National Administrative Department of Statistics

DESIGN

DSO

Statistical Methodology and
Production Division-DIMPE

Technical Development and Innovation in
Trade and Services Sectors-EDITS

General Methodology

JULY 2015

CONTENTS

FOREWORD 3
INTRODUCTION 4
1. BACKGROUND 5
2. DESIGN OF THE STATISTICAL OPERATION 6
2.1. TOPICS SELECTION / METODOLOGICAL DESIGN 6
2.1.1. Information Needs 6
2.1.2. Objectives 6
2.1.3. Scope 7
2.1.4. Reference Framework 7
2.1.5. Design of indicators 9
2.1.6 Planning of results 10
2.1.7 Design of the form or questionnaire 11
2.1.8. Norms, specifications or rules of validation, consistency and imputation 12
2.1.9. Classifications used 12
2.2 STATISTICAL DESIGN 13
2.2.1. Basic components of the statistical design 13
2.2.2. Statistical units 13
2.2.3 Reference and collecting periods 13
2.3 DESIGN OF THE OPERATION 14
2.3.1. Training system 14
2.3.2. Preliminary activities 14
2.3.3. Design of instruments 15
2.3.4. Information Collection 15
2.4. SYSTEMS DESIGN 17
2.5 DESIGN OF QUALITY ASSURANCE METHODS AND CONTROL MECHANISMS 19
2.6 PILOT TESTS 22
2.7 DESIGN OF THE ANALYSIS OF RESULTS 22
2.7.1. Statistical analysis 22
2.7.2. Analysis of context 22
2.7.3. Experts Committees 22
2.8 DISSEMINATION DESIGN 23
2.8.1. Data repository management 23

2.8.2. Dissemination Products and instruments 23
2.9. EVALUATION DESIGN 23
3. RELATED DOCUMENTATION 25
GLOSSARY 26
BIBLIOGRAPHY 30
ANNEXES 31

FOREWORD

The National Administrative Department of Statistics (DANE) is committed to the strengthening and consolidation of the National Statistical System (SEN), as part of the Planning and Statistical Harmonization Project. This process involves producing strategic statistics, the generation, adaptation, adoption and dissemination of standards, and the consolidation and harmonization of the statistical information. It also requires the coordination of instruments, actors, initiatives and products in order to improve the quality of the strategic statistical information, its availability, timeliness and accessibility, as a response to the increasing demand for this type of products.

With this background and conscious of the need and obligation to provide the best possible products to its users, DANE has developed standard guidelines for the submission of methodologies that contribute to the visualization and clear understanding of the statistical process. These guidelines have been used for the elaboration of the methodological documents of its operations and statistical research. DANE makes them available both to the specialized users and to the public in general. These methodologies are presented in standard manner; they are complete and easy to read. The main technical characteristics of the processes of each research are presented in order to facilitate its analysis, control, replicability and evaluation.

These series of documents intend to foster the transparency, confidence and credibility in the technical quality of the institution and should contribute to a better understanding of the statistical information, produced following the principles of coherence, comparability, integrity and quality.

Along these lines, DANE's Methodology and Statistical Production Division has elaborated this document to present in a summarized form the methodology of the Survey on Development and Technological Innovation in the Trade and Services Sectors (EDITS).

INTRODUCTION

The most important component of DANE's mission is to produce and disseminate statistical information of general interest, with strategic value for the decision making processes of individuals, enterprises and governmental organizations, both in national and international environments.

By realizing its mission DANE has contributed to formalize the statistical characterization of the technical change and innovation as highly important phenomena for the performance of the national economy. In Colombia, the economic policy in general, and the manufacturing and competitiveness policy in particular, recognize nowadays that the transfer, absorption, adaptation and generation of novel knowledge and technical solutions by the enterprises are factors that positively affect the productivity and competitiveness of the national economy, and consequently the economic growth in the long term.

The importance of the availability of strategic information, in the form of variables and indicators, for pursuing the technological development and innovation activities in the Colombian economy, has been highlighted by the National Planning Department (DNP) in its document "Bases of the National Development Plan, 2010-2014, Prosperity for all"; in the chapter related to "Cross-sectional Supports of the democratic prosperity" it mentions: "The knowledge and innovation are a cross-sectional support that will sustain the infrastructure, housing, farming and mining sectors, (considered as the four drivers of the economy), allowing to solve technical problems, to reduce costs, to extend coverage and to compete in globalised markets with diversified and sophisticated supply. In the same way, innovation is the strategy to transform and invigorate the sectors in which the economy has been traditionally concentrated".

The policy approach proposed for this area of development by the government is based on the diagnosis revealing that the Colombian productive sector presents a low capacity of innovation compared with other countries. This explains why to propose a strategy sustained in three pillars for using knowledge and innovation: funding, training and organizing. The Bases of the Plan say: "Funding implies to increase public and private investments in Science, Technology and Innovation as a percentage of GDP; training facilitates the availability of staff with skills and knowledge to implement the required innovations in the productive sector and organizing allows to specialize the institutions in taking care of the different stages of the process of generation and use of knowledge".

This methodological document is structured as follows: the first part, including this section, introduces the topics of the research; the second section presents its background research; the third part contains its design, its scope, the objectives and the conceptual base, the elements of statistical production (describing the relevant aspects of the preparatory activities, collecting, editing, coding, supervision and consolidation of data as well as the activities related to the dissemination of the final statistical data. Finally, a glossary of basic terms and some Annexes with the collecting instruments used in the operation are presented.

1. BACKGROUND

In its role as leader of the national statistical system, DANE has been for almost one decade collecting, controlling the quality of information, processing, analyzing and publishing the results of the Survey on Development and Technological Innovation in the Manufacturing Sector (EDIT), contributing with this to the institutionalization of the production of national statistical information of high quality regarding technical change and innovation in Colombia. Between 2004 and 2011, within the framework of the Administrative Agreement 023, the National Planning Department (DNP) and the Administrative Department of Science, Technology and Innovation (COLCIENCIAS) participated and provided support for the realization of this objective.

The First Survey on Development and Technological Innovation for the Trade and Services Sectors (EDITS I) was conducted in 2006, using a sample of 4.393 enterprises, with a reference period covering 2004-2005. Its results were published in 2008. As from 2009, DANE submitted the conceptual design and the methodological definitions of the survey to a detailed revision process with the support of the Coordinating Committee of the Survey (DANE-DNP-COLCIENCIAS) and of several national experts. Since then the EDITS design follows the last recommendations of the international manuals on statistics and indicators for the measurement of scientific and technological activities (the OCDE "family" of Frascati Manuals), the guidelines of the RICYT, and the standards derived from the accumulated experience of these type of measurement in several countries. The Second Survey on Development and Technological Innovation (EDITS II) was then implemented for the reference period 2008-2009, including 4.136 enterprises, followed by EDITS III referring to 2010-2011, including 5.038 enterprises.

The EDITS implemented for enterprises of the Trade and Services sectors is an operation of "census type" addressed to all the population of enterprises that fulfill the inclusion criteria. The population represented includes 16 sub-sectors or activities relevant for this research. The inclusion parameters are annual income and total employment of the enterprises of each sub-sector. The results present the characteristics of technological development and innovation for each subsector but do not include aggregated estimates for the total sample of Trade and Services activities.

Given the continuous expansion in the number of enterprises included, because of the improvement in the registers or because the objective number of enterprises fulfilling the inclusion parameters increases, the global information produced by EDITS IV is not directly comparable to that of EDITS III. This is the reason why the presentation of in the corresponding web publications of the changes of the main variables between these two surveys is based on a longitudinal panel. Besides EDITS IV includes the **public universities** in the group of enterprises delivering superior education services and a new definition of inclusion parameters in health services activities to cover **public and private institutions** and not only those of high-complexity as was the case in the former surveys.

2. DESIGN OF THE STATISTICAL OPERATION

2.1. TOPICS SELECTION / METODOLOGICAL DESIGN

2.1.1. Information Needs

The Survey of Development and Technological Innovation in the Trade and Services sectors - EDITS, is the main source of statistical information about the dynamics of the technical and organizational change and of the existing relationships between the economic activity of the enterprises and knowledge considered as a production factor.

This survey is also the main source of information available for the national government and the Colombian entrepreneurs on the trends of the investment in activities of development and technological innovation, its situation with respect to other countries and the kind of obstacles found; therefore, it is instrumental for designing public and private policies in agreement with the challenges raised by the environment of increasing competition.

Finally, EDITS is an indispensable tool for the research work of universities and centers dedicated to the production of secondary information on science, technology and innovation in Colombia, through the publications of cases studies and scientometrics indicators.

2.1.2. Objectives

General

To characterize technological dynamics and the activities related to innovation and technological development in enterprises of the Colombian Trade and Services sectors.

Specific

- ✓ To identify the innovations achieved by manufacturing enterprises during the reference period;
- ✓ To identify which are the purposes of the enterprises of the sector in undertaking scientific, technological and innovation (STIA);
- ✓ To determine the investment realized by the enterprises in STIA during the reference years;
- ✓ To study which funding sources have been used by the manufacturing enterprises for insuring the development and technological innovation-STIA in the reference period;
- ✓ To determine the size and level of education of the enterprises staff involved in STIA;
- ✓ To characterize the relationships between the manufacturing enterprises and the rest of participants involved of the National System of Science, Technology and Innovation (SNCTI);
- ✓ To identify which are the sources of information and what is the origin of the innovating ideas that the trade and services enterprises have for the development of STIA;
- ✓ To determine which instruments of intellectual property protection have been used by the trade and services enterprises during the reference period, as well as the obstacles that they find to access them.

2.1.3. Scope

EDITS is a statistical operation open to constant review and improvement. Nevertheless, from the conceptual and methodological point of view, its design preserves a basic theoretical framework coherent with the main agreements reached by the community of national and international experts, on design, application and interpretation of national surveys on innovation. In particular, EDIT has incorporated most of the methodological paths drawn up by the Organization of Cooperation and Economic Development (OECD), in particular the Oslo Manual, and by the Latin American Network of Indicators of Science and Technology (RICYT), compiled in the Bogota Manual. Most of these recommendations have been adapted to the information needs and to technical restrictions identified for Colombia.

Following the guidelines of the Oslo Manual (2005), the primary statistical unit of the EDITS is the enterprise. Following the same guidelines, the survey is designed according to the "subject approach" "which starts from the innovative behavior and the activities of the firm as a whole. The idea is to explore the factors influencing the innovative behavior of the firm (strategies, incentives and barriers to innovation) and the scope of various innovation activities, and above all to get some idea of the outputs and effects of innovation" (Oslo Manual, 2005, paragraph 50 pp. 20).

As it has been already mentioned, the statistical operation developed is a census, since it covers all the trade and services enterprises that fulfill the parameters of inclusion in the universe. These parameters have been changed when defining the basic framework of EDITS IV. This last version of the research includes a total of 5.848 enterprises in the trade and services sectors. Table 1 presents the selected activities studied by EDITS according to ISIC Rev. 3 A.C.

With EDITS IV, DANE starts a transition towards the presentation of results according to ISIC Rev 4. A.C. The work is initially done by establishing the equivalence table for the two classifications. There is an important difference between the two classifications as ISIC rev 4.AC introduces new activities. In the particular case of EDITS IV, the new classification uses 19 activities instead of 16, as shown in Table 2 that follows.

2.1.4. Reference Framework

Theoretical framework

The "Proposed Guidelines for Collecting and Interpreting Technological Innovation Data" - (Oslo Manual, 2005) - is taken by OECD as a basic reference. The Frascati Manual (OECD, 2002) proposes also a practical standard for surveys of research and experimental development, and gives some recommendations and methodological guidelines, especially to improve R&D statistics.

For the case of developing countries, the Latin American Network of Researchers on Science and Technology (RICYT) designed the Bogota Manual. With the conceptual and methodological orientation provided by these manuals, the countries can measure, in conditions of international comparability, the variables that directly and indirectly affect the creation of new products, processes, trading techniques and organizational forms and their substantial improvement, as well as the impact on their economies.

Supported on the previously mentioned references, the Survey of Development and Technological Innovation for the Trade and Services Sectors – EDITS is concerned with a wide spectrum of self realizations of the enterprises competing inside markets with defined borders, where innovation includes a set of new or significantly improved products (goods or services) introduced into the market, or new or significantly improved production processes implemented in the enterprise; or new methods of organization, or new marketing techniques, applied in the operations of the enterprise.

Thus, every innovation is always, by definition, a novelty or an improvement involving a given enterprise, although it is not necessarily an improvement when referring to the competitors in the market. It should be mentioned that the esthetic modifications of products or the simple changes in organization or in management are excluded from the definition of innovation.

Conceptual Framework

Innovation is a widely studied concept, based on novelty and specific application. Thus, an invention, or a creative idea, becomes innovation if used to satisfy a concrete need.

> "Invention is the creation of an idea potentially generating commercial benefits. If it does not acquire concrete form in products, processes of service, the invention is not an innovation strictly speaking. Innovation is to turn ideas into products, processes or services, new or improved, that the market values" (Paiva, 2010).

The change in an enterprise may occur through innovations that take place for the first time in absolute terms, or through innovations that have arisen in another environment and are assimilated for the first time in a given enterprise practices. For this reason a twofold point of view exists for identifying and valuing innovations: those that are new for the society and those that they are new for the organization that integrates them.

In this sense and according to the conceptual guidelines outlined by the Organization of Cooperation and Economic Development (OECD) through the Oslo Manual [1](2005), EDITS considers that innovation may appear as:

- A new or significantly improved good o service introduced into the enterprise;
- A new or significantly improved good o service introduced in the market (domestic or international);
- A new or significantly improved process introduced into the enterprise;
- A new organizational method introduced into the enterprise;
- A new marketing technique introduced into the enterprise.

Enterprises integrate innovations by very different forms, and they can do it for the purpose of obtaining a greater quality in their products or services, diminishing costs, offering a larger range of products or services, or in order to introduce them rapidly to the market. What is required, in any case, is that a change has to be introduced in the enterprise.

Setting up typologies has called the attention of numerous scholars and researchers, whose works have lead to different classifications. On the basis of the discussions on the conceptual and methodological aspects of the survey, the inter-institutional committee of EDIT has proposed a typology for classifying, a posteriori, the enterprises once the results on innovation for the reference period are known.
Following this proposal, four types of enterprise are identified:

- Innovators, strictly speaking: enterprises that in the survey´s reference period obtained at least one new or significantly improved good or service for the international market;
- Innovators, broadly speaking: enterprises that in the reference period obtained at least one new or significantly improved good or service for the domestic market of for the enterprise, or implemented a new or significantly improved process for its main production line or for the complementary ones, or a new form of organization or marketing;

[1] The Oslo Manual is the guideline collecting and interpreting data on innovation, developed by OECD for use of its member countries.

- Potentially innovators: enterprises that when answering the survey had not obtained any innovation in the reference period, but reported to be in that process or to have given up some project of innovation;
- Non- innovator: enterprises that in the survey's reference period did not produce innovations, neither reported to have any in process, or to have given up some project for producing innovations.

International references

EDIT also uses as reference the measurement of innovation experiences of other countries and regions through different instruments. Such is the case of the Survey of Innovation of the European Community (CIS); the Survey on Research Investigation and Development of Canada; the Survey of Innovation in Services of Uruguay, Spain's NSO Survey on Innovation in Companies, and the Survey on Research and Development of Brazil.

2.1.5. Design of indicators

The main indicators of EDIT correspond to aggregates and distributions. The formulas for their calculation are:
Given a variable X observed in n elements of the population, the aggregate indicator is the sum of the variable corresponding to the n elements:

$$\textbf{Aggregate (X)} = \sum_{i=1}^{n} X_i$$

Given a variable X observed in n elements of the population, and the population is classified in j categories the distribution of the variable X for a particular group j is expressed as:

$$\textbf{Distribution (Xj)} = \frac{\sum_{i=1}^{n} Xij}{\sum_{i=1}^{n} Xi} * 100$$

The aggregate of the numerator corresponds only to the value of X for the population belonging to category j and the denominator is the aggregate of X for the whole population. Given that all the elements of the population belong to one and only one category j the sum of all the distributions j is 100%.

The main indicators or results defined in the survey are as follows:

- Number of innovations implemented by the enterprises by type of innovation;
- Number of enterprises that qualified the importance of the innovations implemented by the enterprises and the difficulties faced at the time of innovating.
- Distribution of the total amount invested by the enterprises in scientific, technological and innovation activities according to industry, type of capital of the enterprise and classification of the innovation for each year of the reference period;
- Distribution of the total amount invested by the enterprises in scientific, technological and innovation activities according to sources of financing, for each year of the reference period;
- Distribution of public resources invested by the enterprises in STIA by lines of co-financing and credit, for each year of the reference period;
- Total number of employees of the enterprise by level of education, for each year of the reference period;

- Number of employees of the enterprise participating in STIA by level of education, for each year of the reference period;
- Number of employees of the enterprise participating in STIA by functional areas of the enterprise, level of education, and gender, for each year of the reference period;
- Distribution of the employees with higher education, participating in STIA by area of educational skills and gender, in the last year of the reference period;
- Distribution of the employees who have received training/qualification related with STIA, by type of training or qualification;
- Number of enterprises that found internal and external sources as origin of ideas to innovate;
- Number of enterprises that established supporting links for the realization of STIA, by type of agent of the SNCTI;
- Number of manufacturing enterprises that cooperated with different partners in STIA realization, by type of partner and type of STIA;
- Number of intellectual property registries and certifications of quality, by type of registry and type of certificate;
- Number of enterprises that qualified the importance of the obtained certifications, by type of impact.

2.1.6 Planning of results

EDIT results are disseminated on DANE's webpage and includes press bulletins, annexes and notes. The information presented refers to:

- The activity of development and technological innovation;
- The investment made in the reference period;
- The number of employees involved in STIA, by type of association with the enterprise; functional area, educational level, and special training/qualification;
- The sources of ideas for innovation;
- Financing for innovation, sources and value;
- Enterprise registries of intellectual property, product and process certifications.

2.6.1.1 Design of output tables (or results)

The output tables are used in the research in order to present the information obtained at different levels of aggregation, for instance according to economic activity (ISIC Rev. 3 or 4), to the specific typology introduced for the EDITS survey, to staff categories or to the legal status of the enterprise.

These tables are used for the analysis of the variables, as well as for the verification of the results, the calculation of indicators and for establishing their internal coherence. Finally, the Annexes published in DANE webpage are elaborated from these output tables.

The list below presents some of the output tables published in the Annexes of the publications of this research:

- Number of enterprises by typology (on innovation terms), and by economic activity (ISIC.Rev.3.A.C. and Rev. 4. A.C.);
- Number of innovations by the manufacturing enterprises covered by the survey, by type of innovation and economic activity (ISIC.Rev.3.A.C and Rev. 4. A.C.);
- Importance of the innovations of the innovative enterprises by type of impact of the innovation and economic activity (ISIC.Rev.3.A.C. and Rev.4.A.C.);
- Enterprises that invested in Scientific, Technological and Innovation Activities (STIA), and amount invested according to the legal status of the enterprise and division of economic activity (ISIC Rev.3.A.C. and Rev. 4. A.C.);

- Amount invested in STIA by the enterprises included in the survey, by financial source and economic activity (ISIC Rev 3.A.C);
- Incidence of the barriers of access to public resources on the enterprises that financed STIA with those resources by type of barrier and economic activity (ISIC.Rev.3.A.C.);
- Employees that participated in STIA of the enterprises, by educational level and economic activity (ISIC Rev 3.A.C);
- Employees that received specialized training/qualification with resources of the enterprises by type of training/qualification and economic activity (ISIC Rev 3.A.C);
- Sources of ideas for innovative enterprises, and potentially innovative enterprises that had the intention to innovate, by type of source and economic activity (ISIC Rev 3.A.C);
- Number of innovative enterprises, and potentially innovative enterprises that had the intention to innovate, and use sources external to the enterprise as origin of the innovating ideas, by type of source and economic manufacturing activity (ISIC Rev.3 A.C.);
- Number of intellectual property registers by the manufacturing enterprises in the sample, by type of protection and economic activity (ISIC Rev.3 A.C.);

2.1.7 Design of the form or questionnaire

In order to collect the information a unique enterprise identification page is used. The content of the six chapters depends on the reference period and has the structure as described below:

- *Enterprise identification card*: It contains the data on identification, location, general characteristics, type of organization and the structure of the social capital of the enterprise.
- *Chapter I - Innovation and its impact on the enterprise in the reference period:* it summarizes the information about the innovations made by the enterprise and the main objectives pursued; it identifies the impacts that these realizations have had on the enterprise; it determines the state of advance of the innovations, and reviews the factors that have prevented (if any) the achievement of the objectives in the development of innovations.
- *Chapter II - Investment in STIA in the reference period:* it registers the different STIA realized by the enterprise in its innovative process, and the total amount of resources invested in each of the activities.
- *Chapter III - Funding of STIA in the reference period:* it characterizes the structure of funding of the enterprise for STIA realization; it obtains data on the amounts funded by co-financing programs and credit originating from different sources, and identifies possible obstacles to the access to public financing and the existing tax incentives.
- *Chapter IV – Employees involved in STIA in the reference period:* it quantifies and characterizes the educational level of staff employed by the enterprise and the educational level of staff participating in STIA. It also characterizes the staff participating in STIA during the last year of the reference period according to functional areas and level of education and identifies the total number of persons that have received, at the enterprise expense, either specialized training or qualification with STIA resources, during the reference period.
- *Chapter V - Relationships with actors of SNCTI and cooperation for innovation in the reference period:* it explores the sources of ideas for innovation, the relationships of the enterprise with the other actors of the SNCTI who support the STIA realization, and obtains information on the relationships of cooperation for innovation that were developed between the enterprise and the other actors of the SNCTI, according to the expected goals.
- *Chapter VI- Intellectual Property, certifications of quality, technical standards and regulations in the reference period:* the purpose of the first part of this chapter is to find out the types of protection of intellectual property requested or used during the reference period, as well as the possible obstacles that the enterprise found to

using a system of protection of intellectual property. In the second part the questionnaire enquires about obtaining quality certifications of the process or of the product obtained, and the level of importance that represented for the enterprise obtaining these certifications.

2.1.8. Norms, specifications or rules of validation, consistency and imputation

The collection of EDITS is realized by self – completion of the electronic form on line, through DANE's webpage. In order to guarantee the quality and consistency of the collected data, besides the activities realized during the process of collection and editing, an integral system has been developed that makes possible the automatic supervision for each stage of the survey and implements a quality control of the information reported by the enterprises through the collection program.

The process of correction of inconsistencies is supported by a series of crossed verifications of the information, as those described below:

- Outliers, very high or very low values of investment in STIA;
- Verification of figures to confirm that values are reported in the proper value unit (thousand pesos);
- Comparison of the activity of the enterprise registered in the form, with the activity according to preliminary data taken from EAS and EAC for the reference period;
- Comparison of the total employment reported in the EDITS form, with the preliminary data taken from EAS and EAC for the reference period.

Imputation and/or adjustments of coverage

The figures in EDITS are not submitted to any imputation or adjustment of coverage. This is because it is accepted that neither the magnitudes nor the relationship between the innovation activities and technological development experienced by the enterprises at aggregated level, may be used for generalization by allocating values based on historical or sectoral averages, given the non-linear and underdetermined character of the technological behavior of the enterprises. This is due to the fact that the enterprises may invest in technological reconversion in a given year, followed by a year with null or non-significant investment in the same item.

2.1.9. Classifications used

This statistical operation uses the International Standard Industrial Classification-ISIC, (Rev.3. A.C. and Rev. 4. A.C.), for activities of trade and services defined according to the inclusion parameters. As has been mentioned EDITS IV includes the information concerning the main variables classified according to ISIC Rev. 4. A.C., as a kind of anticipation of its use (see 2.1.3). The main variables are detailed in point 2.6.1.1. (Design of output tables).

2.2 STATISTICAL DESIGN

2.2.1. Basic components of the statistical design

Universe and objective population

The universe consists of enterprises developing activities corresponding to trade and services (ISIC Rev. 3 and Rev.4, both adapted to Colombia) defined according to the inclusion parameters (See Tables 1 and 2).

Statistical Framework

This research takes as framework the census of large enterprises of trade and services sectors, represented in the registers that DANE manages in the annual surveys EAC and EAS, and defines the inclusion parameters in the survey design.

Definition of variables

The survey EDITs includes 583 variables which can be consulted through the collection instrument. Paragraph 2.6.1.1 presents an indicative summary of some of the aspects of analysis that are structured with the main variables collected.

Source of data

As was already indicated (2.1.3) the statistical operation is a census, given that all the manufacturing enterprises that satisfy the inclusion parameters defined for the universe are studied.

Coverage and geographical breakdown

EDITS uses a unique geographical reference. Results are therefore presented on the basis of **national totals**.

Information Classification

This research uses different levels of classification: economic activity (ISIC Rev. 3 A.C.), type of enterprise concerning innovation (based on EDIT typology), classification of employees, and legal status of the enterprise.

2.2.2. Statistical units

The statistical unit strictly corresponds to the definitions of the universe and objective population.

2.2.3 Reference and collecting periods

Reference period

The reference period in EDITS corresponds to the two years immediately previous to the collection of data. The reference period for EDITS IV is 2012-2013.

Collecting period

The collecting period is the year that follows the reference period.

2.3 DESIGN OF THE OPERATION

2.3.1. Training system

Previously to the beginning of the collecting activities a training program is organized by DANE Headquarters addressed to the technical assistants of the regional offices. They are directly in charge of getting the information and afterwards they will train the required staff in their respective regions. This training is done by means of video conferences, workshops and working tables.

In the same way, the team in charge of the research participates permanently in workshops organized by international organizations on innovation and technological development.

2.3.2. Preliminary activities

Motivation

The motivation starts with a letter addressed to the Executive Director of the enterprise (see Annex 2) informing about the general purpose of the research. The letter includes the keyword to access the electronic application of the survey. In some cases, when the enterprise refuses to provide information or when it is considered necessary to give additional explanations, calls or visits are made to the sources as a resource for motivating the Chief Executive Officer about the importance of the information for the country.

Staff Selection

DANE Headquarters elaborates the previous studies on the opportunity, convenience and volume of a given enrollment. These studies are loaded in SICO; the regional offices study them and propose adjustments if necessary. Once the final approval has been given and the SPGI procedures have been followed, the regional offices carry-out the hiring process.

Call

Once DANE Headquarters have the required budgetary availability for the collection operation and the internal documents to provide resources to the territorial directions have been emitted, based on the approved previous studies (which establish the total number of field coordinators and poll-supervisors, their remuneration and profiles and the starting date) a call is published on DANE webpage with the details on the training courses that will be organized by every regional office.

For hiring more than four persons a call has to be made, whereas for four or less persons, a direct invitation procedure is used. In the latter case, twice as much persons as the staff required should be invited.

Training and selection of staff

It is recommended that the training for EDIT operative staff, be realized in each regional office under the responsibility of the staff that has leaded the collecting activities in the previous years. The material requires will be provided by DANE Headquarters (presentations, manuals, questionnaire, etc.). Once the training period is over, the staff is evaluated and selected.

Profiles

The specific profiles for poll – supervisor and field coordinator appear in Annex 3.

2.3.3. Design of instruments

Collecting Instruments

EDITS Processing Manual: it explains the collection procedures, how to fill-out the control card and the correct way to provide the information requested by each module of the form. It is available for all users.
EDITS Basic Concepts Manual: it explains the meaning of the contents of the form; specifically, the definition of the specialized terms used in the formulation of the questions.
EDITS Editing Manual: it explains the procedure for the exhaustive examination of the data provided by the enterprise and for cross-checking the data among chapters of the form.

Systems Instruments

EDITS user Manual: it helps the user of the data capture system, explains its operation, the different screens and options offered by the program.

V**alidation and Consistency Instruments**

EDITS Matrix of validation and coherence: it describes the required characteristics of the system in order to validate the information and to correctly treat each field when capturing data. It also works as a support for the design of the capture system and as an explanatory document on the conditions that the information must fulfill to be considered as consistent.

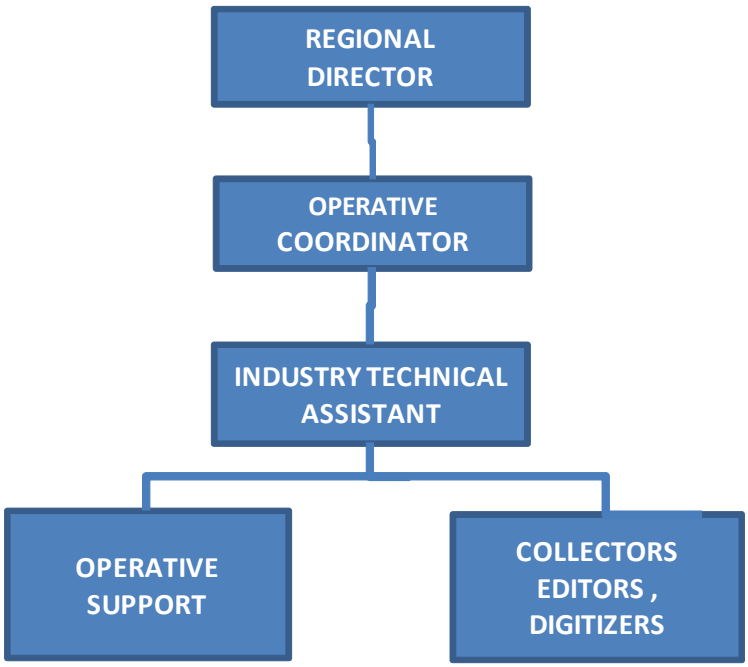
2.3.4. Information Collection

As for all the research activities of DANE, the survey on Development and Technological Innovation has an administrative and operative structure. This is a guarantee for the global development of the research. This structure includes, broadly speaking, the elements described below:

Operative chart

In order to develop the processes of distribution, collecting, editing and capturing the information, each regional level follows an operative chart similar to the one presented in Figure 1.

Figure 1. - EDIT operative chart (regional level)



Source: DIMPE

Methods and mechanisms for collecting the information

The collection of the information is realized by DANE's regional directions; it takes in average four months, to follow the operative plan as designed by the central level.
The planning of the operations requires the register of the census sources, their geographic location and the instruments of collection, aspects that demand human capital, transport, materials and computing resources.
The number of collectors in each regional direction is determined by the number of sources and the complexity of the collection instrument. When these two aspects are defined, the monthly workload assigned to each editor is also established.
The members of the staff present the research to each source and inform them about the time span established for the provision of the information. They must also assist the reporting activity, and strictly follow the manuals and instructions of the operation until obtaining the data within the required parameters of quality and timeliness.

Information Transmission

The collection of the information is realized by **self-response** of the enterprise to the electronic form online, through DANE's webpage, with the support of the previously trained staff. It may be also realized using direct interview of the owner and/or the administrator with knowledge of the enterprise, or of the people in charge of the areas involved in the activities of interest (engineering, quality, tests, experiments, research and development; production and human resources).

The process begins with a communication from the regional direction of DANE to the enterprise, requesting the information for the survey. A user name and a password for the responsible in the enterprise are included so that this person may access DANE's webpage and respond using the electronic form. In the same way, if the sources cannot give the information by electronic means, a physical form is available for them. In both cases, the enterprise counts with the support of a collector- editor who provides complementary information in those cases not covered by the manual.

The web applicative for data collection is part of an interactive module for the control and follow-up of the operation; it makes possible the daily monitoring of the different stages included in the process: distribution, collection, editing, capture, cleansing and transmission of the information from the sources to the regional directions and to DANE's Headquarters. The quality of each step is guaranteed through the electronic application.

Classification and ordering of surveys or registries

In the processes of collection, editing, codification and capture, the information is classified and organized according to the register of enterprises previously defined; it contains the identification and the location variables and a unique identification code for each enterprise, which is later used in the verification and analysis of the consistency processes and in the production of the results of the survey.

Editing guidelines

The fundamental principle for the efficient handling of collected information is to have **unified criteria** among the different persons and trough the different stages involved in its processing. This is the purpose of DANE's instruction device, including the norms and procedures to be used during the editing process, as a guideline to assure the consistency of the information with the pre-established methodological parameters.

Codification

The classification and the codification are realized using the ISIC Rev. 3, A.C., although EDITS IV already introduces the use of ISIC Rev.4, A.C.
The economic activity is classified and codified as follows:

1. In the opening listing select the corresponding category;
2. In the listing of the category select the corresponding division (2 digits category);
3. In the listing of the division select the corresponding group (3 digits category);
4. In the listing of the group, select the corresponding class (4 digits category);
5. The product and the main raw material, depending of its use or destination, define the class;
6. When using the electronic form, the enterprise identification card presents a list of manufacturing activities in alphabetic order. Once the activity has been located and selected with the cursor, the system automatically generates de 4-digits ISIC code.

The ISIC Rev.3 A.C. and ISIC Rev.4 A.C. establish in a unique and concise way the main activity of the enterprise.

2.4. SYSTEMS DESIGN

Verification of the internal consistency of the data and adjustments

By means of the capture program of the electronic form, the data of each of enterprises are published and its consistency is verified. It should be underlined that this process is limited to restricted users according to established permits. Once the enterprise finishes reporting its information, the security of the system does not allow any changes; only the collector in the editing process will be able to introduce changes after contacting the source, after clarifying the possible missing elements or the inconsistencies of information.

Storage and protection of the information

The Systems Office obtains backup copies of the servers with critical information under one of two schemes:

Fixed pre-programmed: a backup copy of the servers where the information of the users is located is done daily.

By request: a backup copy done to a specific location following a request by the users.

The backup copies are carried out in a system of specialized storage for backup and recovery on disc.
A backup copy is made monthly on tapes that are stored externally, outside DANE's Headquarters, under environmental conditions that minimize the risks of damage of storage media.
The information collected from the enterprises is kept in the computer center at DANE's Headquarters in specialized systems of storage accessible exclusively by users with permit.

Coherence of the information

The coherence of the results is obtained through the analysis of the data of each chapter of the survey and some variables of the (EAS) and the (EAC), by the logistics and self-response staff, paying particular attention to variables as economic activity, total employees and annual production.

The economics staff receives the databases and carries out an additional coherence analysis. The information with possible inconsistencies is handed back to the logistics staff, to verify the observations in the forms or to send these observations to the sources. Among the controls, it is crucial to verify the cases in which the enterprise does not report having invested in STIA. The supervisor and the operation assistant of the regional office should visit the enterprise to corroborate this situation. Once the responses are received, they are verified and, if the situation persists, the former procedure is repeated.

The instructive documents and manuals used in this process are: The editing guidelines and the ISIC Rev.3 A.C. and ISIC Rev.4 A.C. already mentioned (p.18)

Weights

As this operation is a census, there are neither weights nor expansion factors.

Generation of output tables

After having an adjusted database, programs in SAS are applied in order to generate the output tables, defining the level of aggregation of the information and the inclusion or not of some enterprises depending on the quality of their data. Finally, on the basis of the output tables the bulletin and other publications are prepared.

2.5 DESIGN OF QUALITY ASSURANCE METHODS AND CONTROL MECHANISMS

Supervision instruments

The integral system available allows the automatic supervision of the execution, for each process of the survey and makes possible to control the quality of the information of each enterprise. In order to take to carry out this activity, the instruments of control used may be grouped in three modules as follows:

- Register module. - It groups all the enterprises which information will be collected in the field operative phase. It makes possible to transfer the sources among cities and the assignment of new features.
- Questionnaire or form module. - It facilitates the continuous capture, cleansing and verification of the information, as well as the verification of the quality of editing and coding stages. It also makes possible to consolidate and deliver the information to DANE's Headquarters.
- Operations module. - It facilitates the daily control and follow-up of the stages of distribution, collection, editing, capture-cleansing and transmission of information obtained from the sources.

This last module contains the information structured as follows:

1. Basic register of sources, taken from the previous survey;
2. New potential sources to be included;
3. Total sources (based on the previous totals 1. and 2.);
4. Distributed sources (date of delivery to the source);
5. Non- distributed sources;
6. Pending sources;
7. Collected sources (date of reception by DANE);
8. Edited sources and code of editor (editing completion date);
9. Recorded sources (not cleansed as they present errors) and identification of the recorder;
10. Sources cleansed not transmitted to DANE's Headquarters;
11. Sources sent to DANE's Headquarters.

The data obtained in this module are summarized in a table, where the different stages of the survey and its coverage, as well as the processing status of each form may be appreciated.

Indicators for quality control of the different processes of the research

The ISO 9001/00, international standard concerning Quality Management Systems, is the basis for a series of indicators for the follow- up the production of results of EDIT, as described below:

Quality Indicators: They represent an approximated measurement of the quality for the editing and capture processes of the information at the moment it is sent to the headquarters by each regional direction. The consistency of the information fed into the system for final results production depends, to a great extent on this control.

- **Quality indicator by responsible person**:

In order to control the quality of each process and obtain an approximated indicator of the quality, each technical assistant must review 10% of the forms that the regional direction will send to DANE's Headquarters; that is, 10% of the forms edited and captured by each of the persons responsible for the development of these processes.

The technical assistant calculates a quality indicator (IC) for each responsible of the process (RP) which is obtained as the arithmetic average of the score of each reviewed questionnaire. The technical assistant qualifies them following a grading table. For each process there is at least one responsible person.

$$\text{IC (RP)} = \frac{\sum \text{IC (Form)}}{\text{Number of forms}}$$

That is, the **average score for a responsible** person is equal total of the scores of the forms of this person divided by the total number of forms of this same person.

Where: IC (Form) is the score, or quality indicator, given to a form processed by the person identified as RP

$\sum$ IC (Form) is the total of scores for the forms processed by RP, and

- **Quality indicator by process**:

The former formula corresponds to one responsible person of a process. To have an indicator of quality for a process corresponding to k responsible persons, the QI_P will be:

$$\text{IC (Process)} = \frac{\sum \text{IC(RP)}}{\text{K}}$$

K = number of persons responsible of a process

- **Quality indicator by regional direction**: (See IDCL below, p. 22)

Reliability Indicators: they evaluate the level of fulfillment of the objectives of the research in aspects such as coverage of the sources, information provided by them and quality level of the operative processes supporting the survey. For its calculation a simple average of all the relevant indicators is taken. The indicators could be referred to quality of response, coverage, and processes quality, starting with those established at the local level and ending with those of the central level as follows:

- **Sources response rate (TRF):** it is the ratio between the number of sources providing information (FI) plus the sources sent with remarks (FE), excluding those under remark **number 5,**[2] and the total number of enterprises in the register sent for field work (TD).

$$\text{TRF} = [(\text{FI}+\text{FE}) / \text{TD}] * 100$$

[2] **REMARK 5** corresponds to the enterprises that still present pending information

Where:

FI: Sources providing information

F2: Sources with remarks different from category 5

TD: Total sources in the register sent to the field.

- **Indicator of sources with pending information (IFD)**: it shows the proportion of sources having remark 5 and the total of expected reporting sources. This indicator determines the percentage of enterprises that must be contacted and questioned about information that has not been provided during the field procedure.

$$IFD = (FNC/FES) * 100$$

Where:

FNC: Sources with remark 5

FES: Total expected sources

- **Local quality indicator (IDCL):** it is the indicator of quality of the chain of processes leading to the final results. It corresponds to the verification of the quality in the editing and capture stages (estimated from the number of errors and omissions given the specific volume of each activity) made in each regional direction

$$IDCL = (ICC+ICCA) / 2$$

Where:
IDCL: Local quality indicator
ICC: Editing quality indicator
ICCA: Capturing quality indicator

- **Headquarters quality indicator (IDCC):** it is the indicator of quality of the operative processes of the research. It is calculated as the sum of errors and omissions generated in the regional directions (treatment as non conforming product) and detected in the Headquarters.

$$IDCC = [(FES-TPNC) / FES]$$

Where:

TPNC: Sum of errors and omissions observed in the Headquarters production process
FES: Total expected sources

Note: In EDITS there is not collecting quality indicator. The collection is replaced by the reception of information.

2.6 PILOT TESTS

When a research is approached for the first time, or when a long time has passed by since the last time that it was realized, or when there are significant changes introduced to improve operative and/or methodological aspects, it is recommendable to realize pilot tests. Pilot tests allow evaluating the performance of collection instruments so that the more advisable operative design for obtaining the objectives can be selected, based on quality assurance and within cost restrictions.

For the development of pilot tests associated with significant changes in the research, a sample or a very small sub-sample of the universe under study is selected and the form is applied to it, in such a way that the analysis of methodological and operative aspects clarifies the questions or doubts existing on the development of the research. Since 2009, EDITS has not undergone any significant changes in operative and/or methodological aspects that justify the application of pilot tests through selection of samples or sub-samples.

As far as general methodological aspects of the EDITS are concerned, previous to each collection operative, some tests are implemented to verify the correct operation of the electronic form to collect the information, and to review the formulation of questions, the wording and the follow-up of flows; in the same way, it is important to review that the instructions distributed through the different manuals and formats, especially those related to processing and collecting, are totally clear for the participants in the implementation of the survey.

In operative aspects, the application of pilot tests is a fundamental tool to select the more appropriate collection scheme, to calculate the task allocation to the staff, to develop the coordination, supervision, and other activities, and to define transportation requirements, honoraria, and per-diem allowances, among others.

2.7 DESIGN OF THE ANALYSIS OF RESULTS

2.7.1. Statistical analysis

EDITS performs a descriptive analysis of the main variables, (paragraph 2.6.1.1, pp. 11). The analysis is made with aggregates and graphs, by comparing the different variables and chapters of the survey. Particular attention is paid to the outliers which require a direct confirmation of the data with the corresponding enterprise.

2.7.2. Analysis of context

The analysis of context emphasizes in the study of the more important trade and services activities during the reference period. This importance is defined by their investment in technological development and innovating results, or by their economic behavior in growth in production, employment or both.

This type of analysis requires first hand information on manufacturing dynamics, and knowledge of particular situations of enterprises that have undertaken important processes of technical or administrative reconversion or of accessing new markets to gain productivity and competitiveness.

2.7.3. Experts Committees

The analysis of context for EDITS is complemented with a presentation of results in the internal committees of study, previous to the publication of the information; in these meetings worthy feedback is received from participants. In these working sessions participate the trade and services sectors experts, EDITS analysts, and economic and operative advisors

to DANE; from them it is possible to obtain unified criteria for the internal assessment of the quality of EDITS and to detect eventual anomalies of the results that must be verified.

EDITS has also a working committee, attended by the main actors in following-up and in development of the innovation in the country, conformed by COLCIENCIAS, the Observatory of Science and Technology (OCyT), the Ministry of Commerce, Industry, Trade and Tourism and the academia.

2.8 DISSEMINATION DESIGN

2.8.1. Data repository management

The information of the research is directly stored in the systems servers of DANE through a program that allows capturing the information in line (via webpage) in real time.

The information processing of EDITS has a SAS format and is stored in the DANE server assigned for this task. On the other hand, the information for dissemination is kept in aggregated form.

The statistical reserve does not allow the users to access micro-data, unless consultations are made through the Specialized External Processing Group in DANE's headquarters in agreement with the criteria of statistical reserve established by the DANE.

2.8.2. Dissemination Products and instruments

The dissemination products of EDITS appear in DANE's webpage, through the press bulletin, annexes and a presentation that make public the information on:

- The activity of development and technological innovation;
- The amount invested in the reference period;
- The objective of the investment;
- The staff employed by type of contract, area, level of education, type of qualification;
- The objectives and the results of the innovation procedure;
- The sources of ideas for innovating;
- The sources and value of the financing;
- The value funded by the innovation agents:
- The intellectual property registries of the enterprises and its product and process certifications.

The dissemination instruments for EDITS include:

- The results of the survey on DANE's webpage;
- The production and adjustment of magnetic files with information concerning micro-data for revision at DANE's consultation room;
- The metadata of the research located in the National Data Archive (ANDA) at DANE's webpage.

2.9. EVALUATION DESIGN

DANE, as the coordinator of the National Statistical System - SEN, directs its efforts to assure the quality the statistical information, by establishing and promoting standards for its continuous improvement, and for controlling its own statistical production. The fundamental principles are those established by the United Nations and the good practices

defined by institutions as the Organization for Economic Cooperation and Development (OECD) and the Statistical Office of the European Community (EUROSTAT).

The evaluation and certification of the quality of the statistical information should assure the quality of the statistical operations, within the framework of the fundamental principles of international reference and considered by DANE as relevant for fulfilling the requirements and needs of the users, and for generating credibility, reliability, confidence and transparency in the production of statistical information within the National Statistical System - SEN.

The process is developed in five stages; selection, collection, evaluation, certification and follow-up, which are oriented to the measurement, evaluation and permanent improvement of the quality of the statistical production.

The improvement plan is one of the results of the evaluation of statistical quality realized by the Commission of Independent Experts – CIE. Their findings are included in the evaluation report, with the respective proposals for improvement, directed to strengthen those aspects that according to the opinion of the commission, affect the quality of the evaluated statistical operation. The plan is the main input for the follow-up stage, where the verification of execution of the improvement actions takes place, as well as the adoption and implementation of the standards of the SEN.

The Plan of Improvement of the Quality of the Information of the **Survey of Development and Technological Innovation in the Trade and Services Sectors** is divided into two parts: the first one includes the improvement actions proposed by the CIE, and the second presents a time schedule for consolidating the quality of the survey, indicating who are the staff responsible of this improvement action. All the EDITS staff knows the plan and the follow-up is made in a joint task-force with DIRPEN.

3. RELATED DOCUMENTATION

EDITS has different types of instruments used throughout the process of planning and collection created with the purpose of guaranteeing the quality of the information. Among them, the Completion, Basic Concepts and Editing Manuals, mentioned previously. This information is available in the National Data Archive (ANDA) accessible through DANE's webpage.

EDIT also uses internal documents in the process of data collection, as the User Manual and the Matrix of validation and consistency; the last one specifies the characteristics required from the system to validate the information and its correct completion in each field of the capture system.

GLOSSARY [3]

Acquisition of machinery and equipment: Machinery and equipment, specifically bought for the production or implementation of goods, services, processes, technical methods, either new or significantly improved. This item does not include the acquisitions for regular replacement or enlargement of the installed capacity, i.e. those for traditional production.

Doctorate: This is the post-graduate academic program that delivers the highest educational degree. Formation for advanced level researchers that takes into account their aptitudes, experience and knowledge acquired in previous levels of education. The doctorate must culminate with a thesis, or articles published in indexed scientific magazines, in which new knowledge is generated.

Engineering and industrial design: Changes in the methods or standards of production and quality control. Working out drawings and designs oriented to define technical procedures for producing or implementing new or significantly improved goods, services or processes in the enterprise.

Enterprise own resources: Funds belonging to the enterprise. They originate in the exercise of its economic activities, in operational and non-operational income and share capitalization and may be used to fund investments in scientific, technological or innovation activities, or to serve as counterpart when the financing program so requires.

Good or service significantly improved for the international market: The good or service is already produced by direct competitors of the enterprise in the international market, nevertheless the enterprise has improved it significantly.

Impact on the market: There is an impact on the market when the innovations fulfill the objective to maintain or to increase the participation of the enterprise in the international or national market.

Impact on the process: Action that bring about changes or improvements in the performance of the production processes, through which enterprises may increase their competitiveness in the markets.

Impact on the product: Changes related to the increase of the quality of goods or services or to the enlargement of the diversity of goods or services offered.

Incubators of Technologically based Enterprises (IEBT): The consideration behind this approach is that the innovating ideas are generated in the projects supporting the creation and development of small businesses (or micro-enterprises) in the first stages of their lives, in a concrete geographic zone, with private, mixed or public financing.

Industrial Design registration: This register concerns the particular appearance of a product. It is different from a patent; it protects the external form of the products, resulting from combinations of lines or two-dimensional or three-dimensional external forms, or colors, line contour, configuration, material texture, without changing the basic design or purpose of the product. This design characterizes the product not only with secondary differences (those that are not easily differentiable at first glance with the existing designs). The validity of an industrial design registration is 10 years from the date of its request at the Industry and Trade Superintendent Office.

Industrial Secret: It is any non-disclosed information that a natural or legal person legitimately owns and may use in some productive activity (commercial or industrial) or be transmitted to a third party. The information that must be disclosed by legal dispositions and warrant is not considered industrial secret (Articles 260 - 261 of Decision 486 of the Andean Community).

Innovation: New or significantly improved good or service introduced in the enterprise or in the market, or a new or significantly improved organizational method or a new or significantly improved technique of commercialization introduced in the enterprise. The changes of esthetic nature and the simple changes of organization or management are not considered as innovation.

[3] The definitions presented in this section are the result of adapting, to the Colombian context, the conceptual guidelines presented by international handbooks for statistics applications and analysis of data on Science, Technology and Innovation. They have been published by OECD (Frascati Manual and Oslo Manual) and by the Latin-American Network for Research on Science and Technology – RICYT (Bogotá Manual).

Innovations Marketing: Activities consisting in the introduction in the market of new or significantly improved goods or services, including market research and launching publicity.

Innovation of Processes: Adoption of new or improved methods of production or distribution. These methods may imply changes in equipment, or in the organization of the production or distribution, or a combination of both, or the use of new knowledge.

Intellectual Property Rights. Software registration: Registries that protect the authorship of books, publications, works of art, databases and any product of the human intellect to assure their commercial exploitation by the creator. These registries are formalized in the office of Intellectual Property Rights of the Ministry of Interior.

Internal Activities of Research and Development (R+D): Systematic works of creation carried out within the enterprise with the purpose of increasing the volume of knowledge and its use to devise goods, services, or new or improved processes.

Lines of Co-financing: Non-reimbursable resources granted to fund a percentage (smaller than 100%) of the total value of a research, technological development and innovation project. In this type of financing the enterprise is required to provide a counterpart in money or goods or both.

Lines of Credit: Reimbursable resources that are granted to fund until 100% of the total value of a research, technological development and Innovation project.

Logos and trademarks: They are all the product brands, commercial names of products, services or of processes, logos, symbols (characteristic of the commercial name with which a product or an enterprise is characterized), registered by the enterprises at the Industry and Trade Superintendent Office, with the purpose of protecting these signs so that they cannot be copied or used by competitors in the market, who can affect their commercial and competitive position.

Masters: Post-graduate academic program oriented to scale-up and develop knowledge for the solution of problems of specific, interdisciplinary or professional nature and to provide the basic instruments that qualify as researcher in a specific area of sciences or technology.

National System of Science, Technology and Innovation (SNCTI): It Is an open system to facilitate the interaction of policies, strategies, programs, methodologies and mechanisms for management, promoting, financing, protection and spreading scientific research and technological innovation, as well as the public, private or mixed organizations who realize or promote the development of scientific, technological or innovation activities.

New good or new service for the enterprise: The good or service is supplied by competitors of the enterprise in the national market, either imported or produced in the country. The enterprise was not producing it in the past and it is substantially different, from the technological point of view, from other products of the enterprise.

New good or service for the international market: The good or service is not produced by direct competitors of the enterprise in the international market and has been developed, produced and traded by the enterprise.

New good or new service for the national market: The good or service is not produced by direct competitors of the enterprise. The good or service already exists in the international market, but not in the national market. The enterprise is imitating the product of other producers (who do not participate in the national market) to develop and produce it in the country.

New good or service: Its fundamental features (engineering specifications, components and materials, built-in software or predicted uses) differ significantly from those of other products previously produced by the enterprise.

Obstacles to Innovation: Internal or external causes preventing the scientific, technological and innovating activities undertaken by the enterprise, to fulfill the expected results, assigned in agreement with strategic plans or projects that justify them. |

Patents of invention: It is the registry of protection at the Industry and Trade Superintendent Office, of inventions of products or procedures. They may correspond to all the fields of technology. They must be new, represent a certain inventive level and must be liable of industrial application.

Productivity: It involves the improvement in the use of the human and physical resources available to the enterprise, i.e. the increase in production capacity with fixed capital and human resources.

Qualified worker: The person who in order to fulfill the requirements of certain occupations has to follow an apprenticeship program, or has secondary basic education complemented with advanced training courses, training at work and experience. The students receive the Certificate of Professional Aptitude (CAP) of SENA.

Regional Centers for Productivity: They are created by the social and productive dynamics that groups the different public and private actors in order to work in strategic and long term programs of productivity and innovation. Example, the Tolima Center for Productivity leads the cotton-textile products cluster.

Research Centers: This is an option for the enterprise to grasp ideas or methods that arise from explicit and/or implicit contracts with people working in this type of organizations.

Private Capital Funds: Provision of funds originating in the contributions of investors who get involved in the enterprise through funds of private capital, funds of risk capital, and operations in stock market or specific investments as investors angels. They exclude share capital.

Resources of Cooperation or Endowments: Non-reimbursable Funds, granted by governmental organizations of a foreign country or by NGOs (the funds can be in cash, goods or services). Endowments done by international national organizations may be public, private or mixed.

Resources of Other Enterprises of the Group: Funds pertaining to other enterprises of the same group (with which a close legal or financial relation exists) that is granted to the enterprise as loan or endowment to finance investments in scientific, technological or innovation activities.

Resources of Other Enterprises: Funds pertaining to other enterprises that are not part of the same group and that the enterprise obtains as loan or endowment to finance investments in scientific, technological or innovation activities.

Resources of Private Banks: Funds granted by private financial corporations that receive deposits and provide credits.

Scientific, Technological and Innovation Activities (STIA-ACTI): Those activities that the enterprise undertakes to produce, promote, disseminate and apply scientific and technical knowledge, or for the development or implementation of goods or services, processes, new or significantly improved technical or organizational or commercialization methods.

Significantly improved good or service for the enterprise: The good or service is already produced by the enterprise. The enterprise improves the product to increase its competitiveness in the national market.

Significantly improved good or service for the international market: The good or service is already produced by direct competitors of the enterprise in the international market; nevertheless the enterprise improves it technologically in a significant manner.

Significantly improved good or service for the national market: The good or service is already produced by direct competitors of the enterprise in the country. The enterprise improves it technologically in a significant manner.

Significantly improved good or service: Product whose performance has been improved to a great extent, as a result of the use of components or materials of better performance, or by changes in one of the technical subsystems that compose a complex product.

Specialization: Post graduate programs that provide possibilities for improvement in the same occupation, profession, discipline or in compatible or complementary areas.

Specialized qualification: Formation at master and doctorate level, involving a significant degree of complexity (requires a highly specialized personal advisor). It includes the pertinent activities financed with resources of the enterprise and those organized directly within the enterprise.

Specialized Training: Training involving a significant degree of complexity (requires a personal instructor highly specialized) and with a minimum duration of 40 hours.

Technical Assistance and Consultancy: assistance for using applied knowhow, by means of an art or technique, specifically contracted for the production or implementation of goods, services, new processes or the significant improvement of them. This activity also includes market intelligence and technology monitoring.

Technical Standard: It is the document that summarizes the characteristics of a product or the processes and methods of production related with it, including the applicable administrative dispositions, and whose observance is compulsory. It may include prescriptions on terminology matters, symbols, packing, marking or labeling applicable to a product, process or method of production, or deal with them exclusively.

Technological Development Centers (CDT): These centers are dedicated to the generation and appropriation of specialized knowledge and technologies for specific sectors or economic activities. For example, the plastics sector works with the chain that develops polymers and new materials and in the metallurgical industry the Metallurgical Technological Center Network (CRTM) research and transfer technology for smelting, iron and steel metallurgy, equipment and assembly lines.

Technological up-grade: It is the renewal of the technological base of the enterprise in terms of products and processes of last generation with the purpose of improving its performance in relation to that of competitors.

Transfer of technology: Acquisition or use under license from other enterprises or organization, of patents or other registries of intellectual property, non-patented inventions and technical knowledge or of another type, to apply in the innovations of a given enterprise.

Utility model: Describes any new form, configuration or disposition of elements of some device, tool, instrument, mechanism or another object or a part of it, which allows a better or different operation, use or manufacture of the object that incorporates it. It brings advantages or technical characteristics that were not present before, which are protected by means of a patent. It may be used during 10 years from the date of request to the Industry and Trade Superintendent Office.

BIBLIOGRAPHY

DANE. (2007). Avance en la adaptación de clasificaciones industriales y de productos en Colombia: CIIU y CPC. (Advances in adapting product and industrial classifications in Colombia: ISIC and CPC)

DEPARTAMENTO NACIONAL DE PLANEACION -DNP- (1998). La innovación tecnológica en Colombia: Características por tamaño y tipo de empresa. Bogotá. (Technological innovation in Colombia: Characteristics by enterprise type and size)

_____. (1997). Panorama de la innovación tecnológica en Colombia. Bogotá. (Overview of technological innovation in Colombia)

Durán, X.; Ibáñez, R.; Salazar, M.; Vargas, M. (2003). La innovación tecnológica en Colombia. Características por sector industrial y por región geográfica. Observatorio Colombiano de Ciencia y Tecnología, Colciencias, DNP. Bogota. (Technical innovation in Colombia. Characteristics by industrial activity and geographic area)

EUROSTAT. - Quality Assessment in statistics. Methodological Documents - Definition of quality in statistics. Doc Eurostat/A4/Quality/03/General/Definition.

Instituto Colombiano de Normas Técnicas y de Certificación (ICONTEC). Normas ICONTEC para documentación, presentación de tesis, trabajos de grado y otros trabajos de investigación . Actualización (2008). (Incontec standards for documents, thesis, other graduate studies documents, research documents. Update)

United Nations. (2004). The operation and organization of a statistics office. In: Manual of statistical organization. New York, Third edition.

Organization for Economic Cooperation and Development (OECD) –(Frascati Manual (2002) – Measurement of Scientific and technological activities.)

_____ and **EUROSTAT.** (2005). Oslo Manual. Guide for the collection and data processing on innovation. Oslo.

Red Latinoamericana de Indicadores de Ciencia y Tecnología (RICYT), Organización de Estados Americanos (OEA), Programa CYTED, COLCIENCIAS, OCYT (2001). **Manual de Bogota**.

_____ Normalización de Indicadores de Innovación Tecnológica en América Latina y el Caribe. Bogota. (Standardization of Technological Innovation y Latin America and the Caribbean).

Paiva Esteban (2010) Introducción a la innovación. CONYCIT. (Introduction to innovation).
http://www.slideshare.net/EstebanPaiva/1e-introduccion-a-la-innovacion-conycit

ANNEXES

CHAPTER I - INNOVATION AND ITS IMPACT ON THE ENTERPRISE DURING 2012-2013

One innovation is defined in this survey as a good or service, new or significantly improved, introduced in the market,
or a new or significantly improved process introduced in the enterprise, or an organizational procedure introduced in the enterprise, or a new marketing technique introduced to the enterprise.

a. An innovation is always new for the enterprise, not necessarily for the market where the enterprise operates.

b. Aestetique changes or simple organizational or managerial changes are not considered innovation.

c. Goods and services that the enterprise introduce in the market are considered products.The services, use to be intangibles, non storable, and their production and marketing may be done simultaneously.

d. The provision of a service may be complemented or require as support the supply of a good and reciprocally.

Who should answer to this chapter?

Persons with a first-hand knowledge of the scientific, technological and innovating activities of the enterprise

I.1 Please indicate if your enterprise introduce any of the following mentioned innovations in the period 2012-2013. If the answer is positive plaease specify how many.

Please take into account that a **new good or service** is one whose characteristics (technical specifications, number of components and materials, incorporated software or forseen uses) considerably differ from those previously produced by the enterprise

						Total Innovations in 2012-2013
1. New goods or services for the enterprise	I1R1C1N	YES		NO		I1R1C2N
2. New goods or services for the national market	I1R2C1N	YES		NO		I1R2C2N
3. New goods or services for the international market	I1R3C1N	YES		NO		I1R3C2N
Total innovations by new goods or services						I1R4C2N

Please take into account that a **good or service significantly improved** is one that already existed and whose performance has been enhanced to a great extent. This may be given by the use of better performing materials or by the change in one of the technical sub-systems tthat constitute a complex system

						Innovations in 2011-2012
4. Improved goods or services for the enterprise (*they are already in the national or international market*)	I1R1C1M	YES		NO		I1R1C2M
5. Improved goods or services for the national market (*they are already in the international market*)	I1R2C1M	YES		NO		I1R2C2M
6. Improved goods or services for the international market	I1R3C1M	YES		NO		I1R3C2M
Total innovations by improved goods or services						I1R4C2M

Other type of innovations

7. Introduced new or significantly improved production systems, distribution or logistics implemented in the enterprise	I1R4C1	YES		NO		I1R4C2
8. Introduced new organizational methods implemented internally, or in the management of knowedge, or in the external relations of the enterprise	I1R5C1	YES		NO		I1R5C2
9. Introduced new or significantly improved marketing techniques (promotion and sales channels, packaging or design of the products to increase or mantain the market (Does not include changes in the funcionality of the products)	I1R6C1	YES		NO		I1R6C2

If your answer is NO to all questions 1-2-3-4-5-6-7-8-9 in the previous section I-1 please proceed to section (I-3)

I-2 Please mark the degree of importance of the impact that the acquisition of new goods or services significantly improved, new processes or significantly improved, new organizational methods or significantly improved, new marketing techniques or significantly improved, had during 2011-2012 on the following aspects of your enterprise:

	Degree of importance		
	High	**Medium**	**None**
Product			

1. Improvement in the quality of goods or services	I2R1C1	⬭	⬭	⬭
2. Increase in the numer of goods or services offered	I2R2C1	⬭	⬭	⬭
Market				
3. The share of the geographical market of your enterprise remains stable	I2R3C1	⬭	⬭	⬭
4. The enterprise has entered into a new geographical market	I2R4C1	⬭	⬭	⬭
Process				
5. Increase in productivity	I2R5C1	⬭	⬭	⬭
6. Reduction in the labor cost	I2R6C1	⬭	⬭	⬭
7. Reduction in the consumption of raw materials	I2R7C1	⬭	⬭	⬭
8. Reduction in the consumption of energy	I2R8C1	⬭	⬭	⬭
10. Reduction in water consumption	I2R9C1	⬭	⬭	⬭
Other impacts				
10.Improvement in norms and technical regulations compliance. includes compliance of norms on reduction of residual disposal or in toxic emissions, and improvement in industrial security conditions	I2R10C1	⬭	⬭	⬭
11. Improvement in the use of residuals of the production process	I2R11C1	⬭	⬭	⬭

If your answer is NO to questions 1-2-3-4-5-6 of section (I-1) please continue in section (I-3)

CHAPTER II - INVESTMENT IN SCIENTIFIC,TECHNOLOGiCAL AND INNOVATION ACTIVITIES IN 2012 and 2013

The Scientific and Technological Innovation Activities (STIA) are all those that the enterprise carries out to produce, promote, disseminate and/or apply technical and scientific knowledge, and for the development or **introduction of goods and services new or significantly improved**, of new or significantly improved processes, of new organizational methods or new marketing techniques.

Who should answer to this chapter?

Persons of the finance area, who know investments and expenses of the enterprise in STIA

TO THE INFORMANTS
How to report monetary figures?
Please report financial and monetary figures in thousand pesos
If the figure to report is $ 179.125.825
The figure you have to write in this form is $ 179.126

II-1 Please report the investment of the enterprise in the 2012-2013 period, in each one of the following scientific, technological and innovation activities, looking for the introduction of new goods or services, substancially improved, or new or improved processes, new or improved organizational methods, or new or significamntly improved marketing techniques

	Amount invested 2012 000 current pesos	Amount invested 2013 000 current pesos
1.Internal R&D activities Creative systematic work performed in the enterprise to enlarge the knowledge and use it in the creation of goods, services and processes or to improve them	II1R1C1	II1R1C2
2. R&D acquisition (external) Acquisition or financing of the R&D activities already mentionned but realizaded by other public or private entities	II1R2C1	II1R2C2
3. Machinery and equipment acquisition Machinery or equipment specically purchased for producing or developing goods, services, or processes, new or significantly improved (do not include those already registered in item 1.)	II1R3C1	II1R3C2
4. Communication and Information Technologies Acquisition, generation, outsourcing or leasing of hardware, sofware and services for managing or processing information, specifically oriented to producing or developing goods, services, or processes, new or significantly improved	II1R4C1	II1R4C2
5. Marketing innovations Activities for introducing in the market goods and services, new or significantly improved, including market studies and launching publicity	II1R5C1	II1R5C2
6. Tranfer of technology Acquisition or use of licenced or purchased patents and other registered intellectual property rights, or other technical know-how without patent, to support innovations in the enterprise. Includes know-how transfer, understood as related with unwritten knowledge non protected by patents.	II1R6C1	II1R6C2
7. Technical assistance and consulting services Consulting services to use technical know-how, contracted for applying a particular art or technique, for producing new goods or services or improving existing ones. Includes market intelligence and technological watch	II1R7C1	II1R7C2
8. Engineering and industrial design		

Change in methods or patterns for production and quality control, designs and technical drawings oriented to define technical procedures required for new or significantly improved goods, services or processes in the enterprise.	II1R8C1	II1R8C2

9. Specialized education and training

Staff educationand training, in-house or externally, specifically oriented to the introduction of new products or processes or significantly improved.	II1R9C1	II1R9C2

TOTAL AMOUNT INVESTED

II.2 Did your enterprise carry out activities related with biotechnology in the period 2011-2012?

Biotechnology is a technology involving scientific techniques using live organisms or its parts to obtain plants or animals or to develop microorganisms for specific uses.

II2R1C1 YES ⬭ Go to II.3 NO ⬭ Go to Chapter III

II.3 Out of the total invested in STIA, please indicate the amount corresponding to biotechnology related activities carried out by your enterprise in 2011 and 2012.

Amount invested 2012 000 current pesos	Amount invested 2013 000 current pesos
II3R1C1	II3R1C2

CHAPTER III - FINANCING THE INVESTMENT IN SCIENTIFIC,TECHNOLOGiCAL AND INNOVATION ACTIVITIES IN 2012-2013

The enterprise may assign its own ressources (ressources obtained in the development of its economic activity) for financing the investments in scientific, technological and innovation activities. It is also possible to finance them with public funds (reembolsable or not), or with private ressources from third parties, such as credits, capital ressources, private banks, private institutions or agencies (national or international), among others.

Please recall that scientific, technological and innovation activities are those that the enterprise implement to produce, promote, disseminate and apply scientific and technical knowledge

Who should answer this chapter?

Persons of the finance area, who should know investments and expenses of the enterprise in scientific, technological and innovation activities

TO THE INFORMANTS
How to report monetary figures?
Please report financial and monetary figures in thousand pesos If the figure to report is $ 179.125.825 The figure you have to write in this form is $ 179.126

III-1 Please give the detail of the financial ressources employed to finance scientific, technological and innovation activities (total investment Chapter II). It must be indicated if they are the enterprise own ressources, or from any of the oher sources listed below. You should also indicate their origin (national or foreign) both for 2011 and 2012.

	(000 pesos at current prices)	
	2012	2013
1. Enterprise own ressources		
Ressources belonging to the enterprise obtained as operational and non operational income, or from share operations, devoted to finance scientific, technological and innovation activities, and those that serve as counterpart when the enterprise is beneficiary of national or international organizations (public, private or mixed)	III1R1C1	III1R1C2
2. Ressources of other enterprises of the group		
Ressources provided by enterprises of the same group (with them there is a close financial or legal relationship) as donation or loan, to finance scientific, technological and innovation activities	III1R2C1	III1R2C2
3. Public ressources		
Ressorces obtained through any of the lines of public financing to realice any of the activities mentionned before(listed in section III.2).They could be reimboursable or not, as well as those that had own resources counterpart (section III.1, option 1)	III1R3C1	III1R3C2

	2012		2013	
	National	Foreing	National	Foreign
4.Ressources from private banks Credit ressources granted by financial instutions, privately owned, that practice financial intermediation	IIIR4C1	IIIR4C2	IIIR4C3	IIIR4C4
5. Ressources of other enterprises Ressources from other enterprises that do not belong to the same group. The ressources are given as donation or loan, to finance scientific, technological and innovation activities	IIIR5C1	IIIR5C2	IIIR5C3	IIIR5C4
6. Capital ressources Ressources comming from private entities that participate in the enterprise through private investment funds, or by stock exchange operations or even a business angel.	IIIR6C1	IIIR6C2	IIIR6C3	IIIR6C4
7.Cooperation and donation ressources				

Non reimboursable ressources, given by GOs of a foreign country or by NGOs . The ressources may be cash, goods or services. Donations may be given by national or international organizations (public, private or mixed)	IIIR76C1	IIIR76C2	IIIR76C3	IIIR76C4
TOTAL (must be equal to the total invested)	IIIR8C1		IIIR8C2	

If you DID NOT use public ressources in 2011-2012 , that is your answer is 0 in the cases for item 3 of the previous section III.1, please go to question III.3

III.2 Please indicate the distribution by origin of the public ressources received in the period 2011 -2012 to finance scientific and technological activities of innovation (Section III.1, Option 3)

Co-financing lines	**(000 pesos at current prices)**	
Non-reimbursable resources granted to fund a percentage (smaller than 100%) of the total value of a research, technological development or innovation project. In this type of financing the enterprise is required to provide a counterpart in money or goods or both.	2012	2013
1. FOMIPYME-INNPULSA Mepymes. Thematic line: Innovation, Development and Technological transfer	III2R1C1	III2R1C2
2. SENA. Innovation and Technological Developmnet Program	III2R2C1	III2R2C2
3. COLCIENCIAS. University CIA-CDT-Enterprise	III2R3C1	III2R3C3
4. COLCIENCIAS. Contingent Recovery. Financing line for intangibles. (Patents and Certificates of vegetal varieties obtention)	III2R4C1	III2R4C2
5. Ministry of Agriculture and Rural Development. Reserach, Technological Development and Innovation Programs and Proyects for Productive Chains.	III2R5C1	III2R5C2

Credit lines	**(000 pesos at current prices)**	
Reimboursable resources that are granted to fund until 100% of the total value of a research, technological development and Innovation project.	2012	2013
6. BANCOLDEX. Support to productivity and competitivity program (before PROGRESAR)	III2R6C1	III2R6C2
7. BANCOLDEX. Innovation incentive. Credit alternative for entrepreneurial projects of productivity, innovation and technological development	III2R7C1	III2R7C2

Other lines	**(000 pesos at current prices)**	
	2012	2013
8. Department or Municipality Funds for Science and Technology	III2R8C1	III2R87C2
TOTAL (Must be equal to item 3 in section III.1)	III2R9C1	III2R9C2

III.3 Did your enterprise have the inention to request public ressources for financing investment in scientific, technological and innovation activities in the period 2012-2013?

III3R1C1 YES ◯ NO ◯

III.4 Please qualify the level of importance that the following obstacles had for your enterpriose to ahve access to Public Ressources for financing STIA in your enterprise in the period 2012-2013.

		Level of importance		
		High	Medium	None
1. Lack of knoledge about the existing lines of credit	III4R1C1	◯	◯	◯
2. Lack of information on conditions and procedures	III4R2C1	◯	◯	◯

3. Difficulty to comply with the conditions or to complete the procedures	III4R3C1	⬭	⬭	⬭
4. Procedures demanding very long time	III4R4C1	⬭	⬭	⬭
5. Financing or cofinancing conditions unattractive	III4R5C1	⬭	⬭	⬭
6. Delay in the intermediary procedures between the commercial bank and the public lines of credit	III4R6C1	⬭	⬭	⬭

III.5 Please select one of the following options concerning tax incentives (reductions and exemptions) for investments in scientific and technological development during 2012-2013:

Your enterprise gor tax incentives	⬭	III5R1C1
You requested tax benefits but you did not obtained them	⬭	
You had the intention to request tax benefits and finally you did not	⬭	
You did not wanted to request tax benefits	⬭	

III.6 Please indicate which of the following listed factores became obstacles for requesting or obtaining tax benefits for investment in scientific and technological development in 2012-2013.	Taxable income deduction due to STIA investments		Taxable income deduction due to new medicines or	
1. Lack of information on benefits and conditions	III6R1C1	⬭	III6R1C2	⬭
2. Difficulties with the Integrated System of Project Managment (SIGEP) for presenting the request online	III6R2C1	⬭	III6R2C2	⬭
3. Difficulty to complete the electronic form.	III6R3C1	⬭	III6R3C2	⬭
4. Excesive or cumbersome conditions or procedures	III6R4C1	⬭	III6R4C2	⬭
5. Very long time to process the approval of the request	III6R5C1	⬭	III6R5C2	⬭
6. Low value of tax benefits	III6R6C1	⬭	III6R6C2	⬭
7. Did not find any obtacles	III6R7C1	⬭	III6R7C2	⬭

CHAPTER IV- AVERAGE PERSONNEL EMPLOYED 2012-2013

The employees who take part in scientific, technological and innovation activities, are those who work in promotion, production, dissemination and application of scientific and technical know-how and in the implementation of new goods, services or processes significantly improved, of new orhanizational methods and new marketing techniques.

Who should answer to this chapter?

Persons working in the Human Ressources area, with access to personnel information.

IV-1 Please indicate the average number number of employees that were working in the enterprise in the period 2012-2013, and the average number of them working (full or part-time)in the activities object of the survey, according to the maximum level of education reached .

	Total number of employees		Total personnel in scientific and innovation activities	
Maximun level of education reached	2012	2013	2012	2013
1. Doctorate	IV1R1C1	IV1R1C2	IV1R1C3	IV1R1C1
2. Magister	IV1R2C1	IV1R2C2	IV1R2C3	IV1R2C4
3. Specialization	IV1R3C1	IV1R3C2	IV1R3C3	IV1R3C4
4. Professional	IV1R4C1	IV1R4C2	IV1R4C3	IV1R4C4
5. Technologist	IV1R5C1	IV1R5C2	IV1R5C3	IV1R5C4
6. Technician	IV1R6C1	IV1R6C2	IV1R6C3	IV1R6C4
7. Secondary school	IV1R7C1	IV1R7C2	IV1R7C3	IV1R7C4
8. Primary school	IV1R8C1	IV1R8C2	IV1R8C3	IV1R8C4
9. Industrial Prodessional Training-SENA	IV1R9C1	IV1R9C2	IV1R9C3	IV1R9C4
10. None	IV1R10C1	IV1R10C2	IV1R10C3	IV1R10C4
TOTAL EMPLOYMENT	IV1R11C1	IV1R11C2	IV1R11C3	IV1R11C4

IV-2 Please indicate the average figures of employees who participated in STIA of your enterprise in the period 2012-2013, (IV-1) according to the department where these activities took place.

Department	2012	2013	Department	2012	2013	Department	2012	2013
1 .Amazonas	IV2R1C1	IV2R1C2	12.Cesar	IV2R1C3	IV2R1C4	23.N. de Santander	IV2R1C5	IV2R1C6
2. Antioquia	IV2R2C1	IV2R2C2	13.Choco	IV2R2C3	IV2R2C4	24.Putumayo	IV2R2C5	IV2R2C6
3. Arauca	IV2R3C1	IV2R3C2	14.Cordoba	IV2R3C3	IV2R3C4	25.Quindio	IV2R3C5	IV2R3C6
4. Atlantico	IV2R4C1	IV2R4C2	15.Cundinamarca	IV2R4C3	IV2R4C4	26.Risaralda	IV2R4C5	IV2R4C6
5. Bogota D.C.	IV2R5C1	IV2R5C2	16.Guania	IV2R5C3	IV2R5C4	27.S. Andres y Prov.	IV2R5C5	IV2R5C6
6. Bolívar	IV2R6C1	IV2R6C2	17.Guaviare	IV2R6C3	IV2R6C4	28.Santander	IV2R6C5	IV2R6C6
7. Boyaca	IV2R7C1	IV2R7C2	18.Huila	IV2R7C3	IV2R7C4	29.Sucre	IV2R7C5	IV2R7C6
8. Caldas	IV2R8C1	IV2R8C2	19.La Guajira	IV2R8C3	IV2R8C4	29.Tolima	IV2R8C5	IV2R8C6
9. Caqueta	IV2R9C1	IV2R9C2	20.Magdalena	IV2R9C3	IV2R9C4	30.Valle del Cauca	IV2R9C5	IV2R9C6
10.Casanare	IV2R10C1	IV2R10C2	21.Meta	IV2R10C3	IV2R10C4	31.Vichada	IV2R10C5	IV2R10C6
11.Cauca	IV2R11C1	IV2R11C2	22.Nariño	IV2R11C3	IV2R11C4	Total (sum 1 to 31)	IV2R11C5	IV2R11C6

IV.3 Please indicate dthe average number of employees with certification of laboral capabilities associated tith tha main activities develpped by the enterprise.

2012	2013

IV3R1C1	IV3R1C2	

IV-4 Please indicate the average number of employees participating in scientific,technological and innovation activities in 2013 by funcional areas and **gender**. .

(The higher education levels are: professional technician, technologist, university undergraduate, specialist, master and doctor)

Functional areas	Men	Women	Total
1. General direction	IV4R1C1	IV4R1C2	IV4R1C3
2. Management	IV4R2C1	IV4R2C2	IV4R2C3
3. Marketing and sales	IV4R3C1	IV4R3C2	IV4R3C3
4. Production	IV4R4C1	IV4R4C2	IV4R4C3
5. Accounting and finance	IV4R5C1	IV4R5C2	IV4R5C3
6. Research and development	IV4R6C1	IV4R6C2	IV4R6C3
Please detail in the following 4 groups the employees in R&D including external consultants			
6.1 Researchers	IV4R7C1	IV4R7C2	IV4R7C3
6.2 Trainees or asistants in R&D	IV4R8C1	IV4R8C2	IV4R8C3
6.3 Technicians in R&D	IV4R9C1	IV4R9C2	IV4R9C3
6.4 Auxiliary or administrative staff in R&D	IV4R10C1	IV4R10C2	IV4R10C3
Total personnel in STIA (Categories 1 to 6)	IV4R11C1	IV4R11C2	IV4R11C3

IV-5 Please indicate the average number of employees in 2012 whose maximum level of education correponds to categories 1 to 6 in question IV.1, according to area of higher education and gender.

Area of studies	Men	Women	Total
1. Exact sciences			
Includes Physics, Chemistry, Mathematics, Statistics and associated	IV5R1C1	IV5R1C2	IV5R1C3
2. Natural sciences			
Includes Biology, Microbiology, Biotechnology and associated	IV5R2C1	IV5R2C2	IV5R2C3
3. Health sciences			
Includes Bacteriology, Nursing, Chirurgical Instrumentation, Medicine, Nutrition ans Dietetics, Optometrics, Dentistry, Public Health, Therapy and related.	IV5R3C1	IV5R3C2	IV5R3C3
4. Engineering, Architecture, Urbanism and related			
Includes Architecture, Urbanism, Engineering (Agricultural, Forestry, Agro-industrial,Environmental, Food Science, Sanitation, Civil, Bio-medical, Systems, Mining)	IV5R4C1	IV5R4C2	IV5R4C3
5. Agronomy, Veterenary and related			
Includes Agronomy, Veterenary, Animal Science and related	IV5R5C1	IV5R5C2	IV5R5C3
6. Social sciences			
Includes: Economics, Management, Accounting, Political Science, International Relations, Social Communication, Journalism, Law, Army and Police Education, Sociology	IV5R6C1	IV5R6C2	IV5R6C3
7. Human Sciences and Fine Arts			
Includes: Languages, Literature, Anthropology, Visual Arts, Library Science, Sport, Physical Education, Design	IV5R7C1	IV5R7C2	IV5R7C3

Total employees with high educational level involved in STIA	IV5R8C1	IV5R8C2	IV5R8C3

IV.6 If your enterprise invested in specialized education and training (your answer was more than 0 in option 9, question II.1) for 2011 or 2012, please indicate the number of persons who received this education or training (given or financed) in years 2011 and 2012.

	Number of persons trained	
	2012	2013
1. Doctorado. Academic program oriented toward a title (Ph.D) related to scientific, technological and innovarion activities realized in the enterprise.	IV6R1C1	IV6R1C2
2. Masters degree. Academic program orientyed to a Masters Degree(MSc, MA), related to scientific, technological and innovarion activities realized in the	IV6R2C1	IV6R2C2
3. Specialized training . Activity inside or outside the enterprise, with a duration of 40 hours or more, related to scientific, technological and innovarion activities realized in the enterprise.	IV6R3C1	IV6R3C2
Total personnel trained or financed	IV6R4C1	IV6R4C2

CHAPTER V- RELATIONSHIP WITH PARTICIPANTS OF THE NATIONAL SYSTEM FOR SCIENCE, TECHNOLOGY AND INNOVATION AND RELATED COOPERATION (2012-2013)

The National System for Science, Technology and Innovation (SNCTI) is an open system including the policies, strategies, programs, methodologies and mechanisms, for managing, promoting, financing and disseminating the scientific research and the technological innovation. It also intends to support the organizations (public, private or mixed) that develop or promote this kind of activities.

Developping scientific, technological and innovative activities inside the enterprise depends, to a great extent, on the diversity and type of relations established with other organizations (public or private), and on the degree of use of specialized information for developpers of new ideas that help in the implementation of innovations. These relations may be established with sources **inside** or **outside** the enterprise.

Who should answer to this chapter?

Persons in charge of Innovation Projects Management, acquainted with information on agreements (contractual or not) with other acting enterprises

V.1 Which of the following sources of information were conductive for developping or implementing innovations on goods, services, processes, or to significantly improved them in 2012-2013 in your enterprise. If the answer is YES for sources extenal to the enterprise (9-32) please precise if it is a national or foreign source.

Internal sources of the enterprise

1. R & D internal Department	V1R1C1	YES ◯	NO ◯
2. Production Department	V1R2C1	YES ◯	NO ◯
3. Sales and Marketing Department	V1R3C1	YES ◯	NO ◯
4. Other Department in the enterprise	V1R4C1	YES ◯	NO ◯
5. Multi-disciplinary groups	V1R5C1	YES ◯	NO ◯
6. Enterprise staff	V1R6C1	YES ◯	NO ◯
7. Other related enterprise of the same group	V1R7C1	YES ◯	NO ◯
8. Foreign Enterprise headquarters	V1R8C1	YES ◯	NO ◯

Sources external to the enterprise				Origin: Domestic	Origin: Foreign		
9. R & D Deparment of other enterprise in the same sector	V1R9C1	YES ◯	NO ◯	◯	◯	V1R9C2	V1R9C3
10. Competitors or other enterprises in the same sector (except the R&D Department)	V1R10C1	YES ◯	NO ◯	◯	◯	V1R10C2	V1R10C3
11. Clients	V1R11C1	YES ◯	NO ◯	◯	◯	V1R11C2	V1R11C3
12. Suppliers	V1R12C1	YES ◯	NO ◯	◯	◯	V1R12C2	V1R12C3
13. Enterprises in other sectors	V1R13C1	YES ◯	NO ◯	◯	◯	V1R13C2	V1R13C3
14. Sectoral groups or associations	V1R14C1	YES ◯	NO ◯	◯	◯	V1R14C2	V1R14C3
15. Chambers of Commerce	V1R15C1	YES ◯	NO ◯	◯	◯	V1R15C2	V1R15C3
16. Technological Development centers	V1R16C1	YES ◯	NO ◯	◯	◯	V1R16C2	V1R16C3
17. Research centers	V1R17C1	YES ◯	NO ◯	◯	◯	V1R17C2	V1R17C3
18. Business incubators technologically oriented	V1R18C1	YES ◯	NO ◯	◯	◯	V1R18C2	V1R18C3
19. Technological parks	V1R19C1	YES ◯	NO ◯	◯	◯	V1R19C2	V1R19C3
20. Regional Productivity Centers	V1R20C1	YES ◯	NO ◯	◯	◯	V1R20C2	V1R20C3
21. Universities	V1R21C1	YES ◯	NO ◯	◯	◯	V1R21C2	V1R21C3
22. Training and technoparks (SENA)	V1R22C1	YES ◯	NO ◯	◯	◯	V1R22C2	V1R22C3
23. Experts and consultants	V1R23C1	YES ◯	NO ◯	◯	◯	V1R23C2	V1R23C3
24. Fairs and exhibitions	V1R24C1	YES ◯	NO ◯	◯	◯	V1R24C2	V1R24C3
25. Seminars and conferences	V1R25C1	YES ◯	NO ◯	◯	◯	V1R25C2	V1R25C3

26. Books, mmagazines, catalogues	V1R26C1	YES	NO		V1R26C2	V1R26C3
27.Industrial property systems of information	V1R27C1	YES	NO		V1R27C2	V1R27C3
28.Intellectual property information systems	V1R28C1	YES	NO		V1R28C2	V1R28C3
29. Internet	V1R29C1	YES	NO		V1R29C2	V1R29C3
30. Science and technology databases	V1R30C1	YES	NO		V1R30C2	V1R30C3
31. Standards and technical rules	V1R31C1	YES	NO		V1R31C2	V1R31C3
32.Public institutions(ministries,secretaries..	V1R32C1	YES	NO		V1R32C2	V1R32C3

V.2 Please indicate if your enterprise had any relationship with any of the following scientific organizations in the 2011-2012 period

Relations supporting scientific, technological and innovation activities including: information exchange on policies, strategies, support, transfer of knowledge, consultancy, tutoring, financing, and joint-venture initiatives

1. COLCIENCIAS	V2R1C1	YES	NO
2. SENA	V2R2C1	YES	NO
3. ICONTEC	V2R3C1	YES	NO
4. Commerce and Trade Superintendency	V2R4C1	YES	NO
5. National Direction of Intellectual Property	V2R5C1	YES	NO
6. Ministries	V2R6C1	YES	NO
7. Universities	V2R7C1	YES	NO
8. Technological Development Center	V2R8C1	YES	NO
9. Research Centers	V2R9C1	YES	NO
10. Business incubators technologically oriented	V2R10C1	YES	NO
11.Technological parks	V2R11C1	YES	NO
12. Regional Productivity Centers	V2R12C1	YES	NO
13. Science and Technology Departmental Councils	V2R13C1	YES	NO
14. Regional Commission for Competitivity	V2R14C1	YES	NO
15. Sectoral associations and Chambers of Commerce	V2R15C1	YES	NO
16. Consultants on Innovation & Technological Dvpmt	V2R16C1	YES	NO
17. PROEXPORT	V2R17C1	YES	NO

V.3 Did your enterprise cooperated with any of the following types of partners for implementing Scientific, Technological and innovation activities in 2012-2013? In your answer is yes please indicate the reason of the cooperation.

Partner type		Purpose of the cooperation							
		R & D	Machinery & equipment acquisition	TICS	Innovation marketing	Tecgnology Transfer	Technical assistance and consultancy	Engineering & industrial design	Training & specialized education
1.Other enterprises (same group)	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
2.Suppliers	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
3.Clients	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
4.Competitors	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
5.Consultants	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
6. Universities	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
Development Centers	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
8.Automous research centers	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
9.Technological parks	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
10.Regional Competitive Centers	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯
11. International organizations	YES ◯ NO ◯	◯	◯	◯	◯	◯	◯	◯	◯

V3R1C1	V3R1C2	V3R1C3	V3R1C4	V3R1C5	V3R1C6	V3R1C7	V3R1C8	V3R1C9
V3R2C1	V3R2C2	V3R2C3	V3R2C4	V3R2C5	V3R2C6	V3R2C7	V3R2C8	V3R2C9
V3R3C1	V3R3C2	V3R3C3	V3R3C4	V3R3C5	V3R3C6	V3R3C7	V3R3C8	V3R3C9
V3R4C1	V3R4C2	V3R4C3	V3R4C4	V3R4C5	V3R4C6	V3R4C7	V3R4C8	V3R4C9
V3R5C1	V3R5C2	V3R5C3	V3R5C4	V3R5C5	V3R5C6	V3R5C7	V3R5C8	V3R5C9
V3R6C1	V3R6C2	V3R6C3	V3R6C4	V3R6C5	V3R6C6	V3R6C7	V3R6C8	V3R6C9
V3R7C1	V3R7C2	V3R7C3	V3R7C4	V3R7C5	V3R7C6	V3R7C7	V3R7C8	V3R7C9
V3R8C1	V3R8C2	V3R8C3	V3R8C4	V3R8C5	V3R8C6	V3R8C7	V3R8C8	V3R8C9
V3R9C1	V3R9C2	V3R9C3	V3R9C4	V3R9C5	V3R9C6	V3R9C7	V3R9C8	V3R9C9
V3R10C1	V3R10C2	V3R10C3	V3R10C4	V3R10C5	V3R10C6	V3R10C7	V3R10C8	V3R10C9
V3R11C1	V3R11C2	V3R11C3	V3R11C4	V3R11C5	V3R11C6	V3R11C7	V3R11C8	V3R11C9

CHAPTER VI- INTELLECTUAL PROPERTY, QUALITY CERTIFICATIONS, TECHNICAL STANDARDS AND TECHNICAL RULES IN THE PERIOD 2012-2013

Who should answer to this chapter?

A person acquainted with intellectual property concepts, patents, authorship rights, copyrights

VI-1. For each one of the protection mechanisms listed below, please indicate if your enterprise was the holder of **valid** registrations in **December 2013**, and the number of them.

Intellectual property registrations

Total valid registrations in Dec. 2013

1. Patents of invention VI1R1C1 YES ◯ NO ◯ VI1R1C2

These titles protect all inventions, manufacturing processes, machines, devices, products, new solutions, fulfilling novelty, creativity and industrila applicability criteria. They are requested to the National Industrial Property Offices. In Colombia the Industry and Commerce Superintendency is the responsible entity.

2. Utility models VI1R2C1 YES ◯ NO ◯ VI1R2C2

These are titles protecting all new form, configuration or element disposition of a device, tool, instrument or a part of them, making possible a better or different operating condition, use or manufacturing of the object, bringinging about a technical effect or advantage that it did not have before and useful for the industry. They are requested to the National Industrial Property Offices. In Colombia the Industry and Commerce Superintendency is the responsible entity.

3. Authorship rights VI1R3C1 YES ◯ NO ◯ VI1R3C2

Title granted to the creators of art and litterary works. Among the written ones thereare poems, novels, drama; artworks as pantings, sculptures, films and choreographies, architectural works, and maps and technocal drawings. The inherent rights appears simoultaneosly with the work itsself but for legal security purposes and constitute probatory evidence, they may be registered in the National Office of Authors' Rights.In Colombia the responsible entity is the National Direction for Authors' Rights, a Special Unit of the Ministry of the Interior. Registers for software are excluded.

4. Software registrations VI1R4C1 YES ◯ NO ◯ VI1R4C2

Titles protecting, under the modalitry of Authors Rights, the applicatives and computer systems, that may be part of a computer or of other device. As with the other Authors' Rights they are registered at the national offices in charge. In Colombia the responsible entity is the National Direction for Authors' Rights.

5. Industrial design registrations VI1R5C1 YES ◯ NO ◯ VI1R5C1

Titles protecting all external forms or aesthetical appearance of functional or decorative elements serving as models or patterns for manufacturing or craft production. The requests are presented to the national offices for industrial property. In Colombia the responsible id the Industry and Commerce Superintendency.

6. Trademarks and copyrights VI1R6C1 YES ◯ NO ◯ VI1R6C2

Title s for protecting marks, slogans, and denominations of origin. The requests are The requests are presented to the national offices for industrial property. In Colombia the responsible id the Industry and Commerce Superintendency.

7. Cert. of vegetal varieties developer VI1R7C1 YES ◯ NO ◯ VI1R7C2

Titles protecting the improvements of vegetal varieties used in agriculture. This may include better yields and a better resistance to plagues and diseases. Requests are presented to the national offices of vegetal developments. In Colombia, this entity is the Colombian Agriculture Institute (ICA).

Total number of valid intelectual property registrations, December 2013 VI1R8C2

VI-2 Please indicate if your enterprise obtained intellectual property protection rights in the period 2012-2013 through any of the following methods and specify the number of them.

Intellectual property registrations obtained in the period 2012-2013 (see definitions in VI-1)

1. Patents of invention	VI2R1C1	YES ◯	NO ◯	VI2R1C2
2. Patents of utility models	VI2R2C1	YES ◯	NO ◯	VI2R2C2
3. Authorship rights	VI2R3C1	YES ◯	NO ◯	VI2R3C1
4. Software registrations	VI2R4C1	YES ◯	NO ◯	VI2R4C2
5. Industrial design registrations	VI2R5C1	YES ◯	NO ◯	VI2R5C2
6. Trademarks and copyrights	VI2R6C1	YES ◯	NO ◯	VI2R6C2
7. Certification of vegetal varieties developer	VI2R7C1	YES ◯	NO ◯	VI2R7C2
Total number of intelectual property registrations obtained in the period 2012-2013				VI2R8C2

VI-3 Please indicate, for each one of the following options, if your enterprise has made use of any of those protection methods and the number of times you did during 2012-2013.

Other protection methods

1. Industrial secret VI3R1C1 YES ◯ NO ◯ VI3R1C2

It is any information, legally owned by a person or organization, that may be used in a productive activity (industrial or commercial) and may be tranfered to a third party.

2. Highly complex design VI3R2C1 YES ◯ NO ◯ VI3R2C2

The enterprise may strategically develop, sketches, preliminar drawings or prototypes for describing ideas or objects of high industrial or commercial value, and using such design techniques that make difficult for competitors their copy or reproduction.

3. Confidentiality agreements (enterprises) VI3R3C1 YES ◯ NO ◯ VI3R3C2

By means of these instruments, two or more enterprises agree to keep an information as confidential, and do not disseminate, use or exploit the information made accesible to them by contract or by the implementation of a task. Please report the different ***type*** of agreements and not the number of times that you have suscribed the same agrement

4. Confidentiality agreements (employees) VI3R4C1 YES ◯ NO ◯ VI3R4C2

By means of these instruments, two or more parties agree to keep an information as confidential, and do not disseminate, use or exploit the information made accesible to them by contract or by the implementation of a task. Please report the different ***type*** of agreements and not the number of times that you have suscribed the same agrement

Total of other protection methods used in the 2012-2013 period VI3R5C2

VI-4 Did your enterprise have the intention to request intellectual property registrations in 2012-2013?

VI4R1C1 YES ◯ NO ◯

VI-5 Please report how important were the following obstacles for obtaining or for requesting intellectual property registration in 2012-2013?

		Level of importance		
		High	Medium	None
1. Lack of information on benefits or requirements	VI5R1C1	◯	◯	◯
2. Difficulties with fulfilling requisites or completing procedures	VI5R2C1	◯	◯	◯
3. Time consuming procedures	VI5R3C1	◯	◯	◯
4. Low capacity of the registrations to protect intellectual property	VI5R4C1	◯	◯	◯

5. The cost/benefit ratio is not attractive	VI5R5C1	◯	◯	◯
6. There is not a generation of innovating ideas	VI5R6C1	◯	◯	◯

VI.6 Did your enterprise get quality processes certifications, during 2012-2013? If your answer is YES, please indicate how many (i.e if you got 2 processes with ISO-14040 and one process with ISO-9001 you must register 3 certifications)

			Number of certifications
YES ◯	NO ◯	VI6R1C1	VI6R1C2

VI.7 Did your enterprise obtain get product quality certifications, during 2012-2013? If your answer is YES, please indicate how many (i.e if have 2 product with ISO-9000 you must register 2 certifications)

			Number of certifications
YES ◯	NO ◯	VI7R2C2	VI7R1C2

VI.8 Are the good or services produced by your enterprise in 2011-2012 subject to fulfill technical requirements?

YES ◯ NO ◯ VI8R1C1

VI.9 Please indicate the level of importance that the following aspects had for obtaining quality certifications of process or product during 2011-2012:

		Level of importance		
		High	Medium	None
1. Generation of innovating ideas	VI9R1C1	◯	◯	◯
2. Increse in productivity	VI9R2C1	◯	◯	◯
3. More access to domestic markets	VI9R3C1	◯	◯	◯
4. More access to international markets	VI9R4C1	◯	◯	◯
5. More technological update	VI9R5C1	◯	◯	◯
6. More technological transfer to the enterprise	VI9R6C1	◯	◯	◯
7. Improved relations (other enterprises of the sector)	VI9R7C1	◯	◯	◯

Source : DANE-DIMPE

Annex 2. Presentation letter (format)

COMMERCIAL NAME OF THE ENTERPRISE
MAIL ADDRESS (Headquarters)
Telephone
City

Gentlemen:

Within the modernization of its statistical research activities and with the aim of offering useful information for decision making in the economic environment of the country, DANE develops a biennial survey of the different development and technological innovation activities of the manufacturing and commercial sector. This survey purpose is to characterize the dynamics of technological changes and to analyze the innovation and technological development within manufacturing and commercial enterprises in Colombia, as well as the evaluation of public policy instruments, both in promoting and protecting innovation.

In order to carry out this task, we count on your valuable cooperation by adequately completing the research form. In order to facilitate your work and to improve the quality and timeliness of the results, DANE has developed a system so that the companies render the information by means of an electronic form. You can access it as of the [day, month, and year] by means of our webpage: www.dane.gov.co, through the following route: "BUSCAR INVESTIGACION/ Encuesta de Desarrollo e Innovación - EDIT/ Formulario electrónico Industria", using the following user name and password assigned to your enterprise:

USER NAME: USER ACCORDING TO REGISTER
PASSWORD: PASWORD ACCORDING TO REGISTER

Data provided to DANE have confidential character and enjoy of statistical reserve; consequently this password is not for public use, and should be known only by the person that your enterprise authorizes for the completion of the form; **we strongly recommend its change through system, after accessing electronic form for the first time.**

For any additional explanation, please call (Phone Number of the Regional Direction- Extension of the Responsible person) or (Phone and Extension of the Responsible in Bogotá Headquarters).

Sincerely,

_____

Regional Director or Responsible of the Survey

Annex 3. Profiles used in the staff selection stage

Poll-Supervisor:

Technology title in economics, business administration, financial administration, accounting, statistics, foreign trade, finance and international business, financial engineering, finance, project formulation, public administration, public accounting, marketing engineering, human resources management, cost and auditing, industrial engineering, systems engineering, food engineering, chemical engineering, mechanical engineering, electrical engineering, electronics engineering, industrial systems, and six months of related experience.

Equivalence 1. - Technical vocational title in the above mentioned specialties and 9 months of related experience.
E**quivalence 2**. - Four semesters of university education in the above mentioned specialties and one year of related experience.

Field coordinator:

University education ended (academic curricula completed) in economics, business administration, financial administration, accounting, statistics, foreign trade, finance and international business, financial engineering, finance, project formulation, public administration, public accounting, marketing engineering, human resources management, cost and auditing, industrial engineering, systems engineering, food engineering, chemical engineering, mechanical engineering, electrical engineering, electronics engineering, industrial systems, and six months of related experience.

Equivalence 1. - Eight semesters approved in the above mentioned specialties and 18 months of related experience.
Equivalence 2.- Technology title in the above mentioned specialties and two years of related experience.
Equivalence 3. - Technical vocational title in the above mentioned specialties and three years of related experience.