



CENTRO DE INVESTIGACION DE LAS TELECOMUNICACIONES

# Business and Information Technologies - BIT Proyect

SURVEY RESULTS  
Colombia May 2007

# **COLOMBIA BIT 2007 - SURVEY RESULTS**



## **GENERAL REPORT**

**Telecommunications Research Center - CINTEL**  
**Avenida Calle 100 No. 19 - 61 Piso 8**  
**Phone: 6353538 Fax: 6353336**  
**Bogotá D.C. Colombia, South America**  
**May 2007**

## CONTENTS

<b>1.</b>	<b>ADOPTION OF ICT IN COLOMBIAN COMPANIES .....</b>	<b>7</b>
<b>1.1</b>	<b>Distribution of the sample .....</b>	<b>7</b>
<b>1.2</b>	<b>ICT Infrastructure .....</b>	<b>10</b>
<b>1.3</b>	<b>ICT and Organizational structure .....</b>	<b>16</b>
1.3.1	Impact of ICT in the workforce .....	16
1.3.2	ICT and Business Process Outsourcing (BPO) .....	21
<b>1.4</b>	<b>ICT and customer management.....</b>	<b>22</b>
<b>1.5</b>	<b>ICT and the communication with trading partners.....</b>	<b>29</b>
<b>1.6</b>	<b>Impact on business results .....</b>	<b>30</b>
<b>1.7</b>	<b>ICT as a tool for Globalization .....</b>	<b>33</b>
	<b>CONCLUSIONS .....</b>	<b>35</b>

## LIST OF FIGURES

Figure 1. Proportion of subsidiaries of multinationals.....	8
Figure 2. Proportion of companies and coverage.....	8
Figure 3. Business nature.....	9
Figure 4. Product nature.....	9
Figure 5. Client nature.....	9
Figure 6. Productive activity.....	9
Figure 7. Type of service.....	10
Figure 8. Business size.....	10
Figure 9. Companies by number of servers.....	11
Figure 10. Companies by number of desktop PCs.....	11
Figure 11. Companies by number of laptops.....	12
Figure 12. Hardware investment.....	14
Figure 13. Security investment.....	15
Figure 14. Software investment.....	15
Figure 15. ¿To whom does the ICT leader reports?.....	16
Figure 16. Use of ICT by staff.....	18
Figure 17. Employees ICT training.....	18
Figure 18. Impact of the ICTs in the personnel structure.....	19
Figure 19. Impact of ICT in the functional structure (1).....	20
Figure 20. Impact of ICT in the functional structure (2).....	20
Figure 21. Proportion of corporations doing outsourcing.....	21
Figure 22. IT processes outsourced.....	21
Figure 23. No IT processes outsourced.....	22
Figure 24. Traditional channels of contact with customers.....	23
Figure 25. Advanced telephone channels to keep contact with customers.....	24
Figure 26. Web-based channels to keep contact with customers.....	24
Figure 27. Sales modalities.....	25
Figure 28. Contrast between traditional and Internet sales.....	25
Figure 29. Mechanisms to segment customers.....	26
Figure 30. Mechanisms for data analysis.....	27
Figure 31. Proportion of companies using Internet advertising methods.....	27
Figure 32. Modalities on-line advertising.....	28
Figure 33. Change image in online advertising.....	28

<b>Figure 34. Companies that practice collaborative relations.....</b>	<b>29</b>
<b>Figure 35. Mechanisms used for purchasing bottom .....</b>	<b>30</b>
<b>Figure 36. 1.3.5 Impact on business results (1).....</b>	<b>31</b>
<b>Figure 37. 1.3.5 Impact on business results (2).....</b>	<b>32</b>
<b>Figure 38. 1.3.5 Impact on business results (3).....</b>	<b>32</b>
<b>Figure 39. Impact on strategic areas.....</b>	<b>33</b>
<b>Figure 40. Impact for international trade .....</b>	<b>34</b>

## LIST OF TABLES

<b>Table 1. Hardware and software adoption .....</b>	<b>13</b>
<b>Table 2. Web tools adoption .....</b>	<b>14</b>
<b>Table 3. Relations processes with partners.....</b>	<b>29</b>

## 1. ADOPTION OF ICT IN COLOMBIAN COMPANIES

The adoption of ICT by Colombian companies has been studied by CINTEL several years ago. By the year 2007, and thanks to an agreement with the University of California at Los Angeles - UCLA, the Center has carried out a study with a standard survey. That is why for the year in question it presents an analysis of the impact of ICT in business by the following criteria:

- Technology infrastructure
- ICT and internal organization (management and business processes)
- Use of ICT as a tool for customer facing
- ICT as a tool for managing relationships with trading partners
- Impact of ICT in business results
- ICT as a tool for globalization

In each of these points, the survey points to direct questions about the impact of ICT as perceived by each of the business leaders.

The survey has two approaches: Static and dynamic. The static approach is comprised of response options that show the current status of every aspect of interest. The proactive approach is structured by options which allow establishing the possible evolution of the current state in some respects such as investment and intention of adoption considering a time horizon of 3 years.

### 1.1 Distribution of the sample

The BIT 2007 survey was conducted among 200 companies (large, medium and small). The distribution of productive activities was established according to the following proportions:

The 9.5% of the companies belong to a business group from another country (Figure 1). The operation ratio from local to international coverage is shown in Figure 2.

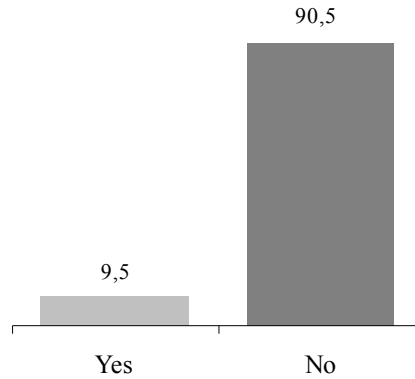


Figure 1. Proportion of subsidiaries of multinationals.

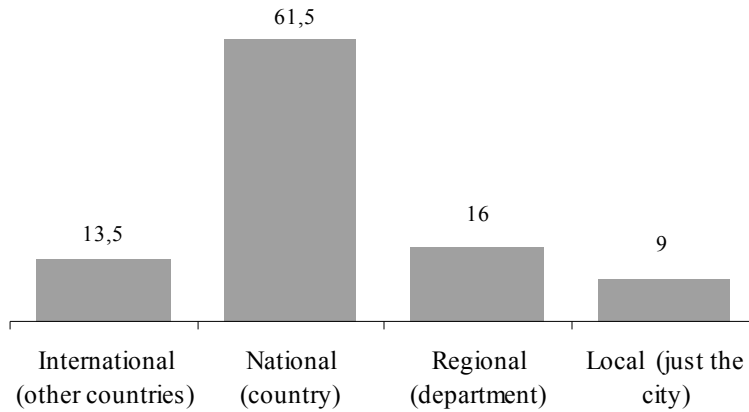


Figure 2. Proportion of companies and coverage

The distribution of enterprises according to the nature of their activity reflects that most of them are engaged in manufacturing physical products and their customers are mainly corporations. Figure 3 to Figure 5 show the proportions.

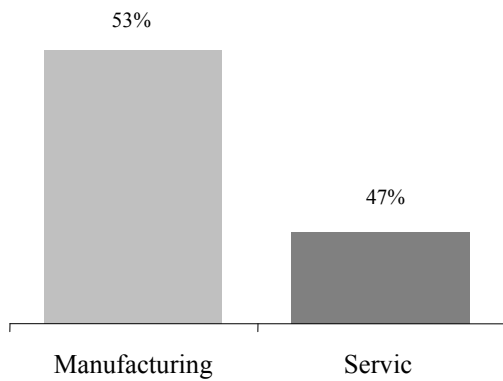


Figure 3. Business nature

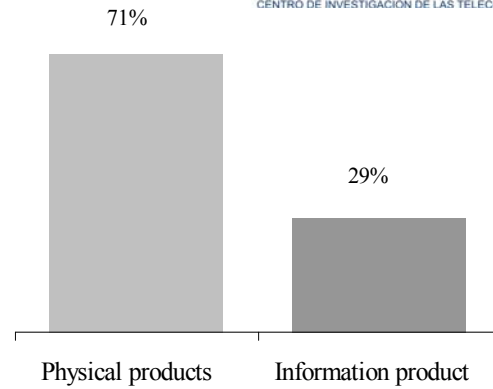


Figure 4. Product nature

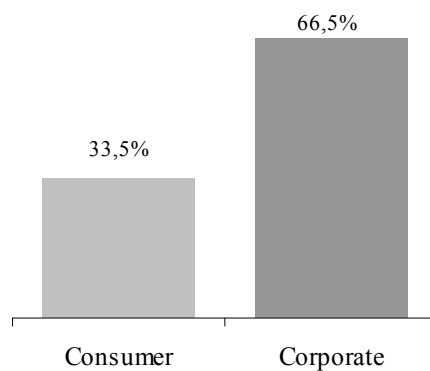


Figure 5. Client nature

Regarding productive activity, economy sectors were distributed into five main groups: Manufacturing, Services, Construction and Trade, the rest of the activities were consolidated under the option "Other" in Figure 6.

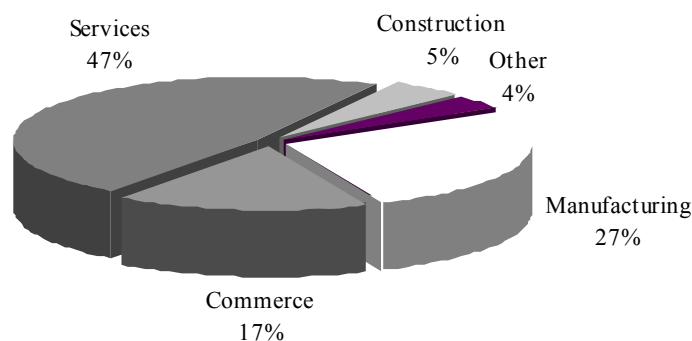


Figure 6. Productive activity

Within the sample, there stand out some which guide their business to communications services and logistics (Figure 7).

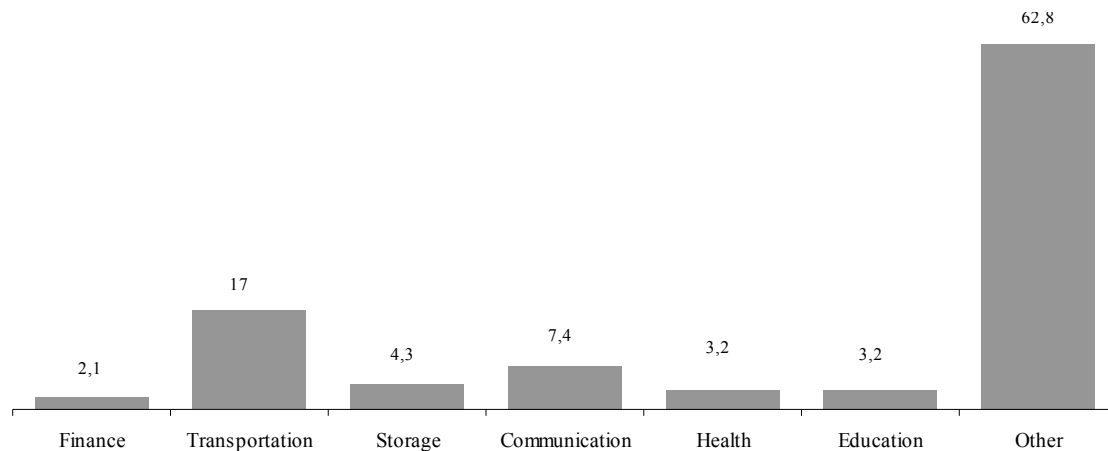


Figure 7. Type of service

Finally, companies included in the sample include 50% of small businesses, 25% of medium enterprises and 25% of large firms<sup>1</sup> (Figure 8).

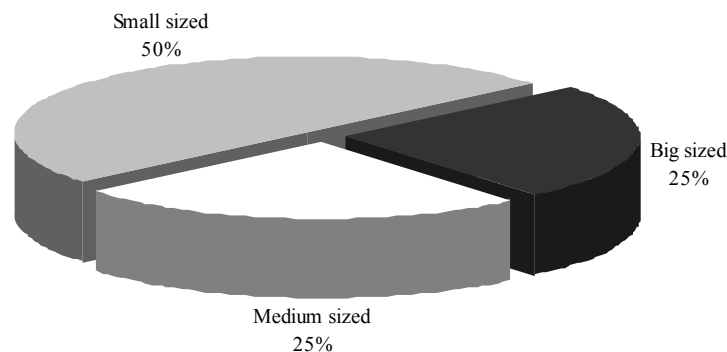


Figure 8. Business size

## 1.2 ICT Infrastructure

For the analysis of the adoption of ICT infrastructure, the survey questions were focused on four basic aspects: Hardware, Software, Security and WEB. The analysis presents the results of the current state of adoption and the evolution in terms of budget.

As for hardware, the number of equipment divided within servers, desktop and laptop computers, turned out with the distribution showed in Figure 9 to Figure 11.

<sup>1</sup> The classification criterion corresponds to the one used by the Chamber of Commerce and used as a classification value the company's assets.

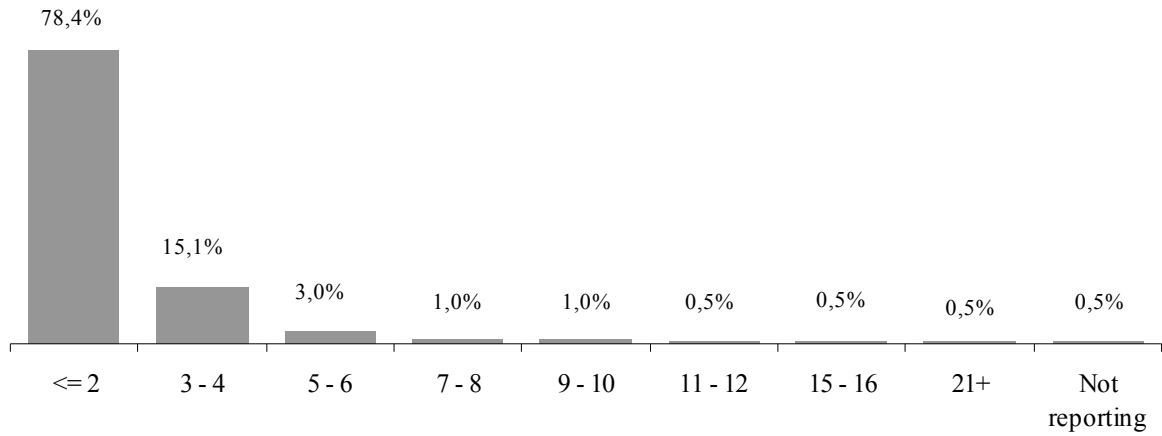


Figure 9. Companies by number of servers

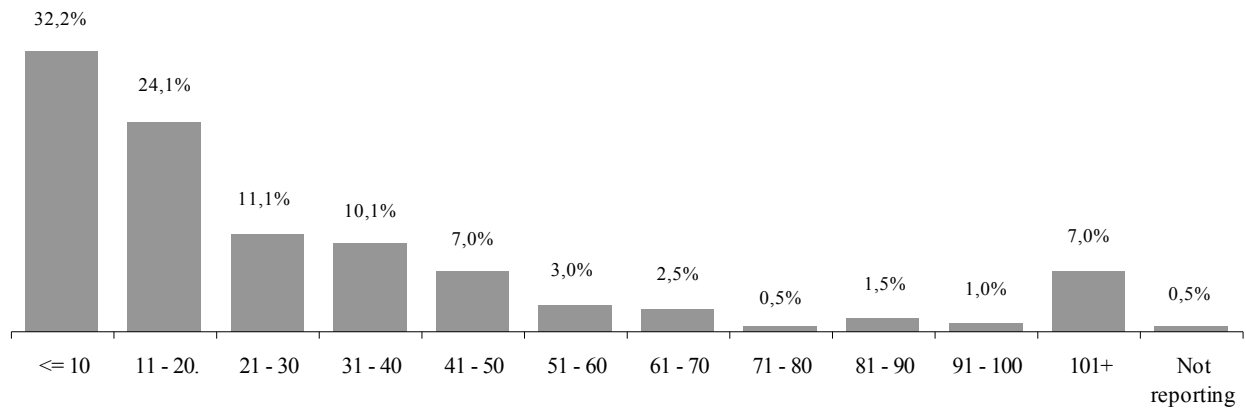


Figure 10. Companies by number of desktop PCs

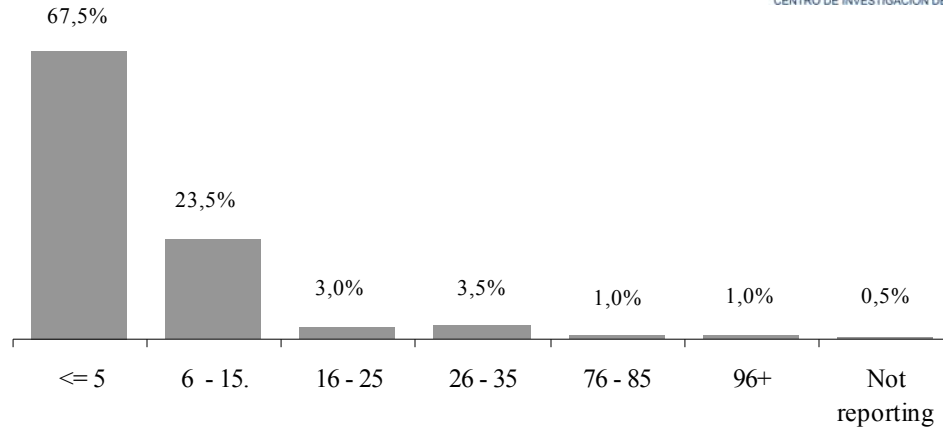


Figure 11. Companies by number of laptops

Regarding storage, the 42% of the companies have expressed counting with specialized storage devices such as SAN<sup>2</sup> and NAS<sup>3</sup>. The radio frequency identification technologies systems (RFID) and wireless technologies are used by the 20.5% and 36% respectively (Table 1).

As for software, most of the companies count on tools for general activities such as Office, instant messaging and e-mail. Validation and processing of purchase orders appear as a service associated to high penetrated ICT. Advanced applications such as ERP, SCM and systems for business intelligence analysis showed low diffusion.

<sup>2</sup> Storage Area Network

<sup>3</sup> Network Attached Storage

Technological Products	Currently have			Don't have		Not Applicable
	Years ago product was purchased			Inted to implement over the next 3 years?		
	Yes	No	Years (media)	Yes	No	
Enterprise Application Integration (EAI) and Middleware	33,50%	53,50%	595,00%	28,00%	72,00%	13,00%
Storage Area Networks (SAN) and Network Attached Storage (NAS)	42,00%	42,50%	616,00%	22,40%	77,60%	15,50%
Operating System - Linux	16,00%	71,00%	407,00%	15,50%	84,50%	13,00%
Digital Receipts	70,00%	23,00%	646,00%	39,10%	60,90%	7,00%
Radio Frequency Identification (RFID)	20,50%	68,00%	555,00%	19,10%	80,90%	11,50%
Biometrics	8,00%	78,50%	350,00%	15,30%	84,70%	13,50%
Third Party authentication and verification (Verisign,	13,50%	74,00%	466,00%	19,60%	80,40%	12,50%
Surveillance systems	18,50%	69,50%	436,00%	27,30%	72,70%	12,00%
Wireless Network Connectivity HW and SW	36,50%	52,50%	470,00%	23,80%	76,20%	11,00%
Groupware / Productivity Tools (Lotus Notes, etc)	89,00%	6,00%	714,00%	16,70%	83,30%	5,00%
Enterprise Resource Planning (ERP)	45,50%	41,00%	567,00%	30,50%	69,50%	13,50%
Business Intelligence	18,50%	68,00%	571,00%	35,30%	64,70%	13,50%
Business Process Modeling	13,00%	75,00%	600,00%	32,70%	67,30%	12,00%
Enterprise Instant Messaging (IM)	61,50%	30,50%	503,00%	36,10%	63,90%	8,00%
Supply Chain Management (SCM)	22,50%	66,00%	565,00%	28,80%	71,20%	11,50%

Table 1. Hardware and software adoption

Regarding web services, 56% of the companies in the sample have a webpage. Within them, 36% declared they use e-commerce as a sales channel. The results obtained in this question are shown in Table 2.

	Yes	No
Web Page	56,0%	36,5%
E-Commerce	31,0%	60,0%
Content Management	18,5%	71,0%
Portal Management	23,5%	65,5%
E-learning	9,5%	78,0%

Table 2. Web tools adoption

The above results present a picture of the state of ICT adoption in surveyed companies. The dynamism in terms of adoption can be approximated through investment trends in ICT projected by each company.

Regarding storage, security and physical infrastructure (wiring, power etc.) executives surveyed stated that the level of investment in these three items increased (Figure 12).

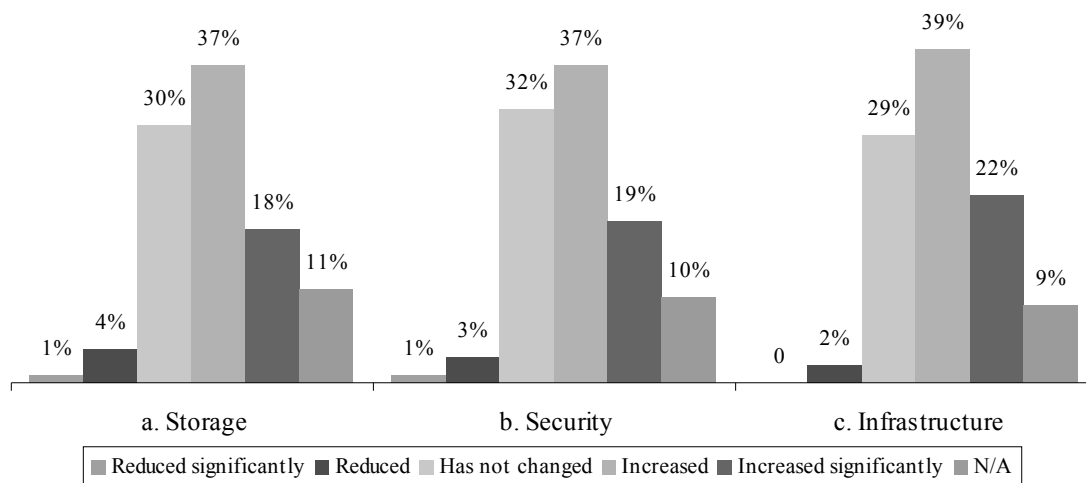


Figure 12. Hardware investment

Investment in security and software have been increased in the last years as shown in Figure 13 and Figure 14.

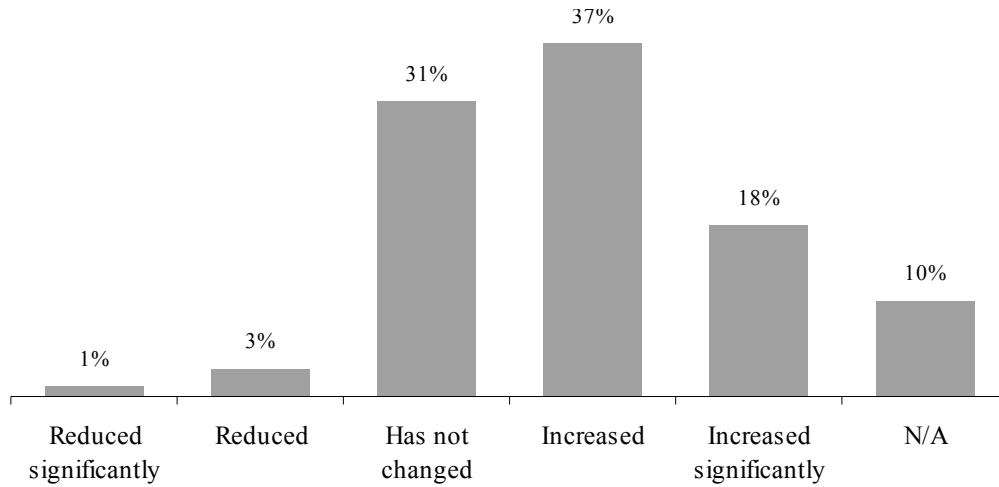


Figure 13. Security investment

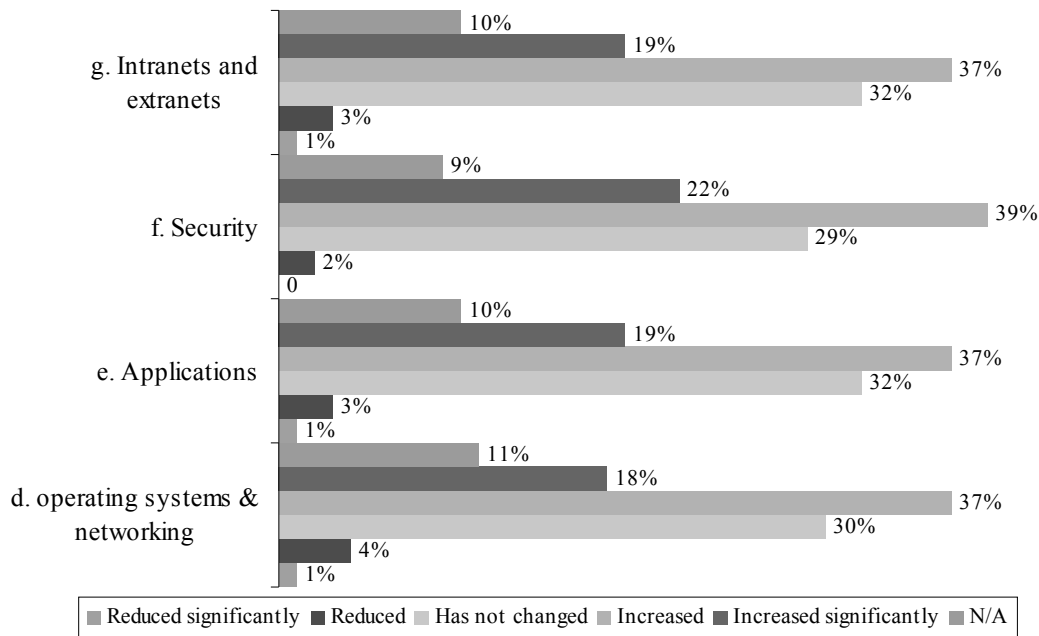


Figure 14. Software investment

### 1.3 ICT and Organizational structure

#### 1.3.1 Impact of ICT in the workforce

One of the aspects of greater consideration on the Information and Communication Technologies constitutes the workforce subject. The impact generated can be as simple as an increase of the productivity of the employees who have activities related to information, up to a reduction of workforce because of the automation of functions. Additionally, the impact within the organization depends on the information strategic level for the directors of the company and the different levels of information specialization required in order to make decisions at managerial levels.

Another aspect to consider is the ICT importance in each organization as a strategic resource. One way to establish a benchmark for measuring this importance is analyzing the managerial level of the ICT leader within the organization structure. The answers indicate that in 74.5% of the companies, the ICT leader (Systems Manager, Systems Director, etc.) reports directly to the General Manager or General Director (in larger corporations, the CEO). This situation shows that Colombian managers really consider ICT a strategic tool for good performance of the organization.

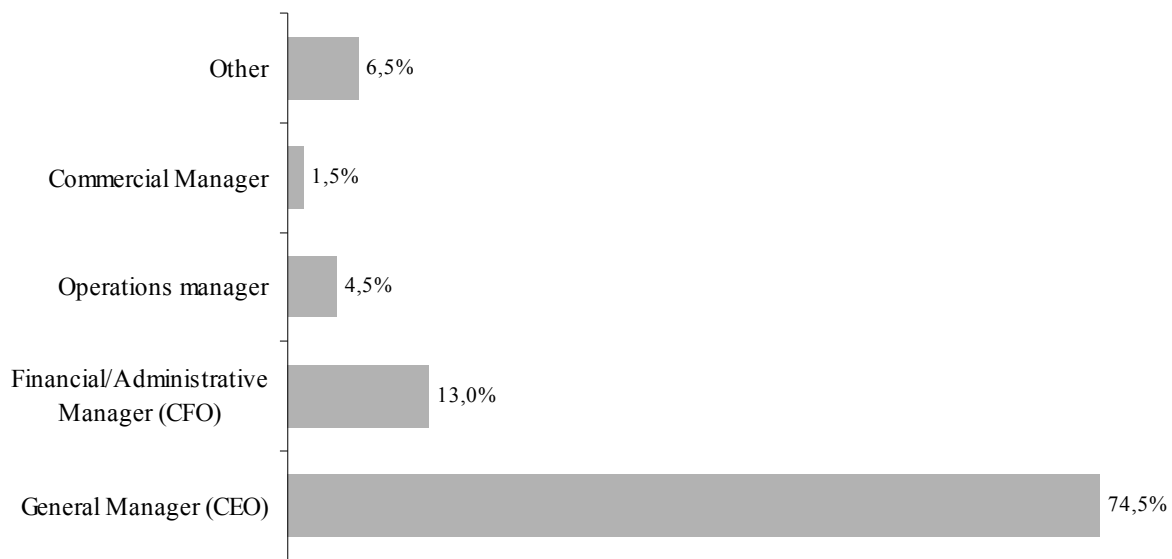


Figure 15. ¿To whom does the ICT leader reports?

Moreover, the use of ICT by employees is growing, according to the survey results (Figure 16). Every day more employees are facing screens, with greater use of Internet-based collaboration tools (such as Net Meeting), which are required due to business dynamics. Additionally, as managers interviewed stated ICT tools are diffused within the

different operative and productive levels, as much as in functions from the day to day and in the specialized processing of information for decision making.

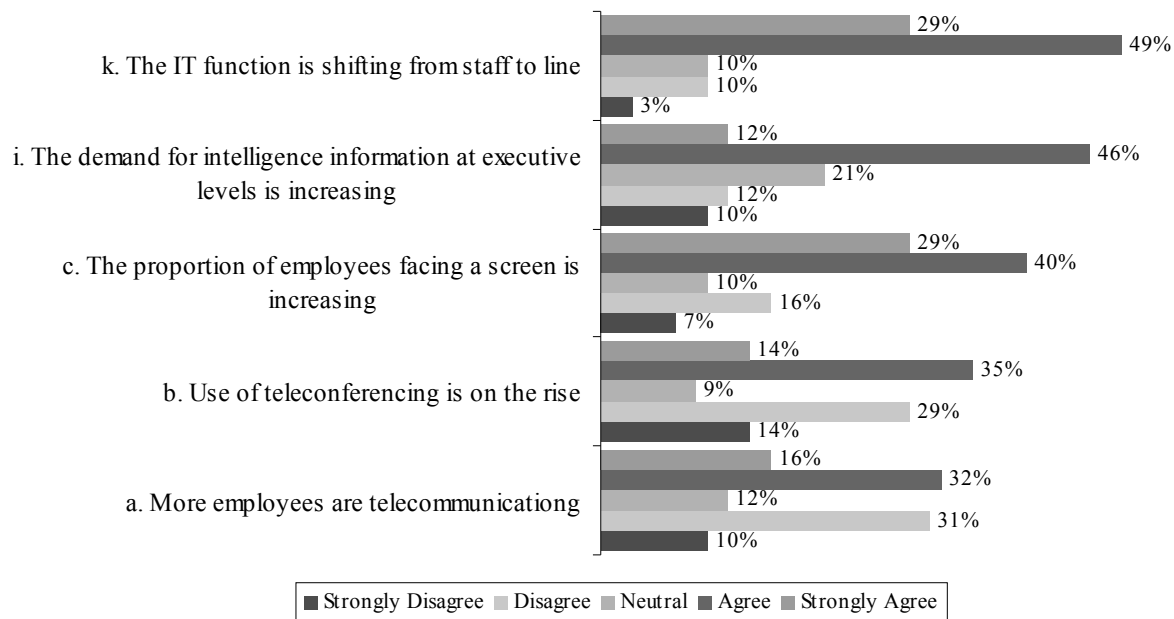


Figure 16. Use of ICT by staff

These conditions require higher levels of training and permanent retraining to enable staff to keep in pace with the changing technology Figure 17.

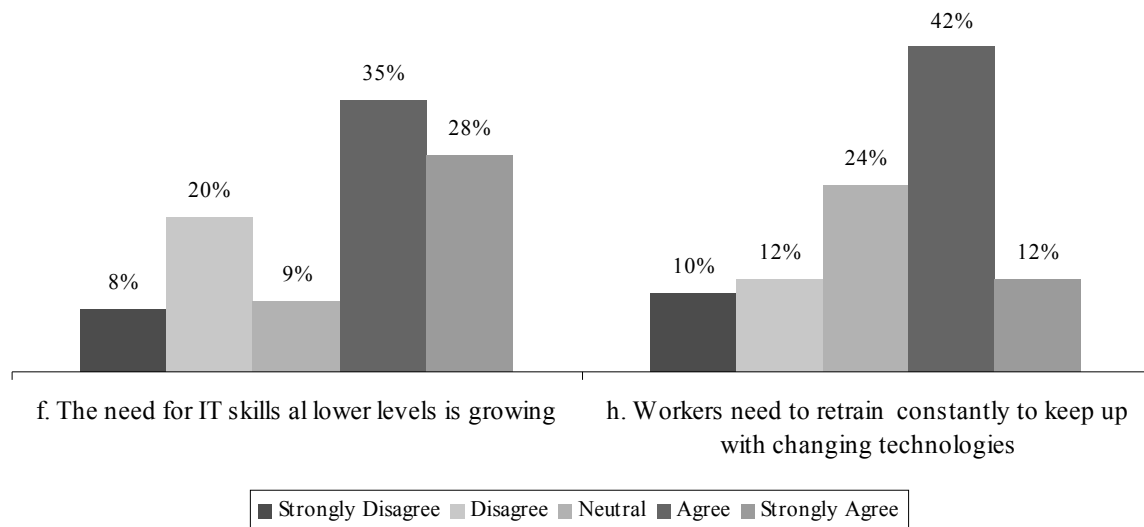


Figure 17. Employees ICT training

However, the structural change is not so evident, 83% of surveyed managers stated that outsourcing is not generating reduction of operative staff in their companies nor in the automation of functions. 68% of them also said that their companies are not

reducing too much the number of middle managers due to a better distribution of supervision functions thanks to ICT (Figure 18).

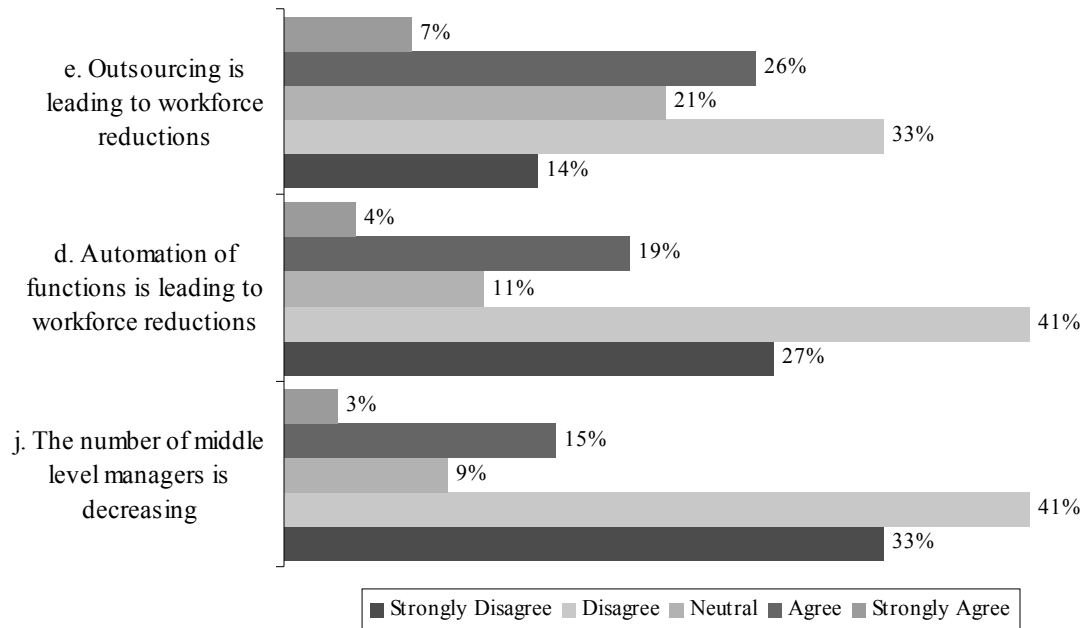


Figure 18. Impact of the ICTs in the personnel structure

In the functional aspect, because of technology, managers can control a larger number of employees and count on better tools for the decision making. The monitoring of the interaction with customers increased as well as automatic monitoring staff productivity. Thanks to technology, organizations are beginning to evolve from hierarchical structures to flat structures in which incentives are based on productivity. Functionally, the companies are expanding geographically. Figure 19 and Figure 20.

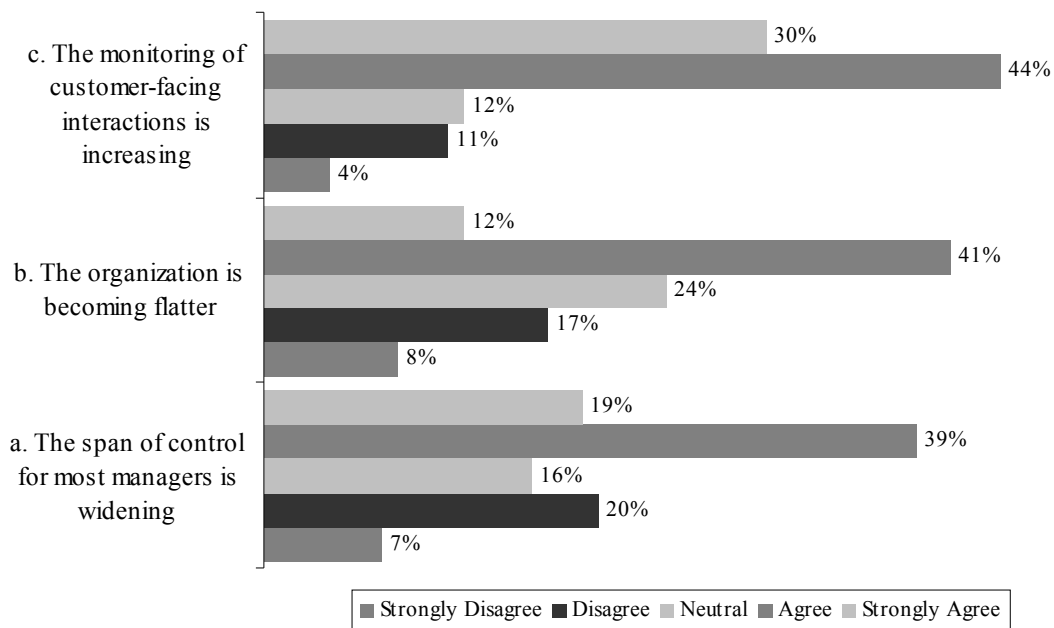


Figure 19. Impact of ICT in the functional structure (1)

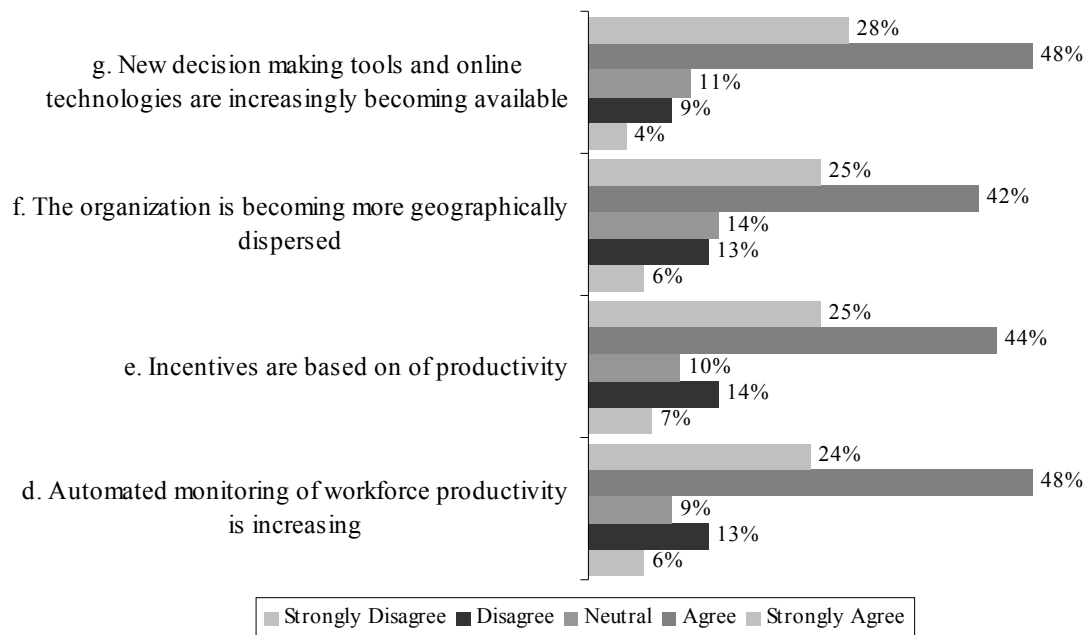


Figure 20. Impact of ICT in the functional structure (2)

### 1.3.2 ICT and Business Process Outsourcing (BPO)

20% of surveyed companies declared they have some kind of outsourcing as an administrative practice (Figure 21). The results shown in this section correspond to those companies performing outsourcing (40 companies).

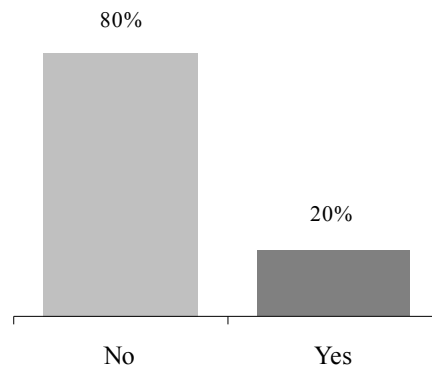


Figure 21. Proportion of corporations doing outsourcing

The BPO for processes outside the core business was classified into three groups according to their nature: BPO in IT, BPO no IT back office and non-IT BPO front office.

Regarding IT processes, information storage, network management and data management are outsourced on part of most of the companies included in the sample, except those of software design needs.

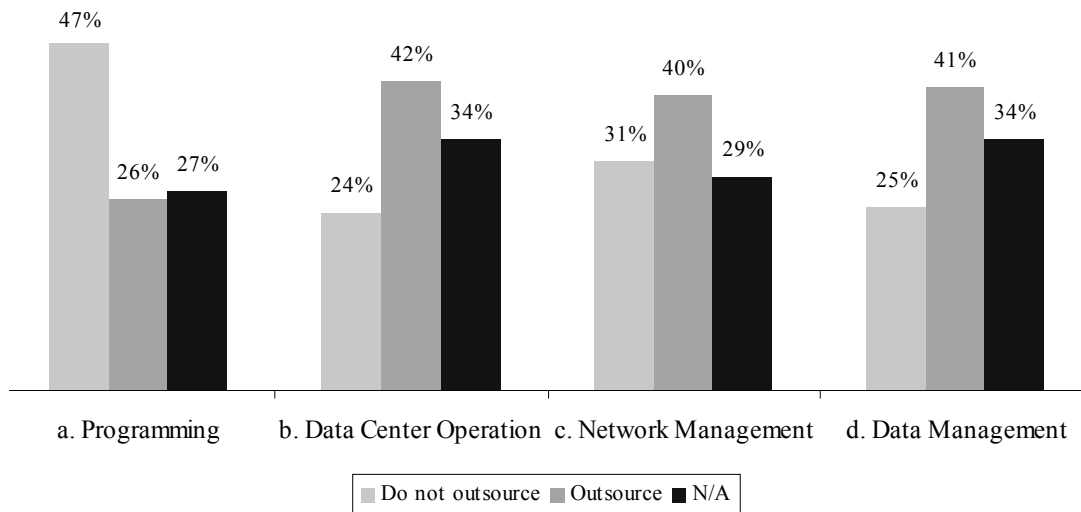


Figure 22. IT processes outsourced

In contrast, the No IT processes in front office as well as back office, are not outsourced by most of the companies (Figure 23).

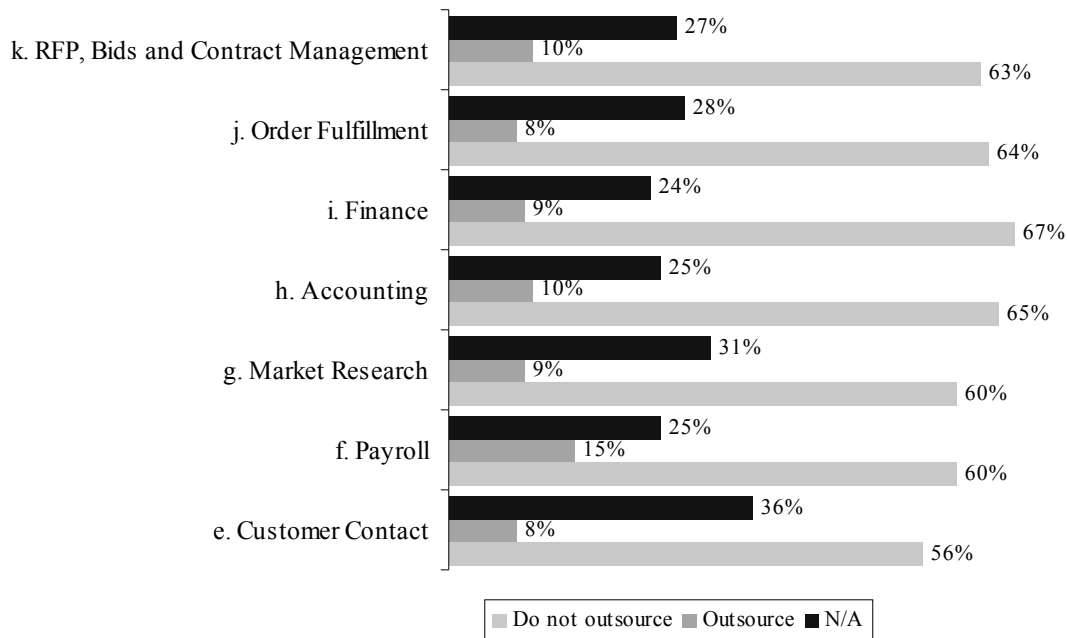


Figure 23. No IT processes outsourced

#### 1.4 ICT and customer management

Technology and especially communications have generated new mechanisms for customer facing. The advanced telephone systems (integrated computer systems) and email represent more productive ways for coverage and monitoring the relationship between an organization and its customers. Moreover, the Internet has become an effective advertising channel. Given the growth in subscriptions and the increasing time users navigate on the web, they have increased the potential for advertising coverage through techniques such as Web banners, and pop up windows.

Some organizations have more advanced Web strategies. It is common to find communities of users sharing experiences on the usefulness of a product or service in the form of discussion forums. For others, those who have a website, the Internet appears as a mechanism to attract surfers in order to inform or persuade about the acquisition of products by using informative media such as on-line brochures or magazines, besides it allows to improve contact with their customers. All these options were considered in the survey BIT 2007 and the results are presented below.

Communication channels with customers were included in the survey, they ranged from the traditional channels to those which use the Internet as a way. These answers were classified within three groups: Traditional media, advanced telephone channels and web media.

As it can be seen in Figure 24, Figure 25 and Figure 26, traditional channels to keep in touch still predominate over advanced telephone channels and web-based media. It is important to emphasize that Colombian entrepreneurs still consider face to face contact as one of the preferred channels to keep in touch with their customers.

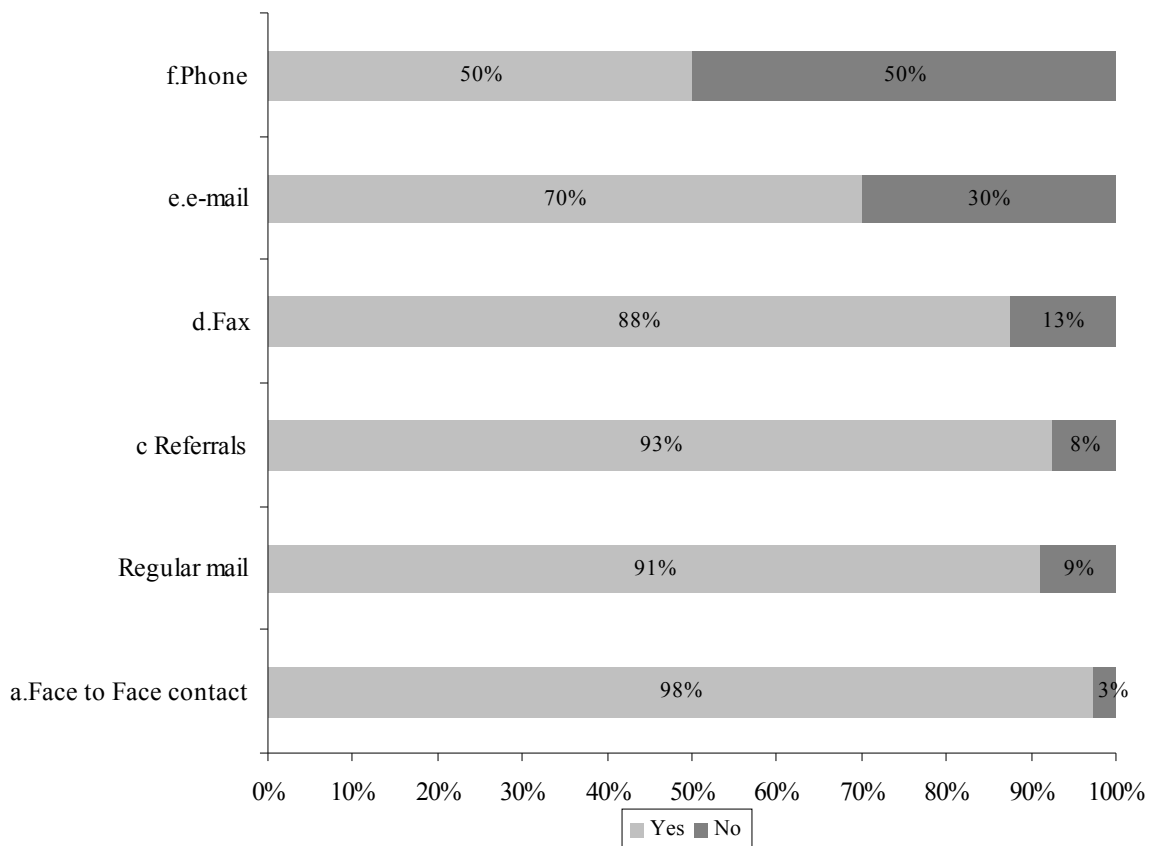


Figure 24. Traditional channels of contact with customers

The advanced telephone channels as telephone and computer integration (CTI) and interactive automatic response systems are used by 26% and 22% of companies surveyed.

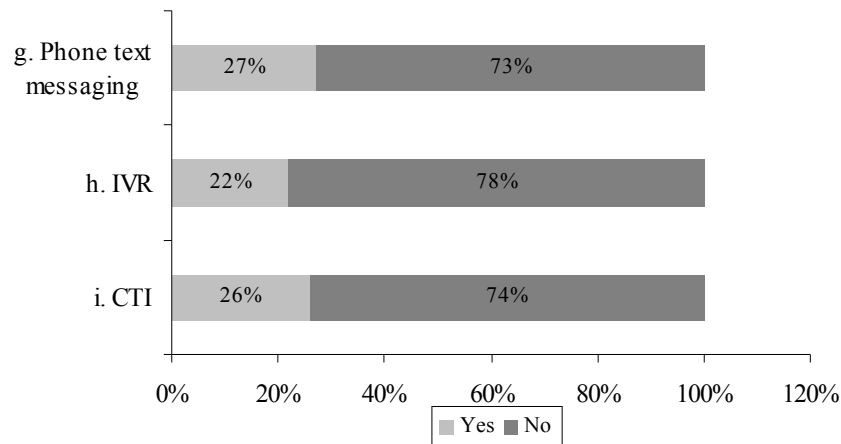


Figure 25. Advanced telephone channels to keep contact with customers

The Web based media show a preference similar to modern telephone systems. Among the most used alternatives, there are online catalogues and transactional websites.

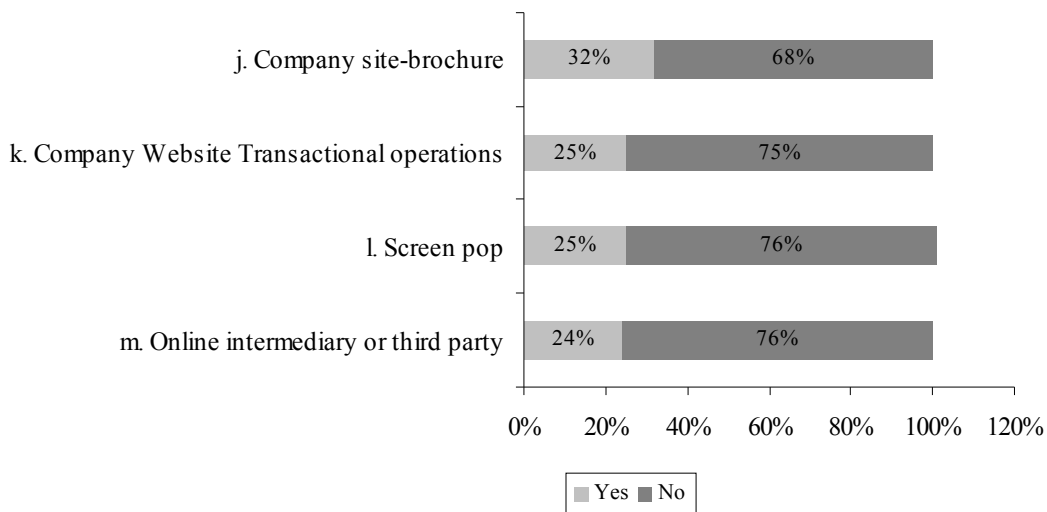


Figure 26. Web-based channels to keep contact with customers

Besides to present new ways to keep in touch with customers, technology has also enabled companies to use new selling strategies. Sales through the Web or electronic commerce (e-commerce), are considered as a promissory way to increase the dynamics of commerce. The massive use of this new modality presents two obstacles: cybersecurity and coverage. Cybersecurity is an essential element to establish confidence between consumers to make payment transactions, and coverage provides the basis of potential users who can access this service.

The answers obtained in the survey regarding these concerns indicate a low use of e-commerce. 92% of companies surveyed expressed they use traditional sales channels and 7% reported they use a combination of both methods (traditional and online). Companies using online channels only were just more than 1% of the total sample.

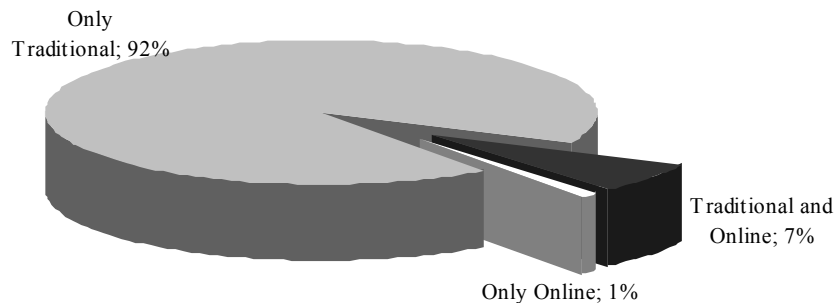


Figure 27. Sales modalities

On the part of employers, the contrast between traditional sales and online sales is shown in Figure 28. In general terms, the business variables specified in this chart are perceived of equal magnitude for the two modalities of sales except for the processing of formats by the client. Nevertheless one slight tendency in income and margins of operation is perceived to present lower levels when it is dealt through the WEB.

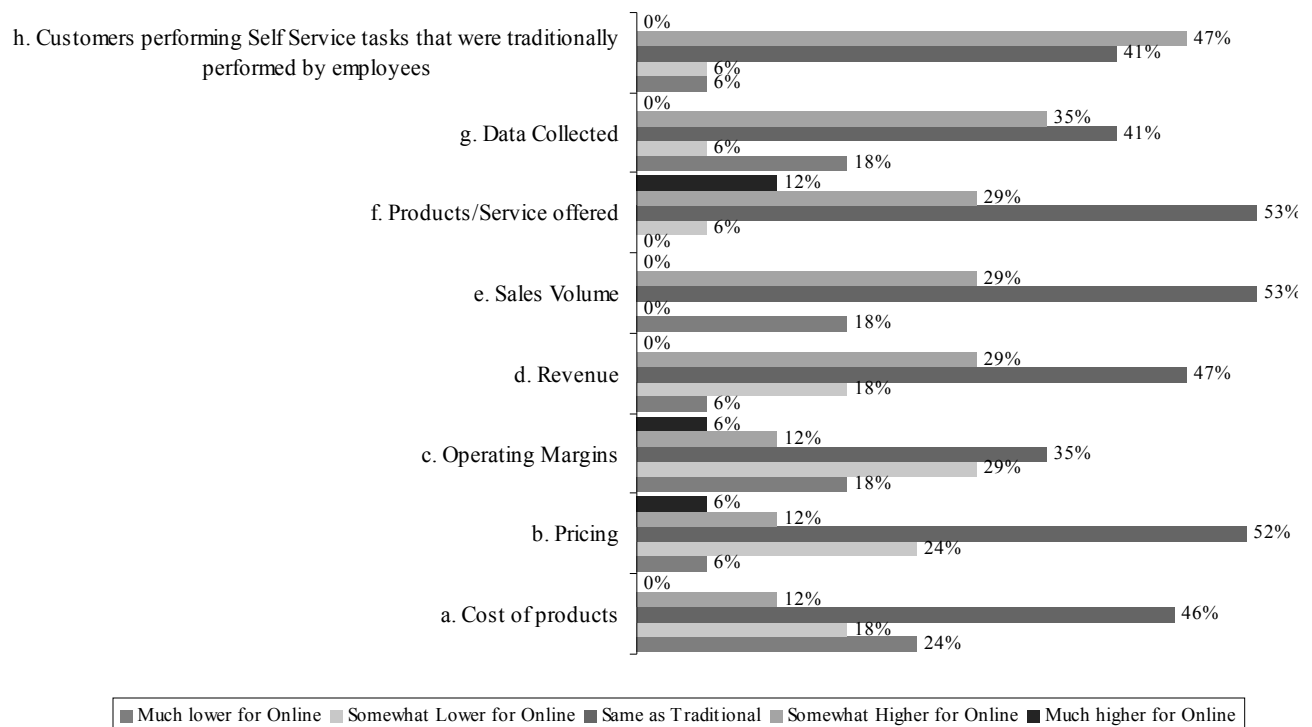


Figure 28. Contrast between traditional and Internet sales

ICT have played an important role in the processes of analysis and processing customer information. Many of the models used for segmentation, definition of profile and characterization of the behavior of the client are based on complex mathematical and statistical processes. The software tools designed to process these models allow the organization to get more precise results and in less time, as well as requiring less qualified people to do this job. However, and given the availability of Web tools, traditional methods such as geographic segmentation and prices personalization even count on greater preference (Figure 29).

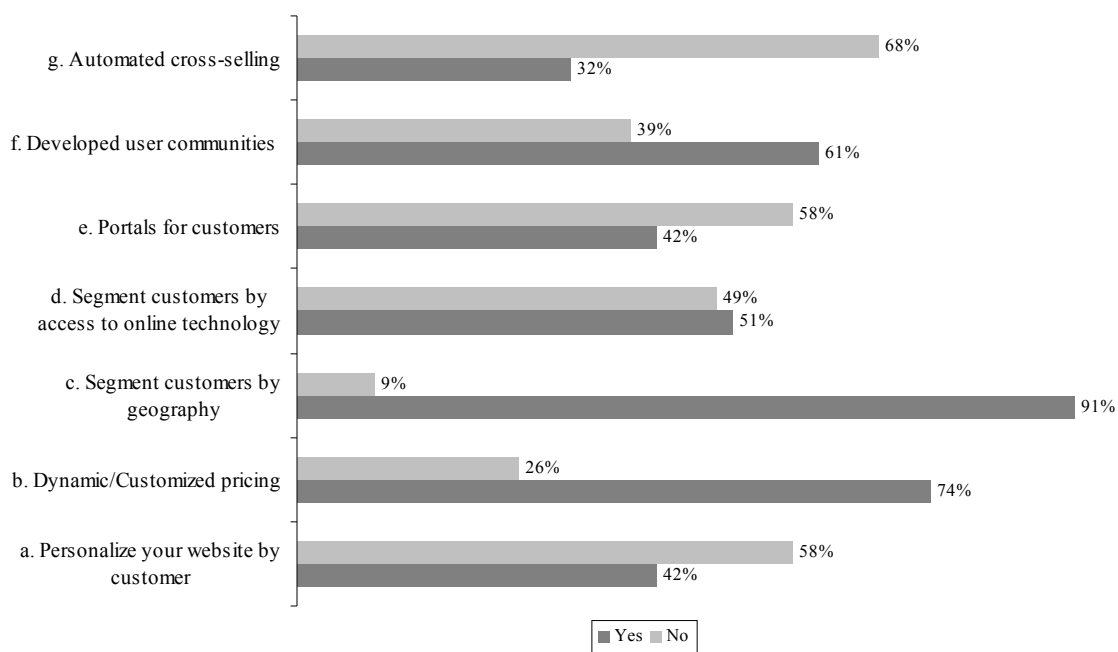


Figure 29. Mechanisms to segment customers

The techniques of data analysis, of both customers and the market in general, also require normally of complex processes that have been facilitated thanks to computing tools. In this respect, the complex techniques of text mining and neuronal network show little preference towards other options (Figure 30). The other techniques mentioned within the survey showed high preference by the companies sampled, specially within the definition of profiles, proactive collection of information and resources offered by the markets bases and data warehouses.

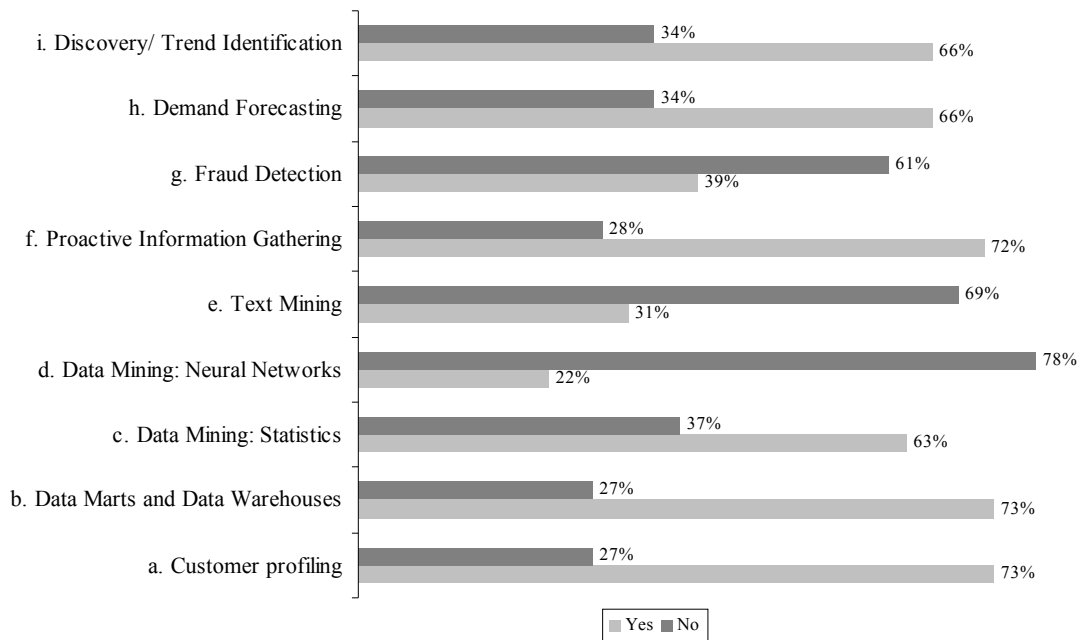


Figure 30. Mechanisms for data analysis

Another aspect of the relationship with customers which becomes very important because of technology, is advertising. In this sense, 15.5% of companies use any kind of online advertising (Figure 31).

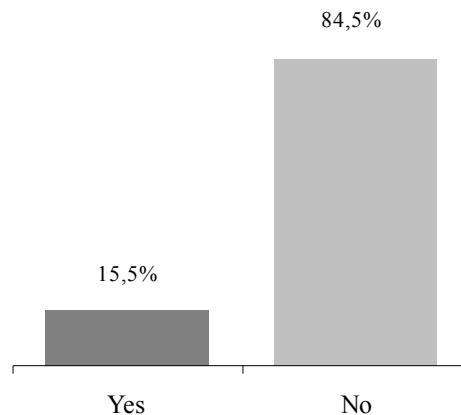


Figure 31. Proportion of companies using Internet advertising methods

Deepening among the methods used for advertising, the survey showed that banners, search engines and links in other pages, are the most demanded online advertising modalities used by firms within the sample.

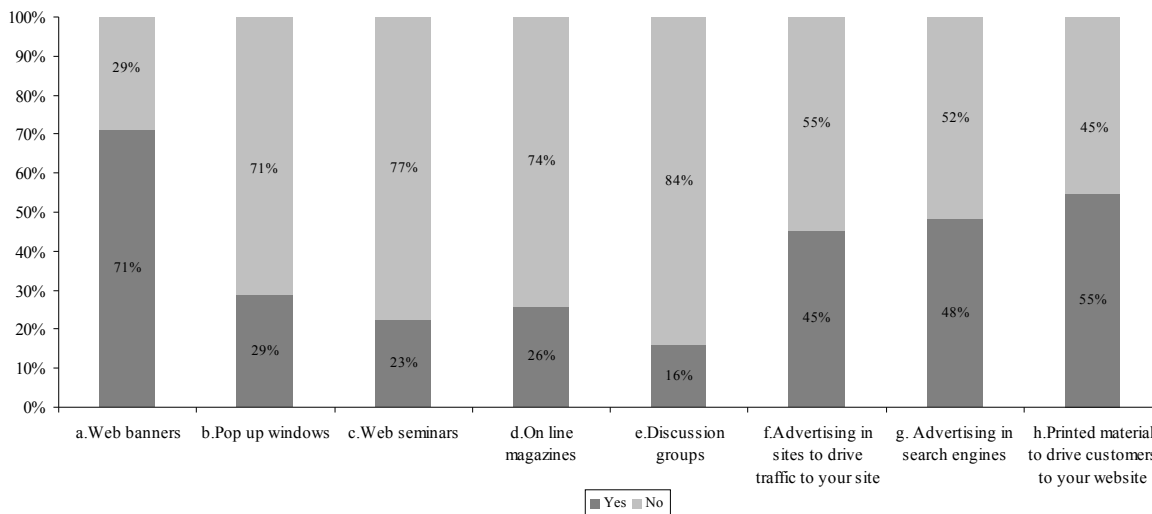


Figure 32. Modalities on-line advertising

However, most of the companies said that being part of the web did not force them to change their own standards of the corporative image such as logo, slogan, name and brands (Figure 33).

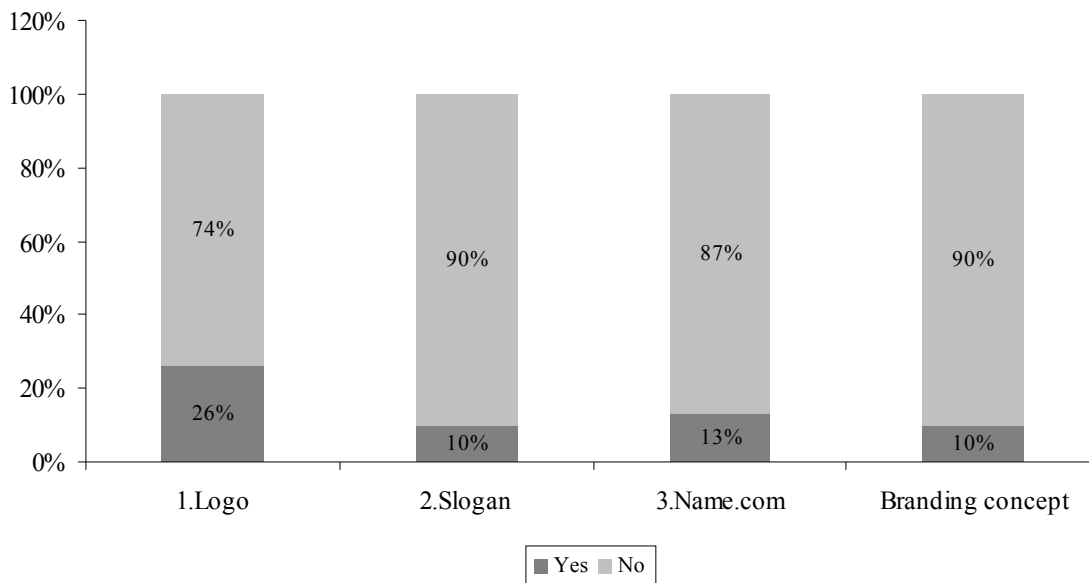


Figure 33. Change image in online advertising

### 1.5 ICT and the communication with trading partners

Another very important topical in business are collaborative relations. The non-formal partnerships established for better coordination between commercial activities and business partners, allowed a better efficiency in the operation of markets.

In this sense, tools provided by ICT represent an element to facilitate such processes. A proper exchange of information in procurement, inventory, payments and planning in common, allow the companies to establish administrative synergies which become beneficial for partners. Despite its importance, only 22% of the companies included in the survey conducted such associations (Figure 34).

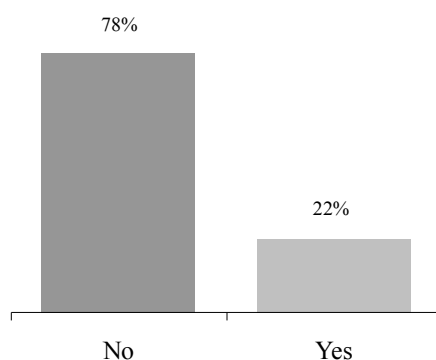


Figure 34. Companies that practice collaborative relations

These 44 companies were asked about the different forms of partnership processes that can be carried out. The results are included in Table 3.

Applications	Process but without software application	Process and Software Application	N/A
PRM	43,2%	31,8%	25,0%
E-Procurement	38,6%	25,0%	36,4%
E-Payment	13,6%	75,0%	11,4%
Collaborative Forecasting	15,9%	22,7%	61,4%
E-Compliance	15,9%	31,8%	52,3%
Collaborative Planning	13,6%	22,7%	63,6%
Demand Planning and Replenishment	20,5%	29,5%	50,0%
Sourcing and Procurement Management	20,5%	36,4%	43,2%
Web enabled communication	11,4%	40,9%	47,7%
EDI	18,2%	36,4%	45,5%
XML based communications	6,8%	25,0%	68,2%

Table 3. Relations processes with partners

A specific application for partnership relations are purchases. A close relationship between partners and the implementation of information systems together with suppliers are key factors for success. In this respect the preference of Colombian businessmen is to buy directly from manufacturers or distributors. Purchase options based on Web facilities such as online auctions, generic markets and aggregators show little preference (Figure 35).

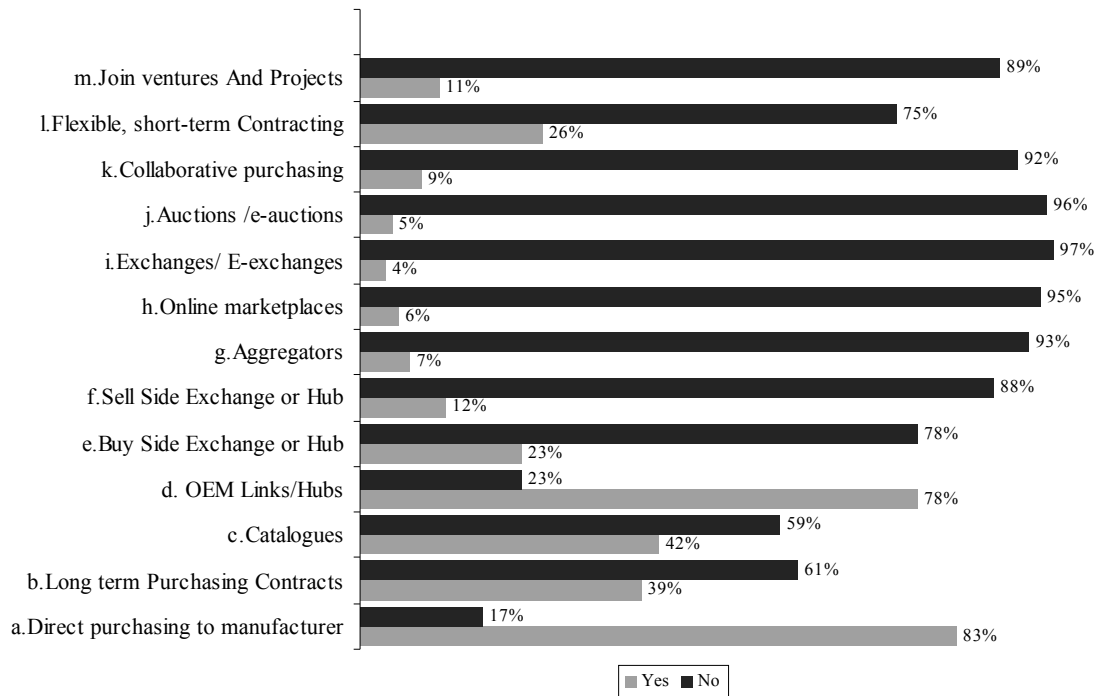


Figure 35. Mechanisms used for purchasing bottom

## 1.6 Impact on business results

The increase of productivity and returns expected from investment in technology should be reflected in the financial and performance indicators of the companies. The position of most directors surveyed with this respect is not clear, but an important percentage (around 30%) feels an increase in productivity and returns. Figure 36, Figure 37 y Figure 38.

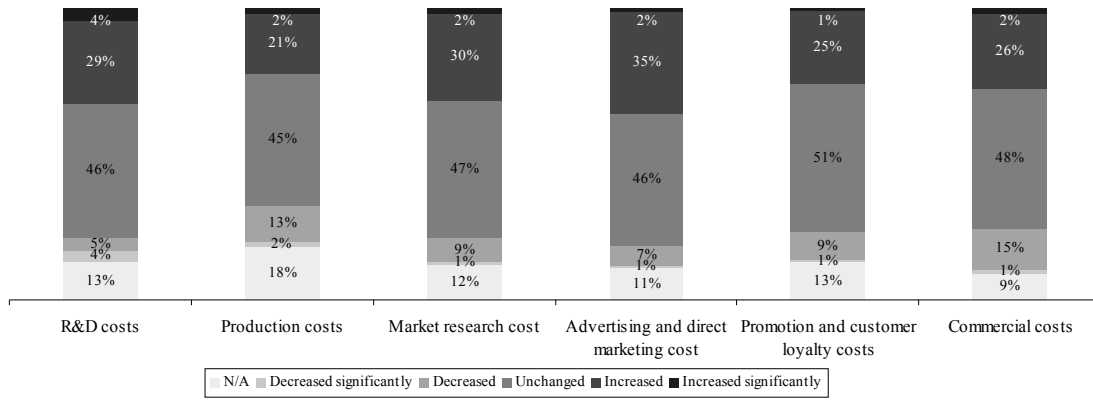


Figure 36. 1.3.5 Impact on business results (1)

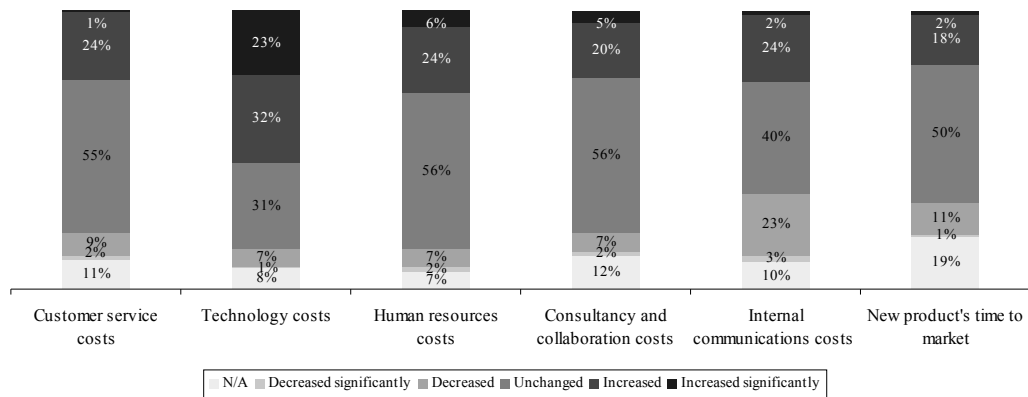


Figure 37. 1.3.5 Impact on business results (2)

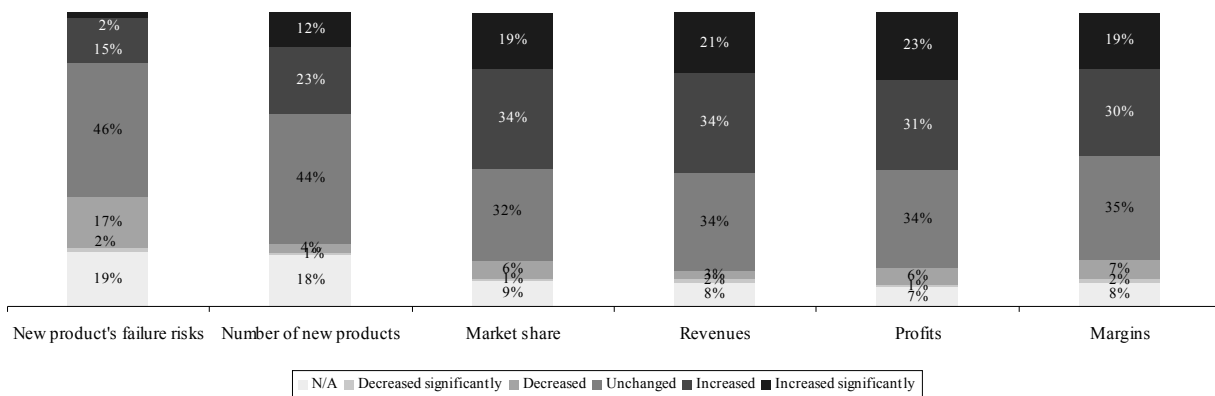


Figure 38. 1.3.5 Impact on business results (3)

However, ICT are recognized as a strategic tool to increase the understanding of customer buying behavior, competition and expectations of the market as shown in Figure 39.

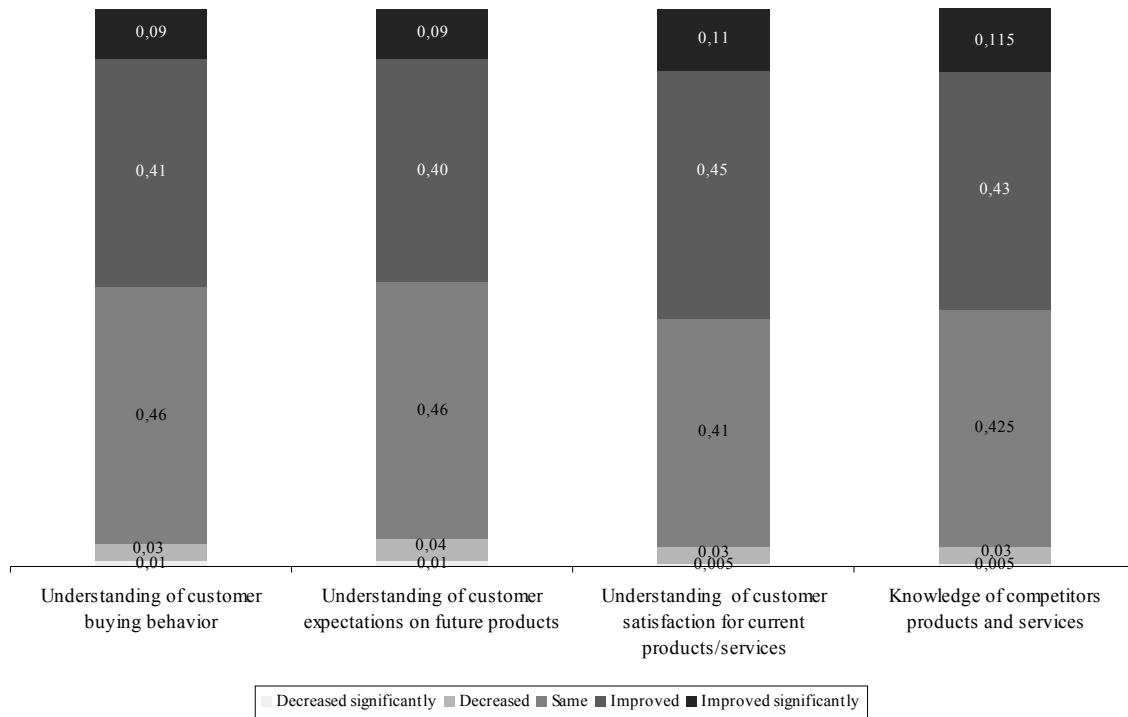


Figure 39. Impact on strategic areas

### 1.7 ICT as a tool for Globalization

6.4% of the companies surveyed declared they conduct international trade operations. Most of the leaders stated that ICT have not impacted this kind of trade. Figure 40.

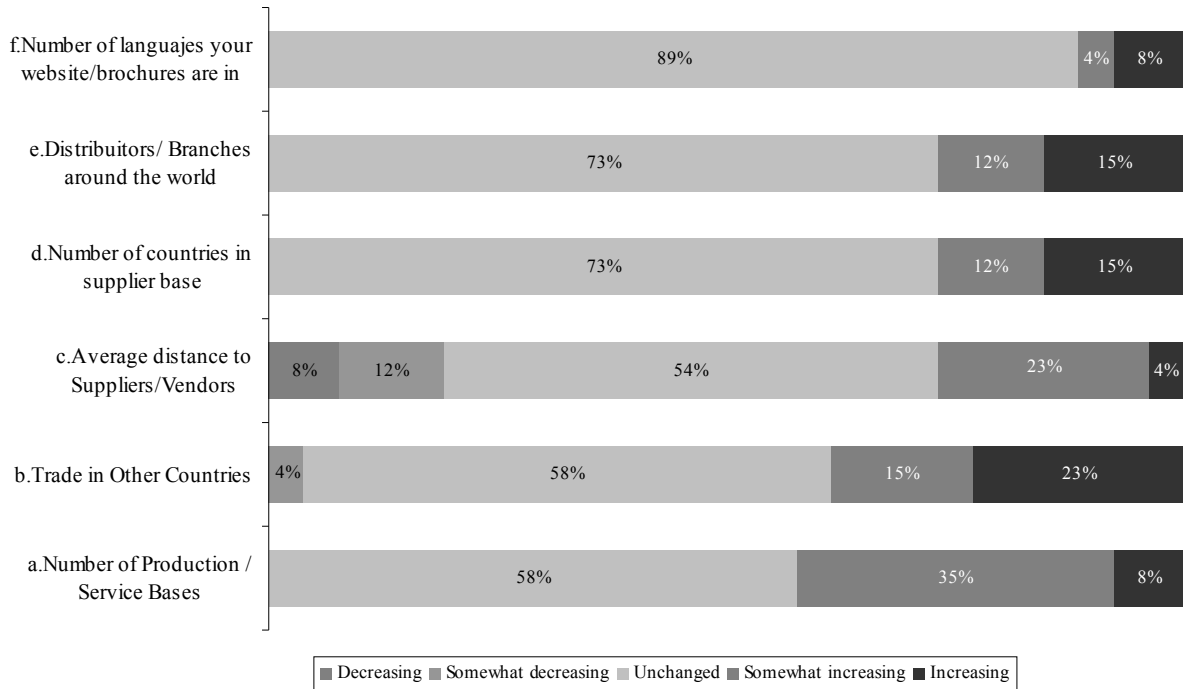


Figure 40. Impact for international trade

## CONCLUSIONS

The analysis of the adoption of ICT infrastructure was focused on four basic aspects: Hardware, Software, Security and Web. Investment in security, hardware and software has increased in the last years.

Colombian managers consider ICT as a strategic tool for good performance of the organization. Every day more employees are facing screens, with greater use of Internet based collaboration tools. ICT tools are diffused within the different operative and productive levels, as much as in functions from day to day and in the specialized processing of information for decision making.

These conditions require higher levels of training and permanent retraining to enable staff to keep in pace with the changing technology.

Outsourcing is not generating reduction of operative staff among Colombian companies. Also, they are not reducing the number of middle managers due to a better distribution of supervision functions thanks to ICT.

The monitoring of the interaction with customers increased as well as automatic monitoring staff productivity. Thanks to technology, organizations are beginning to evolve from hierarchical structures to flat structures in which incentives are based on productivity.

20% of surveyed companies declared they have some kind of outsourcing as an administrative practice.

Traditional channels to keep in touch still predominate over advanced telephone channels and web-based media. Colombian entrepreneurs still consider face to face contact as one of the preferred channels to keep in touch with their customers.

Sales through the Web or electronic commerce (e-commerce) are considered as a promissory way to increase the dynamics of commerce. The massive use of this new modality presents two obstacles: cybersecurity and coverage. However, there is low use of e-commerce in Colombian market.

A proper exchange of information in procurement, inventory, payments and planning in common, allow the companies to establish administrative synergies which become beneficial for partners. Despite its importance, only 22% of the companies included in the survey conducted such associations.

A specific application for partnership relations are purchases. Purchase options based on Web facilities such as online auctions, generic markets and aggregators show little preference.

An important percentage (around 30%) feels an increase in productivity and returns.

6.4% of the companies surveyed declared they conduct international trade operations. Most of the leaders stated that ICT have not impacted this kind of trade.

Finally, Colombian enterprises are adopting technology among their different processes, which has been very strong within large companies compared to those of smaller operations.