

# Firm-level Adoption of Technology Survey

The World Bank

2019

## INTRODUCTION

This survey is being conducted by \_\_\_\_\_ on behalf of \_\_\_\_\_.

The goal of this survey is to gather information about technologies adopted by firms in **Senegal**. The information gathered here will help the World Bank to develop new policies and programs that enhance employment, economic growth and shared prosperity.

The information obtained here will be anonymized. Neither your name nor the name of your business will be used in any document based on this survey.

**INTERVIEWER: WE DEFINE TECHNOLOGY AS MACHINERY, EQUIPMENT, SOFTWARE, OR PROCESS USED BY THE FIRM TO PRODUCE SOMETHING.**

Structure of the questionnaire

- A. GENERAL INFORMATION AND FIRM CHARACTERISTICS
- B. GENERAL BUSINESS FUNCTIONS
- C. SECTOR SPECIFIC TECHNOLOGIES
- D. DRIVERS AND BARRIERS FOR ADOPTION
- E. BALANCE SHEET AND PERFORMANCE

# Firm-level Adoption of Technology Survey

## The World Bank

Frame level

FIELDWORK SUPERVISORS AND MANAGEMENT ARE RESPONSIBLE FOR THE ACCURACY OF THIS SECTION.

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### INFORMATION ACQUIRED PRIOR TO SCREENING:

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<b>Sampling Information [CODES FROM WBG PROGRESS REPORT]</b>	
Sampling sector	<b>s1a</b>
Sampling size	<b>s1b</b>
Sampling location	<b>s1c</b>

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### COVER [TO BE COMPLETED FROM SCREENER BEFORE INTERVIEW]

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<b>Screener Information</b>	
Screener sector	<b>s6a</b>
Module	<b>s5</b>
Screener region	<b>s2e</b>
Name of City/town/village	<b>s2d</b>
Screener size	<b>s7</b>
Multi-establishment firm	<b>s4</b>
Language	<b>s2j</b>

**QUESTIONS BEGIN HERE**

**A. CONTROL AND GENERAL INFORMATION**

TO BE COMPLETED AT THE TIME OF THE INTERVIEW  
TO BE MERGED WITH THE SCREENING QUESTIONNAIRE

<b>GPS COORDINATES</b>	Degrees North (Latitude)	<b>lat</b>
	Degrees East (Longitude)	<b>lon</b>

**A.1 Time face-to-face interview begins:**

<b>Day (dd)</b>	<b>Month (mm)</b>	<b>Year (yyyy)</b>	<b>Hour (00 to 23)</b>	<b>Minutes (00 to 59)</b>
<b>a1a</b>	<b>a1b</b>	<b>a1c</b>	<b>a1d</b>	<b>a1e</b>

<b>A.2</b>	On which calendar date did the last completed fiscal year end?
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<b>Year</b>	<b>Month</b>	<b>Day</b>
<b>a2a</b>	<b>a2b</b>	<b>a2c</b>

**READ OUT THE FOLLOWING INTRODUCTORY SENTENCE ONLY IF s4= 1 (yes):**  
**The first few questions apply to the firm which this establishment is part of.**

**A.3 Ownership**

What percentage of this firm is owned by each of the following:  SHOW CARD 1	<b>Share</b>	<b>DON'T KNOW (SPONTANEOUS)</b>
Private domestic individuals, companies or organizations	<b>a3a%</b>	<b>-9</b>
Private foreign individuals, companies or organizations	<b>a3b%</b>	<b>-9</b>
Government or state	<b>a3c%</b>	<b>-9</b>
Other	<b>a3d%</b>	<b>-9</b>
	<b>100%</b>	

INTERVIEWER: CHECK THAT TOTAL SUMS TO 100% (UNLESS DON'T KNOW)

Question	Variable	Answer	
Is this a shareholding company with shares publicly traded in the stock market? <b>SKIP: IF a4a =1 GO TO a4c</b>	<b>a4a</b>	1 = Yes 2 = No	-9 = Don't know
Is this firm owned by the founder or someone of her/his family?	<b>a4b</b>	1 = Yes. By the founder. 2 = Yes. By the founder's family (2nd generation or more) 3 = No -9 = Don't know -7 = Not applicable	

Is the founder or her/his family member also the top manager?	<b>a4c</b>	1 = Yes. The founder. 2 = Yes. A founder's family member (2nd generation or more) 3 = No -9 = Don't know -7 = Not applicable	
Is the largest owner of the firm also the top manager?	<b>a4d</b>	1 = Yes 2 = No	-9 = Don't know
Amongst the owners of the firm, are there any females?	<b>a4e</b>	1 = Yes 2 = No	-9 = Don't know
What percentage of the firm is owned by females? <b>CONDITION: ASK ONLY IF a4e=1</b>	<b>a4f</b>	(share) Percentage of female ownership	-9 = Don't know

**READ ONLY IF s4=1 (yes)**  
**I want to proceed by asking you about this establishment only.**

<b>A5</b>	Over the year [2018], please tell me what type of product or service represents this establishment's greatest share of annual sales?  <b>INTERVIEWER: PLEASE RECORD THE DESCRIPTION OF THE ACTIVITY AND PRODUCT IN DETAIL, FOR EXAMPLE, "RETAIL SALE OF WOMEN'S OUTDOOR CLOTHING" NOT JUST "CLOTHING".</b>
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	<b>a5a</b>	<b>DETAILED DESCRIPTION OF MAIN ACTIVITY AND PRODUCT</b>	<b>a5c</b> What sector specific questionnaire should be used ?  <b>IF a5c IS DIFFERENT FROM s6b, PLEASE DOUBLE CHECK THE INFORMATION.</b>  <b>CONDITION:</b> <b>IF a5c=0 SKIP SECTION C.</b>
Agriculture (except Livestock)	1	<b>a5b</b>	1
Livestock	2		2
Food Processing	3		3
Wearing apparel	4		4
Motor vehicles	5		5
Pharmaceuticals	6		6
Wholesale or retail	7		7
Financial services	8		8
Land transport	9		9

Health services	10		10
Other manufacturing	101		0
Other Services or Construction	102		0

Question	Variable	Answer
In what year did this establishment begin operations?	<b>a6</b>	(year) Year the establishment began operations -9 = Don't know

INTERVIEWER: PROVIDE FOUR DIGITS FOR YEAR

Question	Variable	Answer
How many years of experience working in this sector does the Top Manager have?	<b>a7a</b>	(Number of years) 1 = If less than a year -9 = Don't know
Is the Top Manager female?	<b>a7b</b>	1 = Yes 2 = No -9 = Don't know
What is the highest level of education of the Top Manager? SHOW CARD 2	<b>a7c</b>	1 = Primary school 2 = Secondary school 3 = Complete high-school 4 = College degree 5 = Post-Graduation (MBA, Master or PhD) -9 = Don't know
Did the Top Manager study abroad for more than a month?	<b>a7d</b>	1 = Yes 2 = No -9 = Don't know

## B. GENERAL BUSINESS FUNCTIONS

### READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:

The next topic to be covered is about use of water, electricity, telecommunications, and internet for business purpose.

### TECHNOLOGY ENABLERS

#### B.1 Use of electrical energy

Does this establishment have <b>an</b> electrical connection from the grid? [SKIP: IF <b>b1a</b> =2 OR <b>b1a</b> =-9, GO TO <b>b2a</b> ]	<b>b1a</b> 1 = Yes 2 = No -9 = Don't know	
Over the year [2018] did this establishment experience power outages? [SKIP: IF <b>b1b</b> =2, GO TO <b>b2a</b> ]	<b>b1b</b> 1 = Yes 2 = No	
In a typical month, over the year [2018], how many power outages did this establishment experience?	<b>b1c</b> (Number of power outages in a typical month) 1 = Less than one per month -9 = Don't know	
How many hours did these power outages last on average?	<b>b1d</b> (Hours) -9 = Don't know	<b>b1e</b> (Min) 1 = Less than one minute -9 = Don't know

#### B.2 Use of generators

Over the year [2018], did this establishment own or share a generator? [SKIP: IF <b>b2a</b> =2 OR <b>b2a</b> =-9, GO TO <b>b2a</b> ]	<b>b2a</b> 1 = Yes 2 = No -9 = Don't know	
Over the year [2018], what percentage of this establishment's electricity came from a generator that the establishment owned or shared?	<b>b2b</b> (share %)	
What is the main source of energy used by this establishment owned or shared generator?  SHOW CARDS 3	<b>b2c</b> 1 = Solar power 2 = Fuel 3 = Grid or Battery-stored backup 4 = Wind power 5 = Other	

#### B.3 Mobile phone coverage

How many telephone landline does this establishment use for business purpose? INTERVIEWER: IT INCLUDES EQUIVALENT NUMBER OF LANDLINE SUBSCRIPTION PLANS PAID	<b>b3a</b> (number of telephone lines) -9 = Don't know
How many mobile phone lines does this establishment use for business purpose? INTERVIEWER: IT INCLUDES OWNED DEVICES AND COVERAGE PLANS PAID TO EMPLOYEES	<b>b3b</b> (number of cell phone lines) -9 = Don't know

### B.4 Computer coverage

How many desktop or laptop computers does this establishment use for business purpose? <b>INTERVIEWER: IT INCLUDES OWNED OR RENTED COMPUTERS</b>	<b>b4a</b> (number of computers) -9 = Don't know
How many tablets or smartphones does this establishment use for business purpose? <b>INTERVIEWER: IT INCLUDES OWNED OR RENTED DEVICES</b>	<b>b4b</b> (number) -9 = Don't know

### B.5 Internet service and coverage

Does this establishment have an Internet connection?	<b>b5a</b> YES = 1, NO = 2	
What is the fastest type of Internet connection does this establishment has?  SHOW CARDS 4	<b>b5b</b> 1 = Dial up 2 = DSL or Fiber 3 = Wireless or Satellite 4 = BPL 5 = Other	
In a typical month, over fiscal year [2018], how many times was the Internet service down in this establishment? [SKIP: IF <b>b5c</b> =0 OR <b>b5c</b> =-9, GO TO <b>b5f</b> ]	<b>b5c</b> (number of times) 1 = Less than one -100 = To many to count -9 = Don't know	
How many hours did the Internet service down last on average?	<b>b5d</b> (Hours) -9 = Don't know	<b>b5e</b> (Min) 1 = Less than one minute -9 = Don't know
At the present time, does this establishment have its own website?	<b>b5f</b> YES = 1, NO = 2 -9 = Don't know	
At the present time, does this establishment use an account on an online social media for business purpose?	<b>b5g</b> YES = 1, NO = 2 -9 = Don't know	
Does this establishment use cloud computer services for business purpose?	<b>b5h</b> YES = 1, NO = 2 -9 = Don't know	

### B.6 Water

Does this establishment have water connection to the network?	<b>b6a</b> YES = 1, NO = 2 -9 = Don't know
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**READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:**  
Now, we turn to questions about methods and procedures to perform general business functions

### TECHNOLOGY ADOPTION

### B.7 Self-evaluation on this establishment level of adoption

Question	Answer
In a scale from 1 to 10, where 10 means that the establishment is using the most advanced production processes available in its sector, where do you think this establishment stands with respect to:	
other firms in [ADD COUNTRY NAME]?	<b>b7a</b> score (1-10)
most advanced firms in the world?	<b>b7b</b> score (1-10)

### B.8 Business administration

Question: Does this establishment use any of the following methods for managing finance, accounting, and HR processes?	Variable	Answer	
Handwritten processes	<b>b8a1</b>	1 = Yes 2 = No	-9 = Don't know
Computers with standard software such as Excel or equivalent	<b>b8a2</b>	1 = Yes 2 = No	-9 = Don't know
Mobile Apps or digital platforms	<b>b8a3</b>	1 = Yes 2 = No	-9 = Don't know
Computers with specialized software	<b>b8a4</b>	1 = Yes 2 = No	-9 = Don't know
Enterprise Resource Planning (ERP) or equivalent software integrated with other back office functions	<b>b8a5</b>	1 = Yes 2 = No	-9 = Don't know
Other	<b>b8a6</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
What is the method used more often by this establishment for managing finance, accounting, and HR processes?  [CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b8a</b> VARIABLES] SHOW CARDS 5	<b>b8b</b>	1 = Handwritten processes 2 = Computers with standard software 3 = Mobile Apps or digital platforms 4 = Computers with specialized software 5 = Enterprise Resource Planning (ERP) 6 = Other -9 = Don't know

Question	Variable	Answer
For how many years has this establishment been using specialized or ERP software for managing HR processes, finance, and accounting? [CONDITION: ASK ONLY IF <b>b8a4=1</b> OR <b>b8a5=1</b> ]	<b>b8c</b>	(Number of years) 1= If less than a year -9 = Don't know

### B.9 Production or service operations planning

Question: Does this establishment use any of the following methods for production or service operations planning?	Variable	Answer	
Handwritten processes	<b>b9a1</b>	1 = Yes 2 = No	-9 = Don't know
Computers with standard software such as Excel or equivalent	<b>b9a2</b>	1 = Yes 2 = No	-9 = Don't know
Mobile Apps or digital platforms	<b>b9a3</b>	1 = Yes 2 = No	-9 = Don't know
Specialized software for production or service operations planning and demand forecast	<b>b9a4</b>	1 = Yes 2 = No	-9 = Don't know
Enterprise Resource Planning (ERP) software integrated with other administrative functions	<b>b9a5</b>	1 = Yes 2 = No	-9 = Don't know
Other	<b>b9a6</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
<p>What is the method used more often by this establishment for production planning?</p> <p>[CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b9a</b> VARIABLES]</p> <p>SHOW CARDS 7</p>	<b>b9b</b>	<p>1 = Handwritten production planning</p> <p>2 = Computers with standard software such as Excel or equivalent</p> <p>3 = Mobile Apps or digital platforms</p> <p>4 = Specialized software for production planning and demand forecast</p> <p>5 = Enterprise Resource Planning (ERP) integrated with other administrative functions</p> <p>6 = Other</p> <p>-9 = Don't know</p>

Question	Variable	Answer
<p>For how many years this establishment has been using a specialized software for production planning?</p> <p>[CONDITION: ASK THIS QUESTION ONLY IF <b>b9a4=1</b> OR <b>b9a5=1</b>]</p>	<b>b9c</b>	<p>(Number of years)</p> <p>1 = If less than a year</p> <p>-9 = Don't know</p>

### B.10 Sourcing, Procurement, and Supply Chain Management

Question	Variable	Answer
What is the procedure used more often by this establishment to select and	<b>b10a</b>	1 = Manual search of suppliers, including personal visit or phone calls, without stored supplier's information in centralized database.

manage suppliers and purchase materials and services?  SHOW CARDS 8		2= Management of supply chain information using PCs, manually updated (e.g. Microsoft Excel) 3 = Online social media, specialized Apps or digital platforms 4 = Supplier Relation Management (SRM) or other specialized software not integrated with production planning 5 = Supplier Relation Management (SRM) integrated with production planning 6 = Other -9 = Don't know
What procedure does this establishment use most often when searching for new employees or collaborators?  SHOW CARDS 9	<b>b10b</b>	1 = Direct reference from employees and colleagues face-to-face or using phone, Whatsapp, SMS or email 2 = Job search announcements in newspapers or magazines 3 = Use of job search online networks (e.g. LinkedIn, Xing,..) or digital platforms (e.g. Facebook) 4 = Job search announcements in their own website 5 = Recruitment agencies 6 = Other -9 = Don't know

### B.11 Marketing and product development

Question: Does this establishment uses any of the following methods to collect and analyze information from customers for marketing purposes or product development?	Variable	Answer	
Face-to-face chat	<b>b11a1</b>	1 = Yes 2 = No	-9 = Don't know
Online chat (e.g. Whatsapp or Internet)	<b>b11a2</b>	1 = Yes 2 = No	-9 = Don't know
Structured surveys by phone, face-to-face, online, or focus groups	<b>b11a3</b>	1 = Yes 2 = No	-9 = Don't know
Customer Relationship Management software (CRM) or equivalent specialized software	<b>b11a4</b>	1 = Yes 2 = No	-9 = Don't know
Big data Analytics or Machine learning algorithms (Artificial Intelligence) with Big Data	<b>b11a5</b>	1 = Yes 2 = No	-9 = Don't know
Other	<b>b11a6</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
What is the method used more often by this establishment to collect and analyze information from customers?	<b>b11b</b>	1= Face-to-face chat 2 = Online chat (e.g. Whatsapp or Internet)

<p>[CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b11a</b> VARIABLES]</p>	<p>3 = Structured customer surveys by phone, face-to-face, online, or focus groups  4 = Customer Relationship Management software (CRM) or other equivalent specialized software  5 = Big data Analytics or Machine learning algorithms (Artificial Intelligence) with Big Data  6 = Other  -9 = Don't know</p>
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Question	Variable	Answer
For how many years has this establishment been using a specialized software to analyze customer information? [CONDITION: ASK THIS QUESTION ONLY IF <b>b11a4=1 OR b11a5= 1</b> ]	<b>b11c</b>	(Number of years) 1 = If less than a year -9 = Don't know

**B.12 Fabrication [MANUFACTURING ONLY]**

[CONDITION: ASK B.12 QUESTIONS ONLY IF **a5a=3 OR a5a=4 OR a5a=5 OR a5a=6 OR a5a = 11 or a5a = 101**]

Question: Does this establishment use any of the following processes for assembling and production? SHOW CARDS 10	Variable	Answer	
Manual processes	<b>b12a1</b>	1 = Yes 2 = No	-9 = Don't know
Machines controlled by operators without computers	<b>b12a2</b>	1 = Yes 2 = No	-9 = Don't know
Computer numerical controlled machine or other machines controlled by computers	<b>b12a3</b>	1 = Yes 2 = No	-9 = Don't know
Robots	<b>b12a4</b>	1 = Yes 2 = No	-9 = Don't know
Additive manufacturing including rapid prototyping and 3D printers	<b>b12a5</b>	1 = Yes 2 = No	-9 = Don't know
Other advanced manufacturing processes (e.g. as laser, plasma sputtering, high speed machine, E-beam, micromachining)	<b>b12a6</b>	1 = Yes 2 = No	-9 = Don't know
Other	<b>b12a7</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
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<p>What is the assembling and production process used more often by this establishment?</p> <p>[CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b12a</b> VARIABLES]</p>	<b>b12b</b>	<p>1 = Manual processes</p> <p>2 = Machines controlled by operators without computers</p> <p>3 = Computer numerical controlled machine or other machines controlled by computers</p> <p>4 = Robot(s)</p> <p>5 = Additive manufacturing/3D printers</p> <p>6 = Other advanced manufacturing</p> <p>7 = Other</p> <p>-9 = Don't know</p>
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Question	Variable	Answer
<p>For how many years has this establishment been using computer numerical controlled machine, robots, 3D printers, or other advanced manufacturing?</p> <p>[CONDITION: ASK THIS QUESTION ONLY IF <b>b12a3=1 OR b12a4=1 OR b12a5=1 OR b12a6=1</b>]</p>	<b>b12c</b>	<p>(Number of years)</p> <p>1 = If less than a year</p> <p>-9 = Don't know</p>

### B.13 Sales methods

Question:	Variable	Answer	
Does this establishment sell some or all of its products directly to final consumers?	<b>b13a</b>	1 = Yes 2 = No	-9 = Don't know

Question: Does this establishment use any of the following sale methods? SHOW CARDS 11	Variable	Answer	
Sales at the establishment's premises	<b>b13b1</b>	1 = Yes 2 = No	-9 = Don't know
Sales by phone, email orders, or sales representatives	<b>b13b2</b>	1 = Yes 2 = No	-9 = Don't know
Sales through social media platforms or apps	<b>b13b3</b>	1 = Yes 2 = No	-9 = Don't know
Online sales using external digital platforms (ex. Amazon, eBay, Alibaba)	<b>b13b4</b>	1 = Yes 2 = No	-9 = Don't know
Online sales (e-commerce) using its own website	<b>b13b5</b>	1 = Yes 2 = No	-9 = Don't know
Electronic orders integrated to specialized supply chain management systems	<b>b13b6</b>	1 = Yes 2 = No	-9 = Don't know
Others	<b>b13b7</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
What is the sale method used more often by this establishment?  [CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b13b</b> VARIABLES]	<b>b13c</b>	1 = Direct sales at the establishment's premises 2 = Direct sales by phone, email orders, or sales representatives 3 = Sales through social media platforms or apps 4 = On line sales using external digital platforms 5 = On line sales using using its own website 6 = Electronic orders 7 = Other -9 = Don't know

Question	Variable	Answer
For how many years has this establishment been using online sales or electronic orders? [CONDITION: ASK THIS QUESTION ONLY IF <b>b13b4=1</b> OR <b>b13b5=1</b> OR <b>b13b6=1</b> ]	<b>b13d</b>	(Number of years) 1 = If less than a year -9 = Don't know

Question: What is the share of sales of this establishment by this method?	Variable	Answer
Online sales using external digital platforms (ex. Amazon, eBay, Alibaba) [CONDITION: ASK THIS QUESTION ONLY IF <b>b13b4=1</b> ]	<b>b13e1</b>	(Share) -9 = Don't know
Online sales (e-commerce) using its own website [CONDITION: ASK THIS QUESTION ONLY IF <b>b13b5=1</b> ]	<b>b13e2</b>	(Share) -9 = Don't know
Electronic orders integrated to specialized supply chain management systems [CONDITION: ASK THIS QUESTION ONLY IF <b>b13b6=1</b> ]	<b>b13e3</b>	(Share) -9 = Don't know

#### B.14 Payment methods

Question: Does this establishment use any of the following payment methods? SHOW CARDS 12	Variable	Answer
Exchange of goods	<b>b14a1</b>	1 = Yes 2 = No -9 = Don't know

Cash	<b>b14a2</b>	1 = Yes 2 = No	-9 = Don't know
Cheque, voucher, or bank wire at the branch	<b>b14a3</b>	1 = Yes 2 = No	-9 = Don't know
Prepaid card, Debit card, or Credit card	<b>b14a4</b>	1 = Yes 2 = No	-9 = Don't know
Online or electronic payment through a bank wire	<b>b14a5</b>	1 = Yes 2 = No	-9 = Don't know
Online payment through platform (including mobile money, mobile wallet, PayPal or similar App-based payment service)	<b>b14a6</b>	1 = Yes 2 = No	-9 = Don't know
Virtual or Cryptocurrency (e.g. Bitcoin, Ether, or others)	<b>b14a7</b>	1 = Yes 2 = No	-9 = Don't know
Others	<b>b14a8</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
What is the payment method used more often by this establishment?  <b>[CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE b14a VARIABLES]</b>	<b>b14b</b>	1 = Exchange of goods 2 = Cash 3 = Cheque, voucher, or bank wire at the branch 4 = Prepaid card, Debit card, or Credit card 5 = Online or electronic payment through a bank wire 6 = Online payment through platform 7 = Virtual or Cryptocurrency 8 = Other -9 = Don't know

Question	Variable	Answer
For how many years has this establishment been using online or electronic payment methods?  <b>[CONDITION: ASK THIS QUESTION ONLY IF b14a5=1 OR b14a6=1]</b>	<b>b14c</b>	(Number of years) 1 = If less than a year -9 = Don't know

### B.15 Quality control inspection

Question: Does this establishment use any of the following quality control inspection methods? SHOW CARDS 13	Variable	Answer

Manual, visual, or written processes	<b>b15a1</b>	1 = Yes 2 = No	-9 = Don't know
Human inspection with the support of computers or phones	<b>b15a2</b>	1 = Yes 2 = No	-9 = Don't know
Statistical process control with software monitoring and data management	<b>b15a3</b>	1 = Yes 2 = No	-9 = Don't know
Automated systems for inspection such as laser-based, sensor-based, voice-control	<b>b15a4</b>	1 = Yes 2 = No	-9 = Don't know
Others	<b>b15a5</b>	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer
What is the quality control method used more often by this establishment?  [CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE <b>b15a</b> VARIABLES]	<b>b15b</b>	1 = Manual, visual, or written processes 2 = Human inspection with the support of computers or phones 3 = Statistical process control 4 = Automated systems for inspection 5 = Other -9 = Don't know

Question: Does this establishment use any of the following quality management practices?	Variable	Answer
Business certification – ISO 9000 or other equivalent	<b>b15c1</b>	1 = Yes 2 = No -9 = Don't know
Six sigma	<b>b15c2</b>	1 = Yes 2 = No -9 = Don't know
Total Quality Management (TQM)	<b>b15c3</b>	1 = Yes 2 = No -9 = Don't know
Lean manufacturing, Just-in-Time, or Kaizen method	<b>b15c4</b>	1 = Yes 2 = No -9 = Don't know

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## C. SECTOR SPECIFIC TECHNOLOGIES

**READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:**

Now, we turn to questions about methods and procedures to perform sector specific business functions

ADD SECTOR SPECIFIC QUESTIONNAIRE – SEPARATED DOCUMENT

INTERVIEWER: ASK THESE QUESTIONS ONLY FOR FIRMS THAT BELONG

TO THE SECTORS FOR WHICH SECTOR SPECIFIC QUESTIONS ARE AVAILABLE.

IF THE FIRM DO NOT BELONG TO THOSE, SKIP THIS SECTION AND GO TO SECTION D.

Agriculture (except Livestock)	C1
Livestock	C2
Food Processing	C3
Wearing apparel	C4
Pharmaceuticals	C5
Motor vehicles	C6
Wholesale or retail	C7
Financial services	C8
Land transport	C9
Health services	C10

## D. DRIVERS OF TECHNOLOGY ADOPTION

INTERVIEWER: The next questions aim to understand the main drivers of technology adoption.

### D.1 Acquisition of machines, equipments, and software

Question: Over the years [2016, 2017, and 2018], did this establishment: READ OUT	Answer
Purchase or lease new or second-hand equipment or machines?	<b>d1a</b> 1 = Yes, new 2 = Yes, second hand 3 = Yes, both (new and second hand) 4 = No -9 = Don't know
Purchase or lease licence for software?	<b>d1b</b> 1 = Yes 2 = No -9 = Don't know
Develop, customize, or significantly modify any equipment, machine, or software?	<b>d1c</b> 1 = Yes 2 = No -9 = Don't know
Was the development, customizaiton, or modification of equipments, machine, or software done in partnership with other institutions or with other firms? [CONDITION: ASK ONLY IF <b>d1c=1</b> ]	<b>d1d</b> 1 = Yes 2 = No -9 = Don't know
Which one was the partner that contributed the most in developping, customizing, or significantly modifying any equipment, machine, or software? SHOW CARD 14 [CONDITION: ASK ONLY IF <b>d1d=1</b> ]	<b>d1e</b> 1 = Academic or research organization 2 = Other enterprises 3 = Both -9 = Don't know

### D.2 Awareness and information

What was the source of information more often used by this establishment to make decisions about the acquisition of new machines, equipments, or software?  SHOW CARDS 15	<b>d2a</b> 1 = Other firms in the sector 2 = Other firms in the locality, but different sector 3 = Suppliers or buyers 4 = Industrial or trade associations 5 = Public technolgy extension services 6 = Private consultants 7 = Fairs, events, and missions 8 = Other
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	-9 = Don't know
Is there any firm with more than 50 employees in the range of 50 kilometers from this establishment producing similar products or offering similar services as this establishment?	<b>d2b</b> 1 = Yes 2 = No -9 = Don't know
Over the years [2016, 2017, and 2018], did this establishment have any business relationship, either as a supplier or as a buyer, with a firm with more than 50 employees in the range of 50 kilometers from this establishment.	<b>d2c</b> 1 = Yes 2 = No -9 = Don't know
Over the years [2016, 2017, and 2018], did this establishment have business, as a supplier or a buyer, with a multinational firm?	<b>d2d</b> 1 = Yes 2 = No -9 = Don't know
Does the CEO or top manager of this establishment have previous experience working in a multinational or a national firm with more than 50 employees in the same sector?	<b>d2e</b> 1 = Yes 2 = No -9 = Don't know

### D.3 Access to finance

Over the years [2016, 2017, and 2018], has this establishment got a loan for purchasing machines, equipment, or licensing software or processes?	<b>d3a</b> 1 = Yes 2 = No -9 = Don't know
What was the interest rate faced by the establishment for this loan?  INTERVIEWER: IF MORE THAN ONE INTEREST RATE, PLEASE ADD THE HIGHEST AVERAGE. NOMINAL INTEREST RATE  [CONDITION: ASK ONLY IF <b>d3a=1</b> ]	<b>d3b</b> Interest rate (average annual rate) -9 = Don't know
Over the years [2016, 2017, and 2018], how many times this establishment needed to borrow money to expand production, but could not get it?	<b>d3c</b> Number of times

### D.4 Management

Question	Answers
Does this establishment provide formal incentives for workers in the form of money, gift, or recognition to suggest and/or use better ways to produce goods or provide services?	<b>d4a</b> 1 = Yes 2 = No -9 = Don't know

<p>In the year [2018], how many key performance indicators were monitored at this establishment? Examples: Metrics on production, cost, waste, quality, inventory, energy, absenteeism and deliveries on time (mark one option): [SKIP: IF <b>d4b=4</b> GO TO <b>d4d</b>]</p>	<p style="text-align: center;"><b>d4b</b></p> <p>1 = 1-2 key performance indicators 2 = 3-9 key performance indicators 3 = 10 or more key performance indicators 4 = No key performance indicators</p>
<p>In the year [2018], how frequently were the key performance indicators reviewed by managers at this establishment?</p>	<p style="text-align: center;"><b>d4c</b></p> <p>1 = Yearly 2 = Quarterly 3 = Monthly 4 = Weekly 5 = Daily 6 = Hourly or more frequently 7 = Never</p>
<p>In the year [2018], what best describes the time frame of production targets at this establishment? Examples of production targets are: production, quality, efficiency, waste, on-time delivery.  SHOW CARD 16</p>	<p style="text-align: center;"><b>d4d</b></p> <p>1= Main focus was on short-term (less than one year) production targets 2 = Main focus was on long-term (more than one year) production targets 3 = Combination of short-term and long-term production targets 4 = No production targets</p>

#### D.5 Availability of human tal

Question	Answers
<p>Over the years [2016, 2017, and 2018], has this establishment hired or tried to hire engineers, computer programmers, or equivalent professionals?</p>	<p style="text-align: center;"><b>d5a</b></p> <p>1 = Yes. It hired. 2 = Yes. It tried it, but not hired. 3 = No -9 = Don't know</p>
<p>What was the main challenge faced by this establishment when hiring engineers, computer programmers, or equivalent professionals? [CONDITION: ASK ONLY IF <b>d5a=1</b> OR <b>d5a=2</b>]  SHOW CARD 17</p>	<p style="text-align: center;"><b>d5b</b></p> <p>1 = No challenges 2 = Lack of availability of professionals 3 = Lack of availability of high-skills professionals 4 = High salaries required -9 = Don't know</p>
<p>Over the years [2016, 2017, and 2018], has this establishment used any external consultants or organizations to help select, adapt, or use new machines, equipment, software, or production process?</p>	<p style="text-align: center;"><b>d5c</b></p> <p>1 = Yes 2 = No -9 = Don't know</p>

<p>What was the main source of external consultants or organizations used by this establishment?</p> <p>[CONDITION: ASK THIS QUESTION ONLY IF <b>d5c=1</b>]</p> <p>SHOW CARD 18</p>	<p><b>d5d</b></p> <p>1 = Universities  2 = Government agency  3 = Other local companies  4 = Foreign company  5 = Business associations  6 = Other sources  -9 = Don't know</p>
<p>Why did this establishment not use any consultants or organizations to help with adoption machines, equipment, software, or process?</p> <p>[CONDITION: ASK THIS QUESTION ONLY IF <b>d5c=2</b>]</p> <p>SHOW CARD 19</p>	<p><b>d5e</b></p> <p>1 = I don't know any consultant or organization  2 = Lack of trust in the quality of the services they provide  3 = Too costly or not convinced of the economic benefit  4 = There was no need  5 = Other  -9 = Don't know</p>
<p>How did this firm adjust labor when acquiring a new machine, equipment, or software?</p> <p>SHOW CARD 20</p>	<p><b>d5f</b></p> <p>0 = Did not do any changes to the number on workers  1 = Used same workers and offered some specialized training  2 = Fired some workers and did not replace them  3 = Hire more workers with same skills  4 = Hire more workers with more specialized skills  -9 = Don't know</p>

**D.6 Trade barriers and uncertainty of demand**

Question	Answers
<p>Over the years [2016, 2017, and 2018], did this establishment export?</p>	<p><b>d6a</b></p> <p>1 = Exported directly  2 = Exported through trading firms  3 = Did not export  -9 = Don't know</p>
<p>In the year [2018], what percentage of this establishment's sales were direct exports?</p> <p>[CONDITION: ASK THIS QUESTION ONLY IF <b>d6a=1</b>]</p>	<p><b>d6b</b> (Percent)</p>

Over the years [2016, 2017, and 2018], has this establishment imported material inputs, machines, or equipment directly?	<b>d6c</b> 1 = Yes 2 = No -9 = Don't know
If the vendor price of an imported input, machines, or equipment is 100, what is the average final price paid for this establishment, including tariffs, tax, storage, and transportation cost?  [CONDITION: ASK THIS QUESTION ONLY IF <b>d6c=1</b> ]	<b>d6d</b> (Value above 100) -9 = Don't know
How many days did it take on average from the time these goods arrived to their point of entry (e.g. port, airport) until the time these goods could be claimed from customs? [CONDITION: ASK THIS QUESTION ONLY IF <b>d6c=1</b> ]	<b>d6e</b> (Number of days) -9 = Don't know

### D.7 Government support

Are you aware of any government support program or subsidy in relation to the adoption of a new machines, equipment or software that could benefit this establishment?	<b>d7a</b> 1= Yes 2= No -9 = Don't know
Has this establishment benefited from any government support program or subsidy in relation to the adoption of a new machine, equipment, or software?	<b>d7b</b> 1 = Yes 2 = No -9 = Don't know
Which kind of government support in the adoption of a new technology has this establishment received?  [CONDITION: ASK ONLY IF <b>d7b=1</b> ]  SHOW CARD 21	<b>d7c</b> 1 = Information 2 = Technical assistance 3 = Tax incentive 4 = Grant 5 = Loan 6 = Other

### D.8 Obstacles and Drivers - ranking

Please select three of the major obstacles faced by this establishment to adopt new equipment,	<b>d8a</b> 1 <sup>st</sup> obstacle	<b>d8b</b> 2 <sup>nd</sup> obstacle	<b>d8c</b> 3 <sup>rd</sup> obstacle
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<p>machine, software, or process to improve its performance?</p> <p>SHOW CARDS 22</p> <p><b>CONDITION: SAME OPTION CANNOT BE REPEATED ACROSS VARIABLES</b></p>	<p>1 = Lack of information on what is available  2 = Uncertainty of demand  3 = Too costly or not convinced of the economic benefit  4 = Lack of technical skills required to support this equipment.  5 = Consumer preferences do not value quality of products  6 = Difficulty in obtaining financing  7 = Lack of knowledge on how to acquire it  8 = It is difficult or costly to comply with government regulations  9 = Electricity, water, or Internet connection are too expensive  10 = Other  -9 = Don't know</p>
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<p>Please select three of the major reasons for the acquisition of new equipment, machine, or software by this establishment to improve its performance?</p> <p>SHOW CARDS 23</p> <p><b>CONDITION: SAME OPTION CANNOT BE REPEATED ACROSS VARIABLES</b></p>	<p><b>d8d</b> 1<sup>st</sup> reason</p>	<p><b>d8e</b> 2<sup>nd</sup> reason</p>	<p><b>d8f</b> 3<sup>rd</sup> reason</p>
	<p>1 = Depreciation or replacement  2 = Competition in the domestic market  3 = Competition in the external market  4 = Other firms in the same sector adopted  5 = Other firms in the locality, from other sectors, adopted  6 = Produce new products  7 = Access new markets  8 = Produce similar products more efficiently  9 = Adjust to regulations  10 = Other  -9 = Don't know</p>		

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**E. LABOR, BALANCE SHEET AND PERFORMANCE**

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**LABOR**

**READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:**  
Now I would like to ask you a few questions about this establishment's labor force and performance

<b>E.1</b>	<p>At the end of the year [2018], how many permanent full-time, permanent part-time, temporary (or seasonal) full-time, and temporary (or seasonal) part-time individuals worked in this establishment? Please include all employees and managers.</p> <p>(Permanent full-time employees are defined as all paid employees that are contracted for a term of one or more fiscal years and/or have a guaranteed renewal of their employment contract and that work a full shift)</p> <p>(Permanent part-time employees are defined as all paid employees that are contracted for a term of one or more fiscal years and/or have a guaranteed renewal of their employment contract and that work in part-time shift, usually less than 20 hours per week)</p> <p>(Temporary or seasonal, full-time workers are all short-term, that is for less than a year, workers with no guarantee of renewal of employment and work full-time.)</p> <p>(Temporary or seasonal, part-time workers are all short-term, that is for less than a year, workers with no guarantee of renewal of employment and work usually less than 20 hours per week.)</p> <p><b>(INTERVIEWER: INCLUDE INTERVIWEE IF APPLICABLE).</b></p>
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	<b>Number</b>
Permanent workers, full-time, at the end of the year [2018]	<b>e1a</b>
Permanent workers, part-time, at the end of the year [2018]	<b>e1b</b>
Temporary or seasonal workers, full time, at the end of the year [2018]	<b>e1c</b>
Temporary or seasonal workers, part-time, at the end of the year [2018]	<b>e1d</b>
<b>DON'T KNOW (SPONTANEOUS)</b>	<b>-9</b>

	<b>Months</b>
What was the average length of employment of seasonal or temporary workers in the year [2018]?	<b>e1e</b> -9 = Don't know

What was the total share of female workers by the end of the year [2018]?	<b>e1f</b> (share) -9 = Don't know
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<b>E.2</b>	<p>At the end of the year [2016], how many permanent full-time, permanent part-time, temporary (or seasonal) full-time, and temporary (or seasonal) part-time individuals worked in this establishment? ? Please include all employees and managers <b>(INTERVIEWER: INCLUDE INTERVIWEE IF APPLICABLE).</b></p>
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	<b>Number</b>
Permanent, full-time workers, at the end of the year [2016]	<b>e2a</b>

Permanent, Part-time, at the end of the year [2016]	<b>e2b</b>
Temporary or seasonal workers, full time, at the end of the year [2016]	<b>e2c</b>
Temporary or seasonal workers, part-time, at the end of the year [2016]	<b>e2d</b>
<b>IF ESTABLISHMENT WAS NOT IN BUSINESS THREE YEARS AGO</b>	<b>-7</b>
<b>DON'T KNOW (SPONTANEOUS)</b>	<b>-9</b>

What was the average length of seasonal or temporary workers in the year [2016]?	<b>Months</b>
Average length of seasonal or temporary employment in the year [2016], in months	<b>e2e</b> -9 = Don't know

What was the share of female workers three complete fiscal years ago? <b>(INTERVIEWER: INCLUDE FULL TIME AND PART TIME).</b>	<b>e2f</b> Percentage -9 = Don't know
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<b>E.3</b>	<p>At the end of the year [2018], how many individuals were working in this establishment according to their main occupation?</p> <p><b>(INTERVIEWER: READ EACH CATEGORY)</b></p> <p>Professionals are highly skilled workers with university degree working on their field, such as science and engineering, architecture, finance, IT, and law.</p> <p>Technicians are skilled workers with technical training working on their field associated with professionals, such as science and engineering or financial technicians.</p> <p>Other production employees are workers directly involved in the production process, excluding professionals and technicians.</p>
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	<b>Number</b>	<b>DON'T KNOW</b>
CEOs and Managers	<b>e3a</b>	<b>-9</b>
Professionals	<b>e3b</b>	<b>-9</b>
Technicians	<b>e3c</b>	<b>-9</b>
Clerical support workers [e.g. administrative support]	<b>e3d</b>	<b>-9</b>
Production workers (directly involved in the production process)	<b>e3e</b>	<b>-9</b>
Service or sales workers	<b>e3f</b>	<b>-9</b>

<b>E.4</b>	<p>At the end of the year [2016], how many individuals were working in this establishment according to their main occupation: <b>(INTERVIEWER: READ EACH CATEGORY)</b></p> <p><b>[SKIP: IF e2a = -7 GO TO e5a]</b></p>
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	Number	DON'T KNOW
CEOs and Managers	e4a	-9
Professionals	e4b	-9
Technicians	e4c	-9
Clerical support workers [e.g. administrative support]	e4d	-9
Production workers (directly involved in the production process)	e4e	-9
Service or sales workers	e4f	-9

**E.5** What is the percentage of workers who completed the following degrees as maximum level of schooling achievement?

	Share (%)	DON'T KNOW
Completed primary school (about 9 years of education)	e5a	-9
Completed secondary school (about 12 years of education)	e5b	-9
Vocational training (about 12 years of education)	e5c	-9
Completed college degree or more (15+ years of education)	e5d	-9

What is the number of workers with colleged degree in Engineering or applied science; and Master or Doctoral degrees?

	Number	DON'T KNOW
Engineering or applied science	e5e	-9
MBA, Master or Doctoral degree	e5f	-9

Does this establishment have workers exclusively dedicated to Research and Development activities?	e3g 1= Yes 2= No -9 = Don't know
How many workers are exclusively dedicated to Research and Development activities in this establishment? [CONDITION: ASK ONLY IF e3g=1]	e3h Numbers -9 = Don't know

## BALANCE SHEET

### READ THE FOLLOWING TO THE RESPONDENT BEFORE PROCEEDING:

Now, we would like to ask you a few questions about the financial results of this establishment. It is important that this information be as accurate as possible. The individual data are treated as confidential. The identity of this establishment will not be revealed at any point.

**E.6** What were this establishment's total annual sales for ALL products and services?

	LCUs
Complete year [2018] total sales	e6a
Complete year [2016] total sales	e6b

<b>DON'T KNOW (SPONTANEOUS)</b>	<b>-9</b>
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**E.7** From this establishment's Income Statement or book records for the year **[2018]**, please provide the following information:

	<b>LCUs</b>	<b>DON'T KNOW</b>
Total annual cost of labor including wages, salaries, bonuses, social security payments	<b>e7a</b>	<b>-9</b>
Total annual cost of raw materials and intermediate goods used in production or materials purchased to resell	<b>e7b</b>	<b>-9</b>
Total annual cost of electricity	<b>e7c</b>	<b>-9</b>
<b>TOTAL COST OF OF PRODUCTION SHOULD INCLUDE ALL ABOVE COSTS AND OTHER COSTS NOT LISTED ABOVE</b>		
Total cost of production or service operations (it also includes costs of marketing, distribution, and others not listed above)	<b>e7d</b>	<b>-9</b>

**E.8** Hypothetically, if this establishment were to purchase all the machinery, vehicles, equipment, and buildings it **uses now**, in their current condition and regardless of whether the establishment owns them or not, how much would they cost, independently of whether they are owned, rented or leased?

	<b>LCUs</b>	<b>DON'T KNOW</b>
Machinery, vehicles, and equipment	<b>e8a</b>	<b>-9</b>
Buildings	<b>e8b</b>	<b>-9</b>

**E.9** At the end of the year **[2018]**, what was the average salary of individuals working in this establishment in the following categories?

	<b>Monthly Salary (local currency)</b>	<b>DON'T KNOW</b>
CEOs and Managers	<b>e9a</b>	<b>-9</b>
Professionals	<b>e9b</b>	<b>-9</b>
Technicians	<b>e9c</b>	<b>-9</b>
Clerical support workers [e.g. administrative support]	<b>e9d</b>	<b>-9</b>
Production workers (directly involved in the production process)	<b>e9e</b>	<b>-9</b>
Service or sales workers	<b>e9f</b>	<b>-9</b>

**E.10** Currently, with respect to the main product produced by this establishment?

	<b>% (share)</b>	<b>DON'T KNOW</b>
What is the share in total sales?	<b>e10a</b>	<b>-9</b>
What is the average markup (the percentage over total costs to derive the final price)?	<b>e10b</b>	<b>-9</b>

**CONTROL QUESTIONS**

**INTERVIEWER READ AT THE END OF THE INTERVIEW:**

The survey ends here. I would like to gather a few final details. Thank you for your time and cooperation.

**A.8 Interviewer code a8**

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**A.9 Time face-to-face interview ends:**

Day (dd)	Month (mm)	Year (yyyy)	Hour (00 to 23)	Minutes (00 to 59)
<b>a9d</b>	<b>a9m</b>	<b>a9y</b>	<b>a9h</b>	<b>a9min</b>

**A.10 Please indicate which option best describes the main respondents position:**

Owner	1
President, Executive Director, or CEO	2
Chief Financial, Chief Operational Officer (CFO/COO)	3
Operational or plant manager	4
Sales or marketing manager	5
Accountant	6
Lawyer	7
Other Administrative	8
Other Management	9
Other (Specify) - <b>a10b</b>	10

**a10a**

**A.11 Please complete the following information about the interviewee(s)**

	Years with the establishment	Gender	Email
<b>Main respondent</b>	<b>a11a</b>	<b>a11b</b>	<b>a11c</b>

<b>A.12</b>	The responses to the questions regarding figures (productivity and employment numbers) were:
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Taken directly from establishment records	1
Estimates computed with some precision	2
Arbitrary and unreliable numbers	3
In some case taken from books and in some case estimates	4

**a12**

ADD QUESITON ON THE PERCEPTION

INTERVIEWER COMMENTS:

<b>a13</b>
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(Problems occurred/extraordinary circumstances which could influence results)

<b>A.14</b>	This questionnaire was completed in:
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One visit in face-to-face interview with one person	1
One visit in face-to-face interview with different managers/staff	2
Several visits	3

**STOP HERE**

**a14**

<b>A.15</b>	If option 2 or 3 in <b>A.14</b> , estimate duration of the whole interview
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<b>Hour</b>	<b>Minutes</b>

**a15h**

**a15m**

SUPERVISOR SECTION

A.14 Supervisor code

a14

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**INFORMATION BASED ON LOCATION OF INTERVIEW (s2d). ENSURE s2d IS THE NAME OF AN OFFICIAL LOCALITY AND NOT A NEIGHBORHOOD**

Is this city the official tal city?	a3b	Is this city the main business city?	a3c	Size of locality	a3
Yes	1	Yes	1	City with population over 1 million	2
No	2	No	2	Over 250.000 to 1 million	3
				50.000 to 250.000	4
				Less than 50.000	5

SUPERVISOR: THE DESCRIPTION OF THE ESTABLISHMENT'S MAIN PRODUCT AND ACTIVITY IS PROVIDED IN c1b. PLEASE REVIEW c1b IN ORDER TO IDENTIFY THE CORRESPONDING SECTOR CODE IN c1d

C.1d	<p><b>PLEASE CHOOSE THE 4-DIGIT ISIC REV. 4 SECTOR CODE THAT BEST APPLIES TO THE ESTABLISHMENT'S MAIN ACTIVITY AND PRODUCT.</b></p>
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	Code
CODE OF THE MAIN PRODUCT AND ACTIVITY	c1d