact here is that ICT is considered as a further enabling factor, usable as a leverage to increase the effectiveness of the business.

Improving and better understanding results, deciding faster and “before”, improving quality and relationships both with customers and suppliers means ICT to have significant importance along the value chain, and to represent not only an operative leverage to control efficiency but also an entrepreneur-perceived leverage with strategic impact on the business.

Strangely, “time to market” is not considered as a direct driver in the adoption of ICT; instead, efficient “research and development” and “production” processes are seen as the real enabler of this factor.

The benefits achieved reflect the objectives reached through the application of ICT and show a general good level of responsiveness.

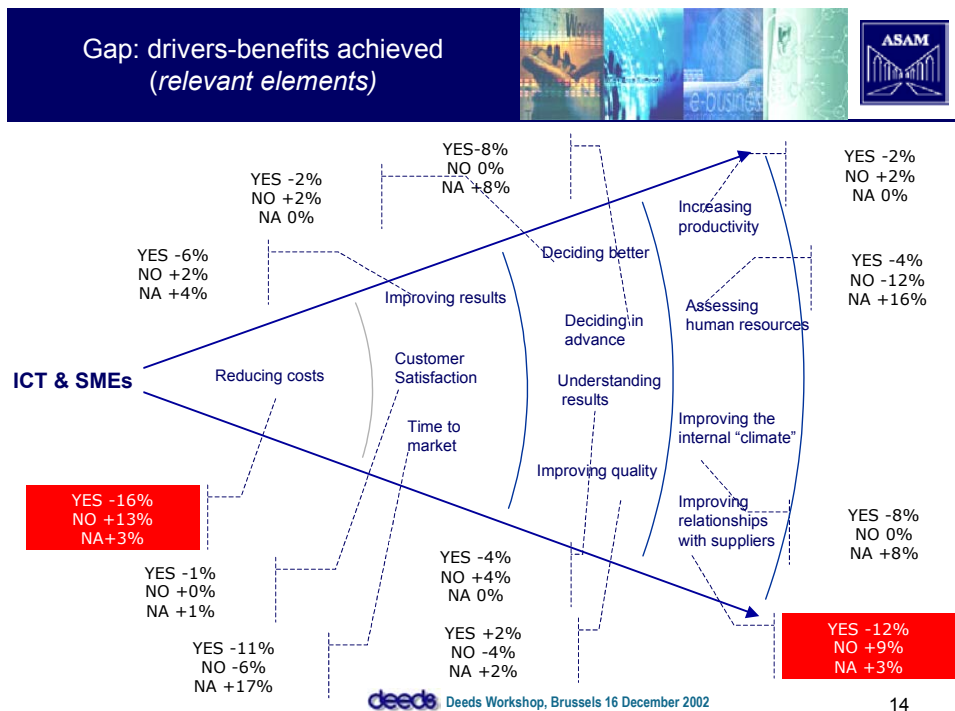
² Metrics – YES means “the factor is a driver”, NO means “the factor is not a driver”, NA means “not answered”



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see note below³

Yet, comparing drivers and benefits some significant discordance appears, showing that ICT cannot completely satisfy initial expectations as far as, in particular, "reducing costs" and "improving relationship with suppliers" are concerned.



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³ Metrics: YES means "benefits have been achieved", NO means "benefits have not been achieved", NA means "not answered"

Nevertheless 88% of the interviewed entrepreneurs declare their overall satisfaction in the ICT adoption at their company.

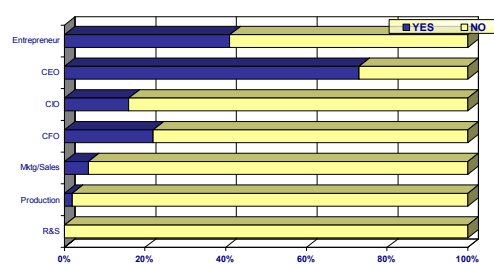
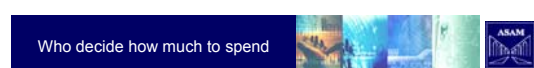
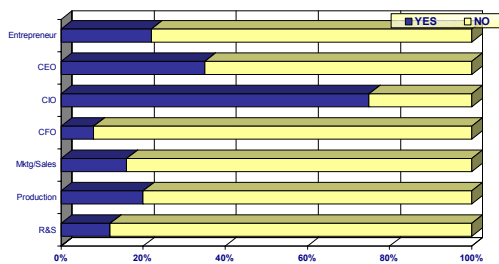
The **set 2** of key issues of the QEO concerned selection criteria, cost allocation and ICT budget. We were particularly interested in costs-investments trade-off.



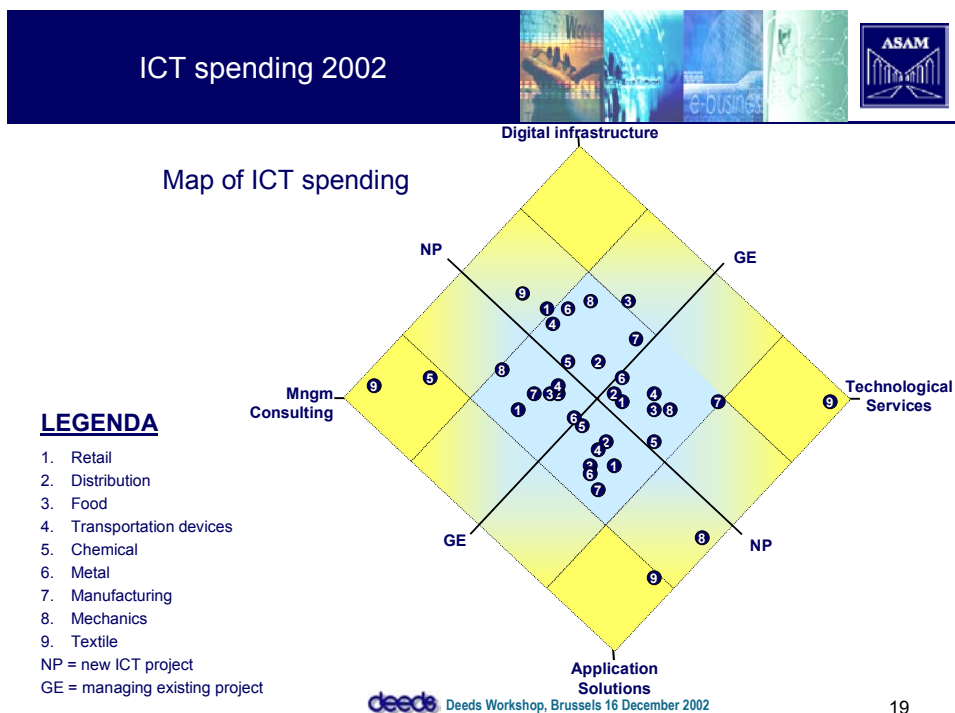
- OBJECTIVES
 - Which **selection criteria** and **costs allocation** ?
 - Which **budget** (costs-investments trade-off)?
- WHAT WE ASKED THEM
 - Who decide what to purchase?
 - Who decide how much to spend?
 - How much is your company's ICT spending ?

The answers to the questions show that the CIO usually decide what ICT components have to be purchased. He also calculates and presents to the board of the company the global ICT budget. The CIO is often sponsor of new initiatives and innovative projects.

Instead, the decision on the final budget allocation for ICT is usually made by the CEO (or Entrepreneur), taking into account the suggestions of both CIO and CFO.



As far as the map of ICT investments/costs in main industry sectors in 2002 is concerned, the research made it possible to sketch the following chart, using the methodological criteria presented above.



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Along the axis, appropriately normalised, NP means “budget of investments in new projects”, and GE means “budget of costs in managing existing projects”.

Textile and mechanics industries show a greater inclination towards the use of ICT.

The **set 3** of key issues of the QEO was addressed to general future trends of ICT in the company, with a particular emphasis to both the general budget and the budget for applications.

Key-Issues: set 3.1

- OBJECTIVES
 - ➔ Which **trends** and **cycles** for the future ?
- WHAT WE ASKED THEM
 - ➔ If you are unsatisfied what do you think to do to increase your satisfaction ?
 - ➔ How much do you think to spend in 2003 ?

Key-Issues: set 3.2

- OBJECTIVES
 - ➔ Which is the ICT **budget** for application solutions (costs/investments trade-off) ?
 - ➔ Which future **trends** ?
- WHAT WE ASKED THEM
 - ➔ Application solutions costs and investments in 2002
 - ➔ Application solutions costs and investments in 2003

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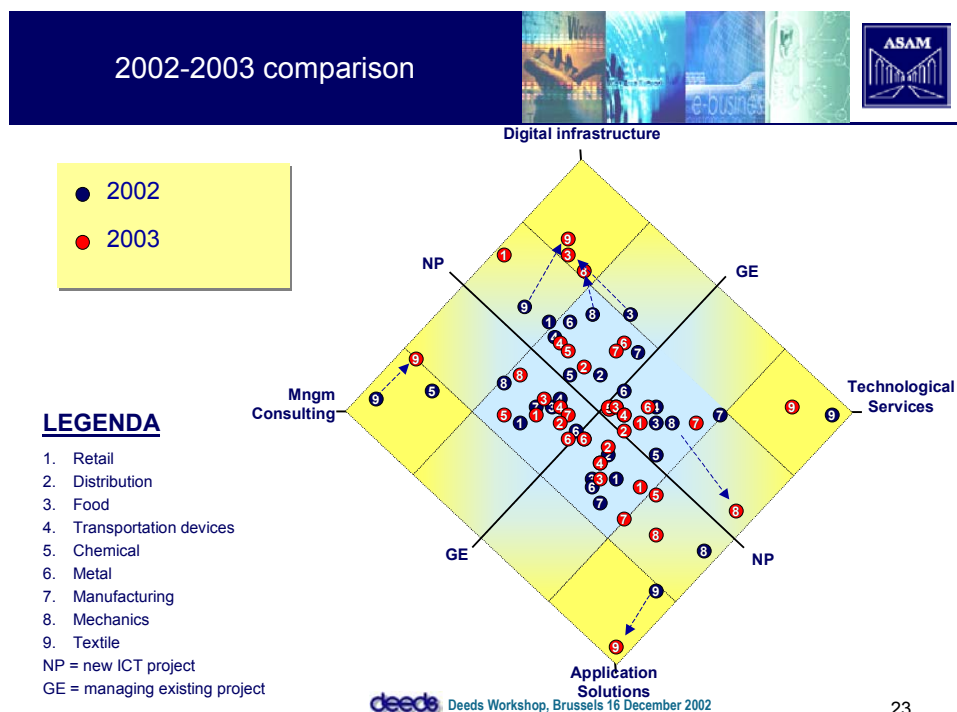
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The relevant aspects stemming from the answers to these questions can be summarised in a sensible expectation of CEOs and entrepreneurs in using ICT in future, not only to achieve meaningful effects on the “physical” operative processes, but also to exploit at best both the internal intangible forces of the company and the network value chain relationships.

As reinforced by direct one-to-one interviews, CEOs are step by step convincing that the future focus of competitive advantage will move towards the set up of an appropriate “ICT knowledge workers” structure and towards the economic involvement of external ICT suppliers in a real partnership.

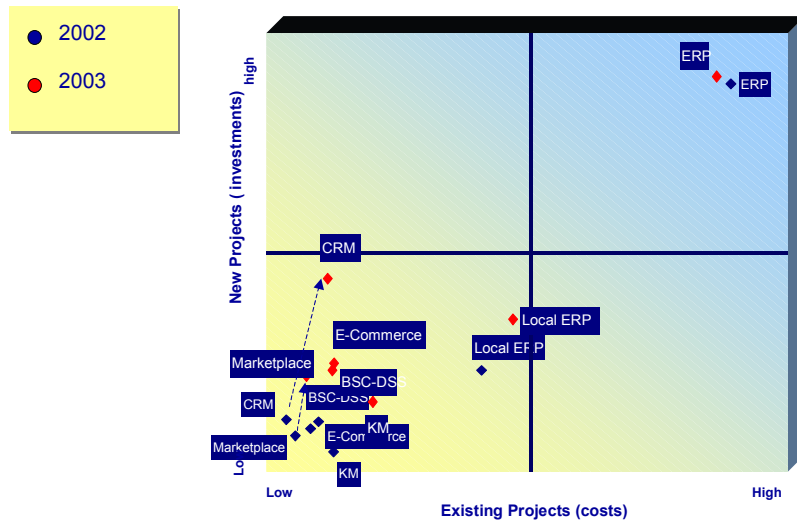
Furthermore, ICT spending will be progressively increased, being accepted and understood by now that ICT is an effective enabling factor both to improve processes functionalities and to successfully support change management programs.

Yet, the 2002-2003 ICT spending comparison map shows that the previously described tendency is not evident for the next ICT budget. In 2003, with the partial exception of Textile and Mechanics industry sectors which will allocate a larger budget, SMEs will spend in ICT just a bit more than in 2002.



Considering application solutions, a significant interest, and expense as well, is going to appear for innovative “strategic business capabilities” like BI (Business Intelligence) projects, KM (Knowledge Management) solutions, e-Marketplace/e-Commerce and CRM (Customer Relationship Management) initiatives.

ERP (international or local suite based), the structure of which tends to “encompass” also the above mentioned innovative capabilities as additional functionalities , still remain the “killer” application.



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6 Preliminary conclusions

Summarising preliminary results of General Survey (phase 1) and waiting for further analysis related to the questionnaire filled by the CIO of the interviewed companies, some relevant conclusions can be drawn about the strategic and economic approach of SMEs towards ICT.

At first, we noted a general attention of the CEO paid not only to efficiency and cost reduction results, but also to the ability of a better effectiveness delivery; ICT is considered both as an operative process enabler and as a powerful strategic leverage to be used both to save financial resources and to improve business results.

A more and more important expectation is growing in relying on appropriately “educated” ICT knowledge workers, considered as the enterprise “backbone” and intangible value of next competitive scenarios.

Improving relationships with all network value chain players will be a critical success factor; expectations of a better “knowledge” of market and customer behaviours can be satisfied by appropriate use of ICT.

Needs of involving ICT suppliers in the “risk” of new ICT initiatives will bring CEOs and entrepreneurs to propose and establish new forms of partnership and collaboration between their enterprise and these suppliers.