
Version II (November 28, 2023)

World Bank's
TECHNOLOGY
ADOPTION SURVEY

IMPLEMENTATION
MANUAL

2023

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1. INTRODUCTION

The World Bank's Technology Adoption Survey (TAS) collect data from enterprises in agriculture, manufacturing and service sectors. It uses a new methodology that includes standardized survey instruments and a uniform sampling methodology to measure technology adoption through business functions (or tasks) performed by the enterprise. This manual provides information and guidance to the implementing contractor, researchers, field managers, field supervisors and enumerators on how to understand the questions in the surveys.

- Why do we need a new instrument to measure technology adoption?

Technology is at the center of the policy and media debate about the present and future of economic development. Talks of the fourth industrial revolution are common buzzwords in any policy discussions, even if many developing countries have yet to adopt widely the technologies associated with the third and second revolution. While the rapid and wide diffusion on new disruptive technologies that characterizes an industrial revolution is becoming a common phenomenon, adoption, especially on those countries further from the technological frontier, is poorly understood.

Despite the relevance of technological adoption to explain differences in income across countries, there is limited data. Beyond specific case studies and the attempt to measure general purpose technologies, there has not been any systematic attempt to measure adoption using firm level questionnaires across countries. The increasing interest of policy makers towards understanding the opportunities and challenges associated with rapid diffusion of digital technologies faces the lack of evidence to support decisions. Some firm-level surveys have incorporated questions about the use of general-purpose technology (e.g. the share of workers using computer, or access to Internet). The limitation of these questions is that they do not describe the purpose for which these technologies are being used. Without these measures it is difficult to provide a proper diagnostic of the bottleneck of technology adoption.

- What is the relationship between the Technology Adoption Survey (TAS) and the World Bank's Enterprise Survey (WBES)?

The TAS is a complementary survey instrument with focus on technology adoption at the firm-level. Both, the TAS and the WBES, are surveys aiming to understand the behavior of enterprises and are done at the establishment- or firm-level. While the WBES covers several dimensions related to business practices, the TAS focuses more specifically on technology adoption. A short version of the TAS questionnaire has been adapted as a special module of the WBES.

The TAS includes three core sections on technology adoption (sector-specific, general business functions, and drivers and barriers for technology adoption), developed as a self-content instrument. Adding these questions as additional modules of the WBES would be unfeasible due to the length of the questionnaire – it would be too long. Yet, the TAS also requires information on the characteristics of the firm and measures of productivity. These modules (A and E) are built on the WBES questionnaire. For those variables already captured by the WBES, the TAS tries to keep similar question to allow for comparability.

The TAS also covers agriculture, in addition to manufacturing and services; while the WBES focuses on manufacturing and services.

- Structure of the Technology Adoption Survey Questionnaire

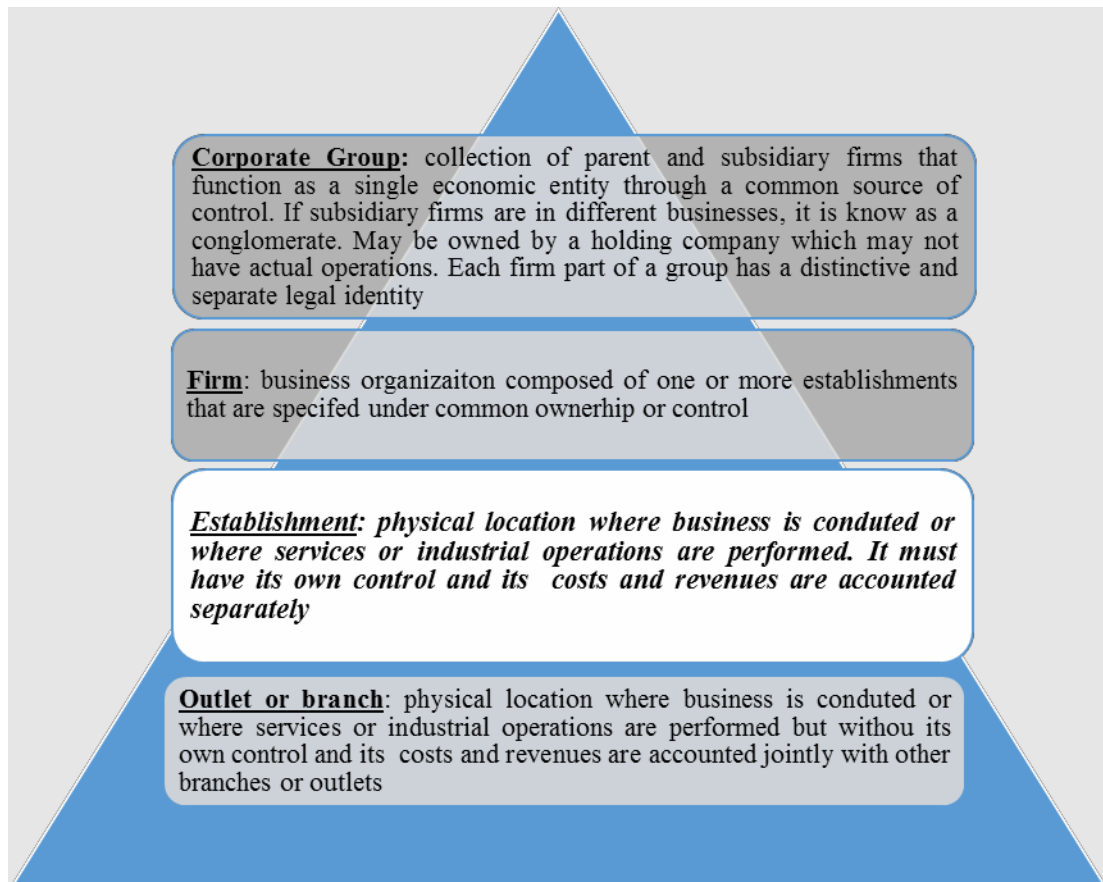
The survey is implemented in two stages. In the first stage the Screener questionnaire is applied (typically by phone) to determine the eligibility of each establishment. In the second stage one of the three versions of the questionnaire (*Agriculture, Manufacturing, or Services*) is administered according to the sector determined in the Screener.

- Screening questionnaire – *Control information*
 - Agriculture
 - Manufacturing and Services

The questionnaires are comprised of five sections organized by topic:

- Section A – *General Information*: characteristics of the establishment
- **Section B – *General Business Functions***
- **Section C – *Sectoral specific technologies***
- **Section D – *Drivers and Barriers for technology adoption***
- Section E – *Labor, Balance Sheet, and Performance (numbers needed to estimate performance or productivity: labor, inputs, costs, outputs, revenues)*.

The study is designed to survey an establishment, which is a physical location where business is carried out, industrial operations take place, or services are provided. A firm may be comprised of one or more establishments; for instance, as a brewery may have several bottling plants and several establishments for distribution. For the purposes of this survey, any establishment must have the key qualifier of having its *own management and control over its workforce*. In practical terms, all establishments from multi-establishment firms are included except headquarters without production or sales; in this case, or if a separate establishment does not have its own management and control over its workforce, the establishment should be substituted.



2. DEFINING TECHNOLOGY ADOPTION

In this questionnaire, technology is defined as the way firms apply knowledge to perform a business function. Following the definition from EUROSTAT (2019), “business functions” are the activities carried out by an enterprise; they can be divided into core functions and support functions. Core business functions are activities of an enterprise yielding income: the production of final goods or services intended for the market or for third parties. Support business functions are ancillary (supporting) activities carried out by the enterprise in order to permit or to facilitate the core business functions, its production activity. Section B of the questionnaire is mostly focused on key support functions that are general across sectors. Section C of the questionnaire is mostly focused on key functions that are sector specific.

A simple way to think about the application of technology is through machines, equipment, software, or processes, which embed significant amount of knowledge to support workers on performing a business function. Some tasks can be performed manually through basic processes, without the support of machines, equipment, software. Usually, the higher the amount of knowledge embedded or accumulated, the more sophisticated is the machine, equipment, or software – these are examples of high-technology. However, many people associate the term “technology” only with high-technology. For this reason, the questionnaire avoids the use of the term “technology.” Instead, it refers to method, process, or procedure whenever it fits.

In the questionnaire, most questions about technology will follow two steps. First, it is asked if the firm adopts or not the technology to perform a given business functions. Second, it asks what technology is used more often by the firm, as described in the example below:

B.8 Question: What of the following method is used by this establishment for managing HR processes, finance, and accounting? INTERVIEWER: READ OUT	Variable	Answer	
Handwritten processes	b8a1	1 = Yes 2 = No	-9 = Don't know
Computers with standard software such as Excel or equivalent	b8a2	1 = Yes 2 = No	-9 = Don't know
Mobile Apps or digital platforms	b8a3	1 = Yes 2 = No	-9 = Don't know
Computers with specialized software	b8a4	1 = Yes 2 = No	-9 = Don't know
Enterprise Resource Planning (ERP) or equivalent software integrated with other back office functions	b8a5	1 = Yes 2 = No	-9 = Don't know
Other	b8a6	1 = Yes 2 = No	-9 = Don't know

Question:	Variable	Answer	
What is the method used more often by this establishment for business administration? [CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE b9a VARIABLES] SHOW CARDS 5	b8b	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	

The reason for this structure is that the questionnaire aims to measure the extensive margin (if the technology is used or not) and the intensive margin (how much the technology is used). The combination of these pieces of information will provide a more accurate measure of both, adoption and importance of different technologies.

3. INSTRUCTIONS FOR INTERVIEWERS

Instructions for interviewers appear in **BOLD AND UPPERCASE LETTERS** whenever the language uses uppercase letters. The interviewer should not read these instructions out loud; they only operate as guidelines. At times, some questions require special instructions before being posed or clarification on how the answer should be recorded:

INTERVIEWER: PLEASE NOTE THAT THE NEXT QUESTION REFERS TO THE TOTAL SALES OF ALL PRODUCTS AND SERVICES

E.6	What were this establishment's total annual sales for ALL products and services?
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	LCUs
Complete year [2022] total sales	e6a
Complete year [2020] total sales	e6b
DON'T KNOW (SPONTANEOUS)	-9

Whatever text that appears in **BOLD AND UPPERCASE** in the questionnaire should not be read aloud; this includes responses to the question like **“DON'T KNOW”**, **“DOES NOT APPLY”**, or **“REFUSED”** when a respondent refuses to answer.

The text in **BOLD, UPPERCASE AND ITALICIZED LETTERS** indicates a skip pattern. When the interviewer sees these letters on the side of an answer given by the interviewee, he or she should proceed according to the instructions given by the skip pattern. In countries where languages do not use Italics, alternative visual designs should be used to indicate skip patterns. When using CAPI, skip patterns will be incorporated into the CAPI script automatically, so that the questionnaire flows as indicated in the paper questionnaire.

Finally, text that appears between parentheses is intended as an option for the interviewer to read as clarification.

E.1	<p>At the end of the year [2022], 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>(INTERVIEWER: INCLUDE INTERVIEWEE IF APPLICABLE).</p>
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	Number
Permanent workers, full-time, at the end of the year [2022]	e1a
Permanent workers, part-time, at the end of the year [2020]	e1b
Temporary or seasonal workers, full time, at the end of the year [2022]	e1c
Temporary or seasonal workers, part-time, at the end of the year [2020]	e1d
DON'T KNOW (SPONTANEOUS)	-9

4. HOW TO ASK QUESTIONS

All questions should be read in the order and with the wording as they appear. Certain question format conventions in the questionnaire should be noted:

a. **Tables** are to be read one category at a time. For example, when asking the following question, interviewers should solicit a response for each line, and then continue reading through the remaining categories in the same manner.

B.8 Question: What of the following method is used by this establishment for managing HR processes, finance, and accounting? INTERVIEWER: READ OUT	Variable	Answer	
Handwritten processes	b8a1	1 = Yes 2 = No	-9 = Don't know
Computers with standard software such as Excel or equivalent	b8a2	1 = Yes 2 = No	-9 = Don't know
Mobile Apps or digital platforms	b8a3	1 = Yes 2 = No	-9 = Don't know
Computers with specialized software	b8a4	1 = Yes 2 = No	-9 = Don't know
Enterprise Resource Planning (ERP) or equivalent software integrated with other back office functions	b8a5	1 = Yes 2 = No	-9 = Don't know
Other	b8a6	1 = Yes 2 = No	-9 = Don't know

b. **Show cards** are used when respondents have to select among several options. For example, when asking the following question:

Question:	Variable	Answer
What is the method used more often by this establishment for business administration? [CONDITION: ASK ONLY IF THE ANSWER IS YES FOR MORE THAN ONE OF THE b8a VARIABLES] SHOW CARDS 5	b8b	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

5. ACCEPTABLE RESPONSES

Many questions ask for percentages or fractions. All numbers should be recorded **without decimals**. So, ten percent is recoded as 10 (not .10 and certainly not 1/10). In cases where the respondent answers 10.5 percent, for example, the enumerator should **round up** to 11 percent. In cases where the respondent answers 10.25 percent, the enumerator should round down to 10 percent.

For purposes of standardization, the conventions for time conversions are the following:

1 day= calendar day;
 1 week= 7 days;
 1 month= 4 weeks;
 1 month= 30 days.
 1 year= 52 weeks; and
 1 year= 365 days.

If the question asks for a response in days and the respondent responds in weeks, **the enumerator must make the conversion** and record the response in days, not in weeks. For the use of CAPI, some shorthand answers can be helpful. For example:

3 months = 90 days
 6 months (half year) = 180 days
 9 months = 270 days

Some questions have pre-coded answers to facilitate implementation. As an example, in the following question answers of **less than one year should all be coded as one**. The questionnaire provides this pre-coded answer.

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 b8a4=1 OR b8a5=1]	b8c	(Number of years) 1 = If less than a year -9 = Don't know

Answer: “Two months”

The only case when the respondent is asked to do the conversion themselves is when they respond in dollars, Euros, or any other currency which the local currency is not. **All questions should have a response in the local currency units (LCUs). The enumerator does not do the conversion himself.** This discussion about currencies should also make it clear that the enumerator should always be aware of the currency units the respondent is referring to in his or her responses.

6. HOW TO MINIMIZE ENUMERATOR BIAS

The questionnaire is to be read as it is written. As with any survey, enumerators should refrain from introducing any interpretation bias by trying to explain or direct the answer. However, in some cases answers are not provided in the format desired or they do not address the issue in question. To handle these situations, in general, questions can be classified in **2 categories**: (1) *opinion-based or sensitive questions*, and (2) *hard-data questions*.

Opinion-based or sensitive questions are those where the actual opinion of the respondent is requested or where a sensitive issue is being addressed such as payment of informal gifts or the degree of obstacle questions. In these cases, enumerators should just read the question. When asked for the meaning of any term or when faced with a respondent who is confused or does not understand the question enumerators should read again the full question as it is written, **without changing wording or providing synonyms or explanation**.

If the respondent puts the enumerator under pressure to explain, as a last resort, the enumerator can indicate that he or she has been instructed to read the question the way it is written and NOT to explain it. **Opinion-based and sensitive questions are identified with shaded background and double bordering. Surveys on CAPI will ensure that sensitive or opinion-based questions are clearly visually differentiated from hard-data questions.**

Hard-data questions are based on quantitative data. In some cases, the questions require identifying the appropriate answer from the “narrative stories” provided by the respondent. In these cases enumerators can probe the respondent using standard techniques: re-ask the question emphasizing key concepts; ask a question that completes an incomplete answer already provided; when the respondent provides the answer in ranges, enumerators can ask “Could you be more specific?” or “Is it more a or more b?”.

7. QUESTION-BY-QUESTION EXPLANATION - SCREENER QUESTIONNAIRES

7.1 SCREENER QUESTIONNAIRE

Number	Instructions	Answer Type
Information Acquired Prior to Screening		
s1a	<u>Sampling sector</u> : Classification of the establishment's activity as defined in the sample frame. This variable should match the strata in the sample frame.	
s1b	<u>Sampling size</u> : Size of the establishment as defined in the sample frame	
s1c	<u>Sampling region</u> : Regional classification of the establishment in the sample frame	
s2a	<u>Name of the firm/establishment</u> : self-explanatory	
s2b	<u>Provide detailed information about the location</u> . For example, if this is an office building, provide the number of the office and floor.	
s2c	<u>Name of street</u> : Physical location of the establishment as determined by the screener questionnaire	
Screener Control Information		
s4	<u>Firm/Establishment is part of a larger firm (Multi-firm enterprise or Multi-establishment firm)</u> : A multi-firm enterprise is an enterprise with several establishments, each with its own location, management, activity, and financial statements. If yes, questions S.4a to S.4f apply to the firm which the establishment is part of. All questions from S.5 only refer to the establishment.	Yes/No
s4a	<u>Number of firms/establishments that are part of a larger firm</u> : Self-explanatory	(number of farms or establishments)
s4b	<u>Firm or establishment is the headquarters' location</u> : Self-explanatory	Yes/No
s4c	<u>Financial statements of the headquarter are separated from the other farms</u> : Examples of financial statements include a balance sheet, an income statement, an equity statement, or a cash flow statement.	Yes/No
s4d	<u>Headquarters engages in production or sales</u> : self-explanatory	Yes/No
s4e1	<u>Address and name of the establishment that represents the largest share of production or sales</u> : Self-explanatory	Name and address
s4e1_2	<u>Detailed address of the firm</u> . Applicable for firms in a panel sample	Address
s4e1_99	<u>Change in name of the establishment name</u> . Applicable for firms in a panel sample	Yes/No
s4e1_11	<u>New name of the establishment</u> . Applicable for firms in a panel sample	Name
s4e2	<u>Region of the establishment that represents the largest share of production or sales</u> : Region is identified based on codes for regional strata.	Code for regional strata (number)

Number	Instructions	Answer Type
s4f	<i>This farm's financial statements are prepared separately from headquarters' statements;</i> Self-explanatory	Yes/No
s7	<i>Number of workers at this establishment;</i> Self-explanatory If the number of workers is fewer than 5, then the survey will be terminated.	(number of workers)
s7a	<i>Does this establishment have more than 4 workers?</i> Self-explanatory.	Yes/No

8. QUESTION-BY-QUESTION EXPLANATION - SECTIONS A, B, D AND E

8.1 SECTION A – GENERAL INFORMATION

Number	Instructions	Answer type
lat	<i>Latitude: (in decimal format), not released due to confidentiality</i>	Latitude
lon	<i>Longitude: (in decimal format), not released due to confidentiality</i>	Longitude
a1a	<i>Time face-to-face interview begins:</i> self-explanatory	Day (dd)
a1b		Month (mm)
a1c		Year (yyyy)
a1d		Hour (00 to 23)
a1e		Minutes (00 to 59)
a3b		<i>Foreign</i> ownership refers to the nationality of the owners, regardless of residency. If the owner is another company or institution owned by individuals who are foreign nationals, then it is foreign owned. Firms that operate under a franchise agreement should be classified according to the nationality of those awarded the franchise.
a3c	<i>Government or state-owned</i> firm that is a subsidiary of a government owned firm should also be considered government-owned.	Share (%)
a4b	<i>Family ownership.</i> Self-explanatory	Select an option number
a4e	<i>Amongst the owners, are there any females:</i> self-explanatory	Yes/No
a5a	<i>Sector related with product or service that represents the greatest share of annual sales of this establishment:</i> This variable is to confirm the choice of sector in the question S5.	Select an option number
a5b	<i>Description of product or service that represents the greatest share of annual sales of this establishment:</i> Given the choice of main sector in a5a, the description of establishment's main activity and product or service should be written down exactly as provided and as accurately as possible. The description must specify the activity of the establishment and the product produced or service offered. The main product and activity are defined as the one that generates the largest proportion of annual sales in monetary value (not volume).	Description
a5b_1	<i>Change in firm location:</i> self-explanatory.	Yes/No
a5b_2	<i>Location of firm from sample frame</i> refers to the firm location provided in the sample frame.	Address
a5c	<i>Sector specific questionnaire:</i> self-explanatory	Select an option number
a6	<i>The year the establishment began operation</i> refers to the year in which the establishment actually started producing (or providing services), not to the year in which it was registered for the first time. The answer is independent of ownership at the time. An establishment may have begun operations without having any sales, if it has incurred direct costs related to production or provision of services (cost of registration is not a direct cost). If the establishment was privatized, then the date provided should refer to when the original government-owned establishment began operations.	Year (yyyy)

	If the establishment changed its production significantly to change <u>sector</u> classification, then the year when that took place should be provided.	
a7a	<i>Top Manager's experience</i> : in the type of sector that the establishment presently operates. Include only the years worked by the manager in the same sector to which the current company belongs <i>Top Manager</i> refers to the highest-ranking management individual. This person may be the owner if he/she works as the Manager of the firm. If top manager had more than trip to study abroad, measure the accumulated time. Note that the study strip abroad must be associated with some formal training, executive course and enrolment in some academic institution	Number (years)
a7b	<i>Top Manager is female</i> : self-explanatory	Yes/No
a7c	<i>Top Manager's highest level of education</i> acquired by the Top Manager of the establishment	Select an option number
a7d	<i>Top Manager studied abroad for more than a month</i> : self-explanatory	Yes/No
a8	<u>Special Economic Zone</u> . Indicate if the establishment is located in a special economic zone. In Bangladesh, the options are BEZA or BEPZA.	Yes/No
a8a	<u>Year of establishment in Special Economic Zone</u> . Indicate the year the establishment located into the SEZ	Year (yyyy)

8.2 SECTION B – GENERAL BUSINESS FUNCTIONS

Number	Instructions	Answer type
Section B - General Business Functions		
Technology enablers		
b1a	Indicate whether the establishment has an electrical connection.	Yes/No
b1b	Indicate whether the establishment experienced power outages over the last year.	Yes/No
b1c	In a typical month, over the year [xx], how many power outages did this establishment experience? Note: If the respondent provides a number for a given year (ie. 2 times a year), divide the answer by 12 to obtain the number of times power outages occurred in a typical month. If the value is less than 1, round up to 1.	Number of days
b2a	Indicate whether the establishment has an owned or a shared generator.	Yes/No
b2d1	Does this establishment use any of the following sources of energy in 2022? – Natural Gas (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No
b2d2	Does this establishment use any of the following sources of energy in 2022? – Fuel Oil (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No
b2d3	Does this establishment use any of the following sources of energy in 2022? – LPG (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No

Number	Instructions	Answer type
Section B - General Business Functions		
b2d4	Does this establishment use any of the following sources of energy in 2022? – Coal or wood fuels (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No
b2d5	Does this establishment use any of the following sources of energy in 2022? – Own renewable (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No
b2d5a	Does this establishment use any of the following sources of energy in 2022? – Own renewable (it refers to energy sources purchased by the firm, not that the grid connection sources from any of them)	Yes/No
b4a	Indicate the number of stationary computers or laptop computers that the establishment has for using in their business.	Number
b4b	Indicate the number of tablets or smartphones that the establishment has for using in their business.	
b5a	Indicate whether the establishment has an internet connection.	Yes/No
b5b	Refer to the fastest type of internet connection that the establishment has. Mark 1 for dial up, 2 for DSL or fiber, 3 for wireless or satellite, 4 for BPL or 5 for other.	Select an option number
b5f	Indicate whether the establishment has a website.	Yes/No
b5g	Indicate whether the establishment has a page in a social media.	Yes/No
b5h	Indicate whether the establishment use cloud computer services for business administration Note: Cloud computing services can include servers, data storage and databases, networking, software, analytics, intelligence and other services. These must be used for business purposes.	Yes/No
Technology adoption		
b7a	Choose a score in a scale from 1 to 10, where 10 means that this establishment is using the most advanced production processes for production available in its sector, with respect to other firms in the same country.	Score (1 to 10)
b7b	Choose a score in a scale from 1 to 10, where 10 means that this establishment is using the most advanced production processes for production available in its sector, with respect to the most advanced firms in its sector in the world.	Score (1 to 10)
b8a1	Indicate the use of Handwritten processes for managing HR processes, finance, and accounting by this establishment.	Yes/No
b8a2	Indicate the use of Computers with standard software such as Excel or equivalent for managing HR processes, finance, and accounting by this establishment.	Yes/No
b8a3	Indicate the use of Mobile Apps or digital platforms for managing HR processes, finance, and accounting by this establishment.	Yes/No
b8a4	Indicate the use of Computers with specialized software for managing HR processes, finance, and accounting by this establishment.	Yes/No
b8a5	Indicate the use of Enterprise Resource Planning (ERP) or equivalent software integrated with other back office functions for managing HR processes, finance, and accounting by this establishment.	Yes/No

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities¹</i>	
b8a6	Indicate the use of other methods for managing HR processes, finance, and accounting by this establishment.	Yes/No
b8b	Select the method used more often by this establishment for managing HR processes, finance, and accounting.	Select an option number
b8c	Indicate the number of years using specialized software or ERP software for managing HR processes, finance, and accounting by this establishment.	Number (years)
b9a1	Indicate if the establishment uses handwritten processes as a production planning method.	Yes/No
b9a2	Indicate if the establishment uses computer with general purpose software as a production planning method.	Yes/No
b9a3	Indicate if the establishment uses mobile Apps or digital platforms.	Yes/No
b9a4	Indicate if the establishment uses specialized software for demand planning and forecasting as a production planning method.	Yes/No
b9a5	Indicate if the establishment uses Enterprise Resource Planning (ERP) or similar specialized software integrated with other administrative functions as a production planning method. <i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i>	Yes/No
b9a6	Indicate if the establishment uses other methods for production planning.	Yes/No
b9b	Select from the methods of production planning mentioned above which one is used more often in the establishment	Select an option number
b9c	Indicate the number of years using a specialized software for production planning by this establishment Note: This refers to the number of years from current year (2023) since the technology has been implemented. For example, if the technology has been implemented in 2017, then this would be 6 years (=2023-2017).	Number (years)
b10a1	Indicate if the establishment uses manual search of suppliers, including personal visit or phone calls to select and manage suppliers and purchase materials and services	Yes/No
b10a2	Indicate if the establishment uses management of supply chain information using PCs, manually updated (e.g. Microsoft Excel) to select and manage suppliers and purchase materials and services	Yes/No
b10a3	Indicate if the establishment uses online social media, specialized Apps or digital platforms to select and manage suppliers and purchase materials and services	Yes/No

¹ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Enterprise_resource_planning.

Number	Instructions	Answer type
Section B - General Business Functions		
b10a4	<p>Indicate if the establishment uses Supplier Relation Management (SRM) specialized software (not integrated with production planning) to select and manage suppliers and purchase materials and services.</p> <p><i>Definition of SRM: Supplier relationship management (SRM) software is used to organize supplier information and allows for monitoring and traceability of all external sales and procurement within an establishment.²</i></p>	Yes/No
b10a5	<p>Indicate if the establishment uses Supplier Relation Management (SRM) specialized software (integrated with production planning) to select and manage suppliers and purchase materials and services</p> <p><i>Definition of SRM: Supplier relationship management (SRM) software is used to organize supplier information and allows for monitoring and traceability of all external sales and procurement within an establishment.</i></p>	Yes/No
b10a6	Indicate if the establishment uses other methods to select and manage suppliers and purchase materials and services	Yes/No
b10a	Select the procedure used more often by this establishment to select suppliers and purchase materials and services.	Select an option number
b10c	<p>Indicate the number of years has this establishment been using SRM for supply chain management.</p> <p><i>Definition of SRM: Supplier relationship management (SRM) software is used to organize supplier information and allows for monitoring and traceability of all external sales and procurement within an establishment.</i></p>	Number (years)
b11a1	Indicate if the establishment uses face-to-face chat or conversations as a method for gathering and analyzing information from costumers for marketing.	Yes/No
b11a2	Indicate if the establishment uses online chat (for example, online chat on website, WhatsApp, Facebook, etc.) as a method for gathering and analyzing information from costumers for marketing.	Yes/No
b11a3	Indicate if the establishment uses structured customer surveys as a method for gathering and analyzing information from costumers for marketing.	Yes/No
b11a4	<p>Indicate if the establishment uses Customer Relationship Management software (CRM) or similar software as a method for gathering and analyzing information from costumers for marketing.</p> <p><i>Definition of CRM: Consumer relationship management (CRM) software is used to handle a company's dealings with its customers. Current CRMs integrate the software with telephone and call recording systems as well as with corporate systems for input and reporting.³</i></p>	Yes/No
b11a5	Indicate if the establishment uses big data analytics or machine learning (artificial intelligence) as a method for gathering and analyzing information from costumers for marketing.	Yes/No

² Source: Pipefy, Accessed 11/21/2023. <https://www.pipefy.com/blog/srm-software/>

³ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Consumer_relationship_system.

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>Definition of big data analytics and machine learning: Big data analytics describes the process of uncovering trends, patterns, and correlations in large amounts of raw data to help make data-informed decisions.⁴ Meanwhile, machine learning (ML) is a field of study in artificial intelligence concerned with the development and study of statistical algorithms that can effectively generalize and thus perform tasks without explicit instructions.⁵</i>	
b11a6	Indicate if the establishment uses other methods for gathering and analyzing information from costumers for marketing.	Yes/No
b11b	Select from a list the method for collecting and analyzing information from customers that is used more often in this establishment.	Select an option number
b11c	Indicate the number of years this establishment has been using CRM, Big Data Analytics, Artificial Intelligence or other specialized software to analyze consumer behavior and customer information. <i>Refer to b11a4 for definition of CRM, refer to b11a5 for definitions of big data analytics and artificial intelligence.</i>	Number (years)
b12a1	Indicate if the establishment uses manual processes as a fabrication process for assembling or producing.	Yes/No
b12a2	Indicate if the establishment uses machines controlled by operators without computers as a fabrication process for assembling or producing.	Yes/No
b12a3	Indicate if the establishment uses computer numerical controlled machine or other machines controlled by computers as a fabrication process for assembling or producing.	Yes/No
b12a4	Indicate if the establishment uses robots as a fabrication process for assembling or producing.	Yes/No
b12a5	Indicate if the establishment uses additive manufacturing including rapid prototyping and 3D printers as a fabrication process for assembling or producing. <i>Definition of 3D printing: 3D printing or additive manufacturing is the construction of a three-dimensional object from a CAD model or a digital 3D model. It can be done in a variety of processes in which material is deposited, joined or solidified under computer control, with the material being added together, typically layer by layer.⁶</i>	Yes/No
b12a6	Indicate if the establishment uses other advanced manufacturing processes (like laser, plasma sputtering, high speed machine, E-beam, micromachining) as a fabrication process for assembling or producing. <i>Definitions: Plasma sputtering is a process in which microscopic particles of a solid material are ejected from its surface, after the material is itself bombarded by energetic particles of a plasma.⁷ High speed machining uses milling machines</i>	Yes/No

⁴ Source: Tableau, Accessed 11/21/2023. <https://www.tableau.com/learn/articles/big-data-analytics>.

⁵ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Machine_learning.

⁶ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/3D_printing

⁷ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/3D_printing

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>at higher spindle rates with lighter, shallower cuts to achieve greater metal removal rates and lower operating costs.⁸ E-beam machining is a process where high-velocity electrons concentrated into a narrow beam that are directed towards the work piece, creating heat and vaporizing the material.⁹ Lastly, micromachining is a technique for fabrication of 3D and 2D structures on the micrometer scale.¹⁰</i>	
b12a7	Indicate if the establishment uses other methods as a fabrication process for assembling or producing.	Yes/No
b12b	Select from a list the process for assembling and producing that is used more often in this establishment.	Select an option number
b12c	Indicate the number of years computer numerical controlled machine, robots or 3D printers has been used in this establishment for fabrication or assembling. <i>Refer to b12a5 for definition of 3D printing.</i>	Number (years)
b13a	Indicate if this establishment sells products to final consumers	Yes/No
b13b1	Indicate if this establishment uses direct sales at the establishment's premises as a sale method. Note: This should be marked yes whenever the establishment sells their products and services at their factory, office, shop or storage facility.	Yes/No
b13b2	Indicate if this establishment uses sales by phone, email orders, or sales representatives as a sale method.	Yes/No
b13b3	Indicate if this establishment uses social media platforms (like Facebook) or apps as a sale method.	Yes/No
b13b4	Indicate if this establishment uses online sales with external websites (like Amazon, eBay, Alibaba, etc.) as a sale method.	Yes/No
b13b5	Indicate if this establishment uses online sales with the website of the company as a sale method.	Yes/No
b13b6	Indicate if this establishment uses electronic orders integrated to specialized supply chain management systems as a sale method. <i>Definition of supply chain management system: These refer to systems that manage the flow of goods, data, and finances related to a product or service, from the procurement of raw materials to the delivery of the product at its destination.¹¹</i>	Yes/No
b13b7	Indicate if this establishment uses other approach as a sale method.	Yes/No
b13c	Select from a list the sale method that is used more often in this establishment.	Select an option number
b13d	Indicate the number of years this establishment has been using online sales or electronic sales.	Number (years)
b13e	What was the share of online sales in total sales in 2020?	Share (%)

⁸ Source: Accessed 11/21/2023. <https://tagteammfg.com/whats-high-speed-machining/>

⁹ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Electron-beam_machining

¹⁰ Source: Wikipedia, Accessed 11/21/2023. <https://en.wikipedia.org/wiki/Micromachining>

¹¹ Source: Oracle, Accessed 11/21/2023. <https://www.oracle.com/scm/what-is-supply-chain-management/#:~:text=At%20the%20most%20fundamental%20level,product%20at%20its%20final%20destination.>

Number	Instructions	Answer type
Section B - General Business Functions		
b13e2	What was the share of online sales in total sales in 2022?	Share (%)
b14a1	Indicate if this establishment uses exchange of goods as a payment method.	Yes/No
b14a2	Indicate if this establishment uses cash as a payment method.	Yes/No
b14a3	Indicate if this establishment uses cheque, voucher, or bank wire at the branch as a payment method.	Yes/No
b14a4	Indicate if this establishment uses prepaid card, debit card, or credit card as a payment method.	Yes/No
b14a5	Indicate if this establishment uses online or electronic payment through bank wire as a payment method.	Yes/No
b14a6	Indicate if this establishment uses online payments through platform (like mobile money, mobile wallet, PayPal, or similar App-based payment service) as a payment method. <i>Definitions: Mobile wallets, also known as digital wallets or e-wallets, are software-based applications that securely store users' payment information, facilitating electronic transactions via smartphones and other digital devices. Meanwhile, mobile money services enable users to conduct various financial transactions, including person-to-person transfers, bill payments, and airtime top-ups, using basic mobile phones.¹²</i>	Yes/No
b14a7	Indicate if this establishment uses virtual currency or cryptocurrency (e.g. Bitcoin, Ether, or others) as a payment method. <i>Definition: A cryptocurrency is an example of a convertible virtual currency that can be used as payment for goods and services, digitally traded between users, and exchanged for or into real currencies or digital assets.¹³</i>	Yes/No
b14a8	Indicate if this establishment uses other approach as a payment method.	Yes/No
b14b	Select from a list the payment method that is used more often in this establishment.	Select an option number
b14c	Indicate the number of years this establishment has been using any of the online or electronic payment methods.	Number (years)
b15a1	Indicate if this establishment uses manual, visual, or written processes without the support of digital technologies as a quality control process.	Yes/No
b15a2	Indicate if this establishment uses human inspection with the support of digital technologies such as computers or phones as a quality control process.	Yes/No
b15a3	Indicate if this establishment uses statistical process control as a quality control process.	Yes/No
b15a4	Indicate if this establishment uses automated systems for inspection (including laser-based, sensor-based or statistical representative processes) as a quality control process.	Yes/No

¹² Source: LinkedIn, Accessed 11/21/2023. <https://www.linkedin.com/pulse/key-differences-between-mobile-wallets-money-guide-patrick-mutabazi>

¹³ Source: IRS, Accessed 11/21/2023. <https://www.irs.gov/businesses/small-businesses-self-employed/digital-assets#:~:text=A%20cryptocurrency%20is%20an%20example,real%20currencies%20or%20digital%20assets.>

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>Definition of automated systems: Automated inspection is the use of digital or computer-aided inspection, measurement and analysis of components. The automation can be: the manipulation of the object, the collection of measurements, or the analysis post-inspection to assess the component against a specification.¹⁴</i>	
b15a5	Indicate if this establishment uses other approach as a quality control process.	Yes/No
b15b	Select from a list the quality control method that is used more often in this establishment.	Select an option number
b15c	Indicate the number of years has the establishment had been using statistical process control with software monitoring and data management or automated systems for inspection as a quality control method	Number (years)
b16a	Indicate whether the premises of the establishment is LEED certified (Leadership in Energy and Environmental Design for green building rating system) <i>Definition of LEED: Leadership in Energy and Environmental Design (LEED) is the world's most widely used green building rating system. LEED certification provides a framework for healthy, highly efficient, and cost-saving green buildings, which offer environmental, social and governance benefits.¹⁵</i>	Yes/No
b16a1	Indicate whether the establishment uses Energy Star/efficient rated equipment, computers and appliances as an energy efficiency method. <i>Definition of Energy Star: ENERGY STAR is a US-government-backed symbol for energy efficiency. The blue ENERGY STAR label provides simple, credible, and unbiased information that consumers and businesses rely on to make well-informed decisions.¹⁶</i>	Yes/No
b16a2	Indicate whether the establishment uses Energy efficient lighting (LED/CFL lamps in lieu of incandescent) as an energy efficiency method. <i>Definition of energy efficient lighting: The energy efficiency in the lighting sector gives the required illumination level of the lighting scheme for the application it has been designed for, while consuming the least amount of energy.¹⁷</i>	Yes/No
b16a3	Indicate whether the establishment uses VAV (variable air volume) HVAC systems as an energy efficiency method. <i>Definition of VAV: Variable air volume (VAV) is a type of heating, ventilating, and/or air-conditioning (HVAC) system. Unlike constant air volume (CAV) systems, which supply a constant airflow at a variable</i>	Yes/No

¹⁴ Accessed 11/21/2023. <https://www.capture3d.com/knowledge-center/blog/automated-inspection>

¹⁵ Accessed 11/21/2023. <https://www.usgbc.org/leed>

¹⁶ Accessed 11/21/2023. <https://www.energystar.gov/about>

¹⁷ Accessed 11/21/2023. https://www.electricaltechnology.org/2016/12/energy-efficient-lighting-techniques-to-implement-it.html#google_vignette

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>temperature, VAV systems vary the airflow at a constant or varying temperature.</i> ¹⁸	
b16a4	Indicate whether the establishment uses programmable thermostats, timers, robots, motion sensors as an energy efficiency method. <i>Definitions: A programmable thermostat is a thermostat which is designed to adjust the temperature according to a series of programmed settings that take effect at different times of the day.</i> ¹⁹ <i>Meanwhile, motion sensors (ie motion sensor lighting) are responsible for turning on the light when they sense a presence and automatically turning it off when it is no longer there.</i> ²⁰	Yes/No
b16a5	Indicate whether the establishment uses IoT enabled system to control premises temperatures, lighting system and/or refrigeration units as an energy efficiency method. <i>Definition of IoT: The Internet of Things (IoT) describes the network of physical objects or “things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.</i> ²¹	Yes/No
b16b	Does this establishment treat wastewater from production/services?	Yes/No
b16b1	Primary treatment through sedimentation tanks to remove settleable solids, and/or scrape fats and oils.	Yes/No
b16b2	Secondary treatment methods to remove organic contaminants: such as bioreactors/ aerobic bacteria additives, filter beds, aerated ponds, activated sludge or rotating biological contactors	Yes/No
b16b3	Tertiary treatment methods disinfecting water and treating wastewater for public water systems, including UV disinfection or chemical disinfection	Yes/No
b16c	Do you have installed any cooling systems in your plant, warehouses and premises?	Yes/No
b16c1	What percentage of the plant, warehouse and premises are cooled?	Yes/No
b16c2	Cooled by: Misting fans (fan-coolers)	Yes/No
b16c3	Cooled by: Independent HVAC systems	Yes/No
b16c4	Cooled by: Fully integrated climate controls systems operated manually	Yes/No
b16c5	Cooled by: Fully integrated climate and indoor air quality controls systems operated by central computer with IoT sensors <i>Definition of IoT: The Internet of Things (IoT) describes the network of physical objects or “things”—that are embedded with sensors, software, and</i>	Yes/No

¹⁸ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Variable_air_volume

¹⁹ Source: Wikipedia, Accessed 11/21/2023. https://en.wikipedia.org/wiki/Programmable_thermostat

²⁰ Source: Accessed 11/21/2023. <https://www.endsa.com/en/the-e-face/energy-efficiency/Savings-motion-sensors>

²¹ Source: Wikipedia, Accessed 11/21/2023. <https://www.oracle.com/internet-of-things/what-is-iot/>

Number	Instructions	Answer type
Section B - General Business Functions		
	<i>other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet</i>	

8.3 SECTION D – DRIVERS AND BARRIERS OF TECHNOLOGY ADOPTION

Number	Instructions	Answer type
Section D – Drivers of Technology Adoption		
d1a	Indicate whether over the last three years [2016, 2017, and 2018] this establishment acquired or integrated new technology by purchasing or leasing new or second-hand equipment or machines.	Yes, new/Yes, Second-hand/ Yes, both/ No
d1b	Indicate whether over the last three years [2016, 2017, and 2018] this establishment acquired or integrated new technology by Purchasing or leasing off-the-shelf software.	Yes/No
d2d	Indicate whether this establishment has had any business relationship (as supplier or buyer) with a multinational firm over the last three years.	Yes/No
d2e	Indicate whether the top manager has had experience working for a firm with more than 50 employees or a multinational in the same economic sector of this establishment.	Yes/No
d3a	Indicate whether over the last three years, this establishment borrowed money for purchasing machines, equipment, or licensing software or processes.	Yes/No
d3c	Refer to the number of times this establishment needed to borrow money to expand production but could not do it because of lack of collateral or access to finance.	Counting (number of times)
d4a	Indicate if the establishment has formal incentives (money, gifts, recognition, etc.) for a worker to suggests better ways to produce goods or services in the establishment or firm.	Yes/No
d4b	Indicate how many key performance indicators (KPI) were monitored last year in this establishment. The alternatives are a range of KPIs.	Select an option number
d6a	Indicate whether over the last three years this establishment exported.	Select an option number
d6b	Indicate whether in the last complete fiscal year, this establishment imported material inputs, machines or equipment directly.	Percent (%)
d6c	Indicate whether over the last three years this establishment imported material inputs, machines, or equipment directly.	Select an option number
d7a	Mention whether you are aware of any government support or subsidy in the adoption of a new technology that could benefit the establishment.	Yes/No
d7b	Indicate if this establishment has received any benefit from the government to adopt new technology.	Yes/No
d7c	Refer to the kind of government support in the adoption of the new technology. Mark 1 for information, 2 for technical assistance, 3 for tax incentive, 4 for grant, 5 for loan, and 6 for	Select an option number

Number	Instructions	Answer type
Section D – Drivers of Technology Adoption		
	other.	
d8a	Select the option that best describes the first reason (or main obstacle) why if there is a new machine, equipment, software or process that could improve the productivity of this establishment, it was not adopted. If the firm has no obstacles then “Others” should be selected.	Select an option number
d8d	Select the option that best describes the first reason (or main driver) why a new machine, equipment, software or process was adopted in this establishment.	Select an option number
d9a	Which of the following environmental and sustainability management practices are used by this establishment? – ISO 14001 <i>Definition: ISO 14001 is a family of standards by the International Organization for Standardization (ISO) related to environmental management that exists to help organizations (a) minimize how their operations (processes, etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements; and (c) continually improve in the above²²</i>	Yes/No
d9b	Which of the following environmental and sustainability management practices are used by this establishment? – ISO 50001 <i>Definition: ISO 50001 Energy management systems - Requirements with guidance for use, is an international standard created by the International Organization for Standardization (ISO). It supports organizations in all sectors to use energy more efficiently through the development of an energy Management System.²³</i>	Yes/No
d9c	Which of the following environmental and sustainability management practices are used by this establishment? - Periodically audited for compliance with environmental regulatory requirements by a third party	Yes/No
d9d	Which of the following environmental and sustainability management practices are used by this establishment? - Formally evaluates contractors and suppliers’ environmental compliance.	Yes/No
d9e	Which of the following environmental and sustainability management practices are used by this establishment? - Participates in any form of carbon-trading, tracking, purchasing and/or selling carbon offset credits.	Yes/No
d9f	Which of the following environmental and sustainability management practices are used by this establishment? - Monitors CO2 and/or CO emissions explicitly at least annually.	Yes/No
d9g	Which of the following environmental and sustainability management practices are used by this establishment? -	Yes/No

²² https://en.wikipedia.org/wiki/ISO_14000

²³ https://en.wikipedia.org/wiki/ISO_50001

Number	Instructions	Answer type
Section D – Drivers of Technology Adoption		
	Monitor energy usage or energy use intensity, at least annually.	
d9h	Which of the following environmental and sustainability management practices are used by this establishment? - Training for staff on energy management	Yes/No

8.4 SECTION E – LABOR AND BALANCE SHEET

Number	Instructions	Answer Type
Section E – Labor and balance sheet		
e1a	<p><i>Number of permanent, full-time workers currently:</i> All workers that are contracted for one or more fiscal years and/or have a guaranteed renewal of employment or an open-ended contract. These workers work a full shift, though this definition may vary by country and by industry.</p> <p>Include paid and unpaid workers (for ex. family members if any). All workers and managers (including respondent) should be counted.</p> <p>In many countries, firms keep workers under temporary contracts that get renewed every year. In these instances, given that workers work a full year they should be included. In other countries, firms “outsource” their employment so that they hire a third party for its workers: in this case all these workers should be accounted for as well, to the extent that they meet the criteria explained above.</p>	Number
e1	<i>Number of permanent, workers, at the end of last fiscal year [2022]:</i> See e1a.	Number
e2	<i>Number of permanent, workers, at the end of last fiscal year [2020]:</i> See e1a.	Number
e3h	<i>How many engineers, scientific professionals, and Research and Development workers does this establishment have?</i> Research and Development or R&D refers to a specific group of activities that a business chooses to conduct with the intention of making a discovery that can either lead to the development of new products or service or procedures, or to improvement of existing products or service or procedures. For example, laboratory research for a new chemical compound of paint would be research and development while market research surveys or internet surfing are NOT considered to be R&D	Number
e5d	<i>The percentage of workers who completed college degree or more (16+ years of education):</i> Self-explanatory.	Share (%)
e6a	<i>Amount of total annual sales for all products and services, at the end of the year [2022]:</i> Self-explanatory.	Local currency
e6b	<i>Amount of total annual sales for all products and services, at the end of the year [2020]:</i> Self-explanatory.	Local currency
e7a	<i>Amount of total annual cost of labor (including wages, salaries, bonuses, social security payments):</i> Self-explanatory.	Local currency
e7b	<i>Amount of total annual cost of raw materials and intermediate goods used in</i>	Local currency

Number	Instructions	Answer Type
	<i>production or materials purchased to resell</i> : Self-explanatory.	
e7c	<i>Amount of total annual cost of electricity</i> : Self-explanatory.	Local currency
e7c1	<i>Total annual cost of natural gas</i> . Self-explanatory.	Local currency
e7c2	<i>Total annual cost of fuel oils</i> . Self-explanatory.	Local currency
e7c3	<i>Total annual cost of Liquefied Petroleum Gases (LPG)</i> . Self-explanatory.	Local currency
e7c4	<i>Total annual cost of Coal or Wood fuels (wood, charcoal, others)</i> . Self-explanatory.	Local currency
e7c5	<i>Total annual cost of own renewable sources used in your production</i> . Self-explanatory.	Local currency
e7d	<i>Amount of total cost of production or service operations (including costs of marketing, distribution, and others not listed above)</i> : Self-explanatory.	Local currency
b7e_1	During the year 2022, what was the per unit cost of electricity for this establishments?	Local currency
b7e_2	During the year 2022, what was the total cost of electricity purchased and delivered to this establishment, regardless of when payment was made?	Local currency
b7e	During the year 2022, what was the total quantity of electricity purchased and delivered to this establishment, regardless of when payment was made.	(Kwh)
e7f_vn	Do you provide any type of after-sales services? (e.g. help desk and technical support, training, warranty, repair and maintenance, online support)	Yes/No
e7f1_vn	How do you provide these services?	Select from option
e7g_vn	Do you use external services during production and distribution processes?	Yes/No
e7g1_vn	Do you use external services during production and distribution processes?: External R&D (Research and Development) services	Yes/No
e7g2_vn	Do you use external services during production and distribution processes?: External IT (Information Technology) services	Yes/No
e7g3_vn	Do you use external services during production and distribution processes?: External engineering services or product design services	Yes/No
e7g4_vn	Do you use external services during production and distribution processes?: External or independent quality control services	Yes/No
e7g5_vn	Do you use external services during production and distribution processes?: External marketing services	Yes/No
e7g6_vn	Do you use external services during production and distribution processes?: External distribution and logistics services companies for the domestic market	Yes/No
e7g7_vn	Do you use external services during production and distribution processes?: External distribution and logistics services companies for importing or exporting	Yes/No
e7g8_vn	Do you use external services during production and distribution processes?: Other external services not listed above	Yes/No
e7h_vn	What is the approximate share of all these costs in your total cost (R&D external services, IT services, engineering or design of products/independent quality,...)	Share (%)
e8a	<i>Expected costs to purchase all the machinery, vehicles, and equipment (owned, rented or leased) the establishment uses now</i> : Total costs expected to	Local currency

Number	Instructions	Answer Type
	purchase all the machinery, vehicles, and equipment owned, rented, or leased by this establishment now.	
e8b	<u>Expected costs to purchase buildings (owned, rented or leased) the establishment uses now:</u> Total costs expected to purchase all the buildings owned, rented, or leased by this establishment now.	Local currency
e8c	<u>Expected costs to purchase Power plant for renewable sources:</u> Total costs expected to purchase all the powerplant for renewable sources owned, rented, or leased by this establishment now.	Local currency
e9rd	<u>Total expenditure on R&D</u>	Local currency
e10a	<u>Share of main product sales in total sales:</u> Self-explanatory.	Percentage
e10b	<u>Average markup:</u> Markup is the ratio between the cost of a good or service and its selling price.	Percentage

9. CONTROL QUESTIONS

Number	Instructions	Answer Type
Information Acquired at the End of Survey		
a8	<u>Interviewer code</u> : Self-explanatory	Number
a9d	<u>Time face-to-face interview ends - Day</u> : Self-explanatory	Number
a9m	<u>Time face-to-face interview ends - Month</u> : Self-explanatory	Number
a9y	<u>Time face-to-face interview ends - Year</u> : Self-explanatory	Number
a9h	<u>Time face-to-face interview ends - Hour</u> : Self-explanatory	Number
a9min	<u>Time face-to-face interview ends - Minutes</u> : Self-explanatory	Number
a10a	<u>Position of the main respondent</u> : Self-explanatory	Select an option
a10b	<u>Position of the main respondent</u> : Specify the position of the main respondent if their positions are not in the list of options.	Describe
a11a	<u>Tenure of main respondent for this establishment</u> : Self-explanatory	Number
a11b	<u>Gender of main respondent</u> : Self-explanatory	Describe
a11c	<u>Email of main respondent</u> : Self-explanatory	Describe
a11d	<u>Phone Number 1 of main respondent</u> : Self-explanatory	Describe
a11e	<u>Phone Number 2 of main respondent</u> : Self-explanatory	Describe
a11f	<u>Name of main respondent</u> : Self-explanatory	Describe
a12	<u>Source of respondents' answers to the questions regarding figures (productivity and employment numbers)</u> : Self-explanatory	Select an option
a13	<u>Interviewer's comments for Problems occurred/extraordinary circumstances which could influence results</u> : Self-explanatory	Describe
a14	<u>Number of respondents or visits to complete this interview</u> : Self-explanatory	Select an option
a15h	<u>Duration of the whole interview – Hours</u> : Self-explanatory	Number
a15m	<u>Duration of the whole interview – Minutes</u> : Self-explanatory	Number
a16	<u>Supervisor code</u> : Self-explanatory	Number
a17a	<u>Capital city</u> : Self-explanatory	Yes/No
a17b	<u>Main business city</u> : Self-explanatory	Yes/No
a17c	<u>Size of locality</u> : Self-explanatory	Select an option
a17	<u>Code of the main product and activity</u> : Self-explanatory	Number

10. QUESTION-BY-QUESTION EXPLANATION - SECTION C

10.1 AGRICULTURE (CROPS AND FRUITS)

Number	Instructions	Answer type
Section C. SECTOR SPECIFIC TECHNOLOGIES		
1. Agriculture (Crops and Fruits)		
c1_0a1	Indicate whether this establishment uses radio (e.g. agriculture programming, advertisements) as a source of information for production decisions.	Yes/No
c1_0a2	Indicate whether this establishment uses TV (e.g. agriculture programming, advertisements) as a source of information for production decisions.	Yes/No
c1_0a3	Indicate whether this establishment uses non-internet mobile phone (SMS, Voice Calling) as a source of information for production decisions.	Yes/No
c1_0a4	Indicate whether this establishment uses mobile internet technologies (e.g. YouTube, WhatsApp, Facebook, Skype, Email, and other web applications) as a source of information for production decisions.	Yes/No
c1_0a5	Indicate whether this establishment uses meetings with other producers, producer organizations, or cooperative as a source of information for production decisions.	Yes/No
c1_0a6	Indicate whether this establishment uses demonstration or visit by public- or private-extension agents (e.g. NGOs, Agribusiness Buyers etc.) as a source of information for production decisions.	Yes/No
c1_0a7	Indicate whether this establishment uses precision agriculture tools (farm management software connected to Internet and other tool related to precision agriculture) as a source of information for production decisions. <i>Definition: Precision agriculture (PA) is a farming management strategy based on observing, measuring and responding to temporal and spatial variability to improve agricultural production sustainability. Precision agriculture often employs technologies to automate agricultural operations, improving their diagnosis, decision-making or performing.²⁴</i>	Yes/No
c1_0b1	Indicate which of the sources of information listed in the previous question was the most relevant	Select an option number
c1_0c1	Indicate total number of acres owned	Number
c1_0c2	Indicate total number of acres rented or leased from others.	Number

²⁴ Source: Wikipedia, Accessed 11/28/2023.

https://en.wikipedia.org/wiki/Precision_agriculture#:~:text=Precision%20agriculture%20often%20employs%20technologies,back%20in%20the%20late%201980s.

Number	Instructions	Answer type
c1_0c3	Indicate total number of acres rented or leased to others,	Number
c1_0c4	Indicate total acres that operates. $c1_0c4 = (c1_0c1 + c1_0c2 - c1_0c3)$	Number
c1_0c5	Indicate tractors owned by the establishment	Number
c1_0c6	Indicate whether rent tractor, equipment or machines.	Yes/No
c1_0c7	Indicate if the establishment rents any equipment, machine or tractor using an online platform, such as uber tractor.	Yes/No
c1_0d1	Indicate the main sources of seeds, whether it is own production, private providers or public programs.	Select an option number
c1_0d2	Indicate whether the seed receive any pre-treatment, such as water soaking, hydrogen peroxide soaking or stratification.	Yes/No
1.1 Agriculture (Crops and Fruits)		
c1_1a1	Indicate whether this establishment's workers prepare the land.	Yes/No
c1_1a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c1_1a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c1_1b1	Indicate whether this establishment uses manual plowing with simple tools (e.g. hand-held hoes, split-hoes, rake) for land preparation	Yes/No
c1_1b2	Indicate whether this establishment uses animal aided instruments (e.g. ploughs) for land preparation	Yes/No
c1_1b3	Indicate whether this establishment uses tractors, motor tillers, rotators, or other equipment manually operated by workers for land preparation	Yes/No
c1_1b4	Indicate whether this establishment uses tractors or other equipment supported by digital enabled technologies (e.g. GPS, software, or precision agriculture tools) for land preparation <i>Definition of technologies: The Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Meanwhile, Precision agriculture often employs technologies to automate agricultural operations, improving their diagnosis, decision-making or performing.²⁵</i>	Yes/No
c1_1b5	Indicate whether this establishment uses other methods for land preparation.	Yes/No
c1_1c	Select from one of the options listed above, the method used more often for land preparation.	Select an option number

²⁵ Source: Wikipedia, Accessed 11/28/2023. https://en.wikipedia.org/wiki/Global_Positioning_System

Number	Instructions	Answer type
c1_1d	Indicate for how long this establishment has been using digital enabled tractors, equipment, or precision agriculture tools for land preparation.	Number of years
c1_2a1	Indicate whether this establishment's production require irrigation	Yes/No
c1_2b1	Indicate whether this establishment uses rain-fed, no additional irrigation for irrigation	Yes/No
c1_2b2	Indicate whether this establishment uses manual irrigation with watering cans for irrigation	Yes/No
c1_2b3	Indicate whether this establishment uses surface flood irrigation by gravity for irrigation	Yes/No
c1_2b4	Indicate whether this establishment uses Irrigation by Small Pump irrigation	Yes/No
c1_2b5	Indicate whether this establishment uses drip irrigation, localized irrigation, underground pipes, sprinkler or center pivot for irrigation <i>Definition of technologies: Drip irrigation is a form of irrigation that saves water and fertiliser by allowing water to drip slowly to the roots of crops in a field, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. Center pivot irrigation is a mechanized irrigation system that irrigates crops in a circular pattern around a central pivot.²⁶ Meanwhile, localized irrigation is a system where the water is distributed under low pressure through a piped network, in a pre-determined pattern, and applied as a small discharge to each plant or adjacent to it.²⁷</i>	Yes/No
c1_2b6	Indicate whether this establishment uses automated system controlled by sensors, software, internet, or apps for irrigation <i>Definition of automated system of irrigation: An automated irrigation system refers to the operation of the system with no or just a minimum of manual intervention beside the surveillance. Almost every system (drip, sprinkler, surface) can be automated with help of timers, sensors or computers or mechanical appliances.²⁸</i>	Yes/No
c1_2b7	Indicate whether this establishment uses other method for irrigation	Yes/No
c1_2c	Select from one of the options listed above, the method used more often for irrigation.	Select an option number
c1_2d	Indicate for how long this establishment has been	Number of years

²⁶ Source: Accessed 11/28/2023. <https://www.lindsay.com/mea/en/resource/what's-the-difference-and-which-method-should-you-use/>

²⁷ Source: Accessed 11/28/2023. <https://www.unescwa.org/sd-glossary/localized-irrigation#:~:text=Term%3A-Localized%20irrigation,plant%20or%20adjacent%20to%20it.>

²⁸ Source: Accessed 11/28/2023. <https://sswm.info/sswm-university-course/module-4-sustainable-water-supply/further-resources-water-use/automatic-irrigation>

Number	Instructions	Answer type
	using drip irrigation, localized irrigation, underground pipes, sprinkler, center pivot or precision agriculture tools for land preparation.	
c1_3a1	Indicate whether this establishment's production require irrigation	Yes/No
c1_3a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c1_3a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c1_3b1	Indicate whether this establishment uses manual application of organic herbicide, fertilizer, or pesticide for weeding and pest control.	Yes/No
c1_3b2	Indicate whether this establishment uses mechanical application of herbicide, fertilizer, or pesticide for weeding and pest control.	Yes/No
c1_3b3	Indicate whether this establishment uses biological methods of fertilizing, weed, or pest control for weeding and pest control	Yes/No
c1_3b4	Indicate whether this establishment uses fully-automated Variable Rate Application (VRA) tools in combination with soil and plant sensors (Precision Agriculture) for weeding and pest control <i>Definition of technologies: Variable rate application (VRA) refers to the application of a material, such that the rate of application is based on the precise location, or qualities of the area that the material is being applied.²⁹ Precision agriculture (PA) is a farming management strategy based on observing, measuring, and responding to temporal and spatial variability to improve agricultural production sustainability.</i>	Yes/No
c1_3b5	Indicate whether this establishment uses drone application in combination with remote sensing or on-site sensors (Advanced Precision Agriculture) for weeding and pest control <i>Definition of technologies: Advanced methods in in precision agriculture include drones and remote sensing. Drones equipped with advanced sensors, such as multispectral or hyperspectral cameras, can collect real-time data on crop health, soil moisture, and nutrient levels. This data can be used to create detailed maps of crop conditions, enabling farmers to apply fertilizers more precisely, thereby optimizing crop yields.³⁰</i>	Yes/No
c1_3b6	Indicate whether this establishment uses other	Yes/No

²⁹ Source: Wikipedia, Accessed 11/28/2023. https://en.wikipedia.org/wiki/Variable_rate_application

³⁰ Source: Accessed 11/28/2023. https://medium.com/@info_24967/drone-based-fertilizer-application-9fd98bbf15ae#:~:text=Drone%2Dbased%20fertilizer%20application%20is,precision%2C%20and%20reduced%20environmental%20impact.

Number	Instructions	Answer type
	methods for weeding and pest control	
c1_3c	Select from one of the options listed above, the method used more often for weeding and pest control.	Select an option number
c1_3d	Indicate for how long the establishment has been using VRA or drone application for weeding and pest control. <i>Definition of VRA: Variable rate application (VRA) refers to the application of a material, such that the rate of application is based on the precise location, or qualities of the area that the material is being applied</i>	Number of years
c1_3e	Indicate whether the establishment uses organic or chemical herbicide, fertilizer, or pesticide for weeding and pest control	Select an option number
c1_4a1	Indicate whether this establishment conduct harvesting, pruning or training	Yes/No
c1_4a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c1_4a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c1_4b1	Indicate whether this establishment uses manual harvesting, training, pruning, or picking for harvesting, training and pruning.	Yes/No
c1_4b2	Indicate whether this establishment uses animal aided instruments for harvesting, training and pruning.	Yes/No
c1_4b3	Indicate whether this establishment uses human-operated machines or single-axle tractor, with one specific function for harvesting, training and pruning	Yes/No
c1_4b4	Indicate whether this establishment uses mechanized process with machines or tractors that combine multiple functions fully operated by the worker (without support of digital technologies) for harvesting, training and pruning	Yes/No
c1_4b5	Indicate whether this establishment uses automated process with machines or tractors that combine multiple functions supported by digital enabled technologies (e.g. GPS or computing systems integrated to tractor) for harvesting, training and pruning <i>Definition of technologies: Tractors with integrated GPS technology allows users to locate the tractor and give real-time movement data, including speed, direction, and position.</i>	Yes/No

Number	Instructions	Answer type
	<i>Tractor GPS systems utilize satellite signals.³¹Meanwhile, computer systems integrated to tractors transform electrical impulses into a controller or CPU to enable the tractor to perform its tasks. An example of this are autonomous tractors.³²</i>	
c1_4b6	Indicate whether this establishment uses other methods for harvesting, training and pruning	Yes/No
c1_4c	Select from one of the options listed above, the method used more often for harvesting, training and pruning.	Select an option number
c1_4d	Indicate for how long the establishment has been using mechanized or automated processes for harvesting, training and pruning.	Number of years
c1_5a1	Indicate whether this establishment stores its product in-house	Yes/No
c1_5a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c1_5a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c1_5b1	Indicate whether this establishment uses precarious facility with product totally or partially exposed to sun, rain and wind for storage.	Yes/No
c1_5b2	Indicate whether this establishment uses storage facilities protecting from sun, rain, or wind, but without controlled temperature for storage.	Yes/No
c1_5b3	Indicate whether this establishment uses special Storage facilities with cold or dry controlled environment for storage <i>Definition: Special storage facilities with cold storage management involves controls in temperature, relative humidity levels, air circulation, adequate space between storage bins, trays and containers, the mixing of compatible produce, as well as the management of product in and outflow.³³</i>	Yes/No
c1_5b4	Indicate whether this establishment uses high-end central storage facilities, with controlled atmosphere and temperature for storage <i>Definition: High-end central storage facilities, such as controlled atmosphere storage (CAS) technology involves</i>	Yes/No

³¹ Source: Accessed 11/28/2023. [https://www.smajayu.com/tractor-gps/#:~:text=Tractor%20GPS%20\(Global%20Positioning%20System,GPS%20systems%20utilize%20satellite%20signals.](https://www.smajayu.com/tractor-gps/#:~:text=Tractor%20GPS%20(Global%20Positioning%20System,GPS%20systems%20utilize%20satellite%20signals.)

³² Source: Accessed 11/28/2023. <https://www.bearflagrobotics.com/autonomous-farm-tractors/#:~:text=Autonomous%20farm%20tractors%20are%20equipped,capabilities%20and%20failsafe%20emergency%20systems.>

³³ Source: Accessed 11/29/2023.

https://energypedia.info/wiki/Cold_Storage_of_Agricultural_Products#Cold_Storage_Management

Number	Instructions	Answer type
	<i>reduction of oxygen (O₂) and increasing carbon dioxide (CO₂) as compared to the ambient atmosphere. Sometimes it also involves removal of ethylene and addition of carbon monoxide. These technologies involve a continuous monitoring and precise adjustment of these gases within the storage container, to a predetermined level.³⁴</i>	
c1_5b5	Indicate whether this establishment uses continuous temperature monitoring device or digital data loggers for storage	Yes/No
c1_5b6	Indicate whether this establishment uses other methods for storage	Yes/No
c1_5c	Select from one of the options listed above, the method used more often for storage.	Select an option number
c1_5d	Indicate for how long the establishment has been using special storage facilities or high-end central storage facilities or continuous temperature monitoring devices for storage.	Number of years
c1_6a1	Indicate whether this establishment packs its product in-house	Yes/No
c1_6a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c1_6a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c1_6b1	Indicate whether this establishment uses manual packing in bags, crates, or boxes for packaging.	Yes/No
c1_6b2	Indicate whether this establishment uses human-operated mechanical equipment for packing in bags, crates, or boxes for packaging.	Yes/No
c1_6b3	Indicate whether this establishment uses automated packing directly linked to the harvesting, training, pruning, or picking process for packaging <i>Definition of automated packaging: Packaging automation is using automatic or semi-automatic machinery at various stages of the packaging process, such as filling, wrapping, labeling and palletizing.³⁵</i>	Yes/No
c1_6b4	Indicate whether this establishment uses modified atmosphere packing for packaging <i>Definition of modified atmosphere packing: Modified atmosphere packaging (MAP) is based on altering the composition of gases in contact with a food by replacing the air in a sealed food package by strictly controlled gaseous</i>	Yes/No

³⁴ Source: Accessed 11/28/2023. [https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/controlled-atmosphere-storage#:~:text=Controlled%20atmosphere%20\(CA\)%20storage%20of,high%20relative%20humidity%20\(RH\).](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/controlled-atmosphere-storage#:~:text=Controlled%20atmosphere%20(CA)%20storage%20of,high%20relative%20humidity%20(RH).)

³⁵ Source: Accessed 11/29/2023. <https://robopacusa.com/advantages-of-automated-packaging/>

Number	Instructions	Answer type
	<i>mixtures, containing carbon dioxide, nitrogen, or others.</i> ³⁶	
c1_6b5	Indicate whether this establishment uses other method for packaging	Yes/No
c1_6c	Select from one of the options listed above, the method used more often for packaging.	Select an option number
c1_6d	Indicate for how long the establishment has been using automated packing or modified atmosphere packing for packaging. <i>Definitions of technologies: Packaging automation is using automatic or semi-automatic machinery at various stages of the packaging process, such as filling, wrapping, labeling and palletizing. Modified atmosphere packaging (MAP) is based on altering the composition of gases in contact with a food by replacing the air in a sealed food package by strictly controlled gaseous mixtures, containing carbon dioxide, nitrogen, or others.</i>	Number of years

10.2 AGRICULTURE - LIVESTOCK

2 Agriculture (Livestock)		
c2_0a1	Indicate whether this establishment uses radio (e.g. agriculture programming, advertisements) as a source of information for production decisions.	Yes/No
c2_0a2	Indicate whether this establishment uses TV (e.g. agriculture programming, advertisements) as a source of information for production decisions.	Yes/No
c2_0a3	Indicate whether this establishment uses non-internet mobile phone (SMS, Voice Calling) as a source of information for production decisions.	Yes/No
c2_0a4	Indicate whether this establishment uses mobile internet technologies (e.g. YouTube, WhatsApp, Facebook, Skype, Email, and other web applications) as a source of information for production decisions.	Yes/No
c2_0a5	Indicate whether this establishment uses meetings with other producers, producer organizations, or cooperative as a source of information for production decisions.	Yes/No
c2_0a6	Indicate whether this establishment uses demonstration or visit by public- or private-extension agents (e.g. NGOs, Agribusiness Buyers etc.) as a source of information for production decisions.	Yes/No
c2_0a7	Indicate whether this establishment uses precision	Yes/No

³⁶ Source: Accessed 11/29/2023. [https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/modified-atmosphere-packaging#:~:text=Modified%20atmosphere%20packaging%20\(MAP\)%20is%20based%20on%20altering%20the%20composition,shelf%20life%20of%20sensitive%20foods.](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/modified-atmosphere-packaging#:~:text=Modified%20atmosphere%20packaging%20(MAP)%20is%20based%20on%20altering%20the%20composition,shelf%20life%20of%20sensitive%20foods.)

Number	Instructions	Answer type
	<p>agriculture tools (farm management software connected to Internet and other tool related to precision agriculture) as a source of information for production decisions.</p> <p><i>Definition: Precision agriculture (PA) is a farming management strategy based on observing, measuring and responding to temporal and spatial variability to improve agricultural production sustainability. Precision agriculture often employs technologies to automate agricultural operations, improving their diagnosis, decision-making or performing.</i></p>	
c2_0b	Indicate was the most relevant source of information to support the production decisions of this establishment.	Select an option number
c2_0c1	Indicate total number of acres owned	Number
c2_0c2	Indicate total number of acres rented or leased from others.	Number
c2_0c3	Indicate total number of acres rented or leased to others,	Number
c2_0c4	Indicate total acres that operates. $c1_0c4 = (c1_0c1 + c1_0c2 - c1_0c3)$	Number
c2_0d	Indicate whether this establishment process the production in house to sell them for final consumers.	Yes/No
c2_1a1	Indicate whether this establishment conduct breeding and genetic procedures in house.	Yes/No
c2_1a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c2_1a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c2_1b1	Indicate whether this establishment uses breed substitution for breeding and genetics	Yes/No
c2_1b2	<p>Indicate whether this establishment uses inbreeding or Crossbreeding for breeding and genetics</p> <p><i>Definitions: Crossbreeding and inbreeding are mating extremes along a continuum: inbreeding is the mating of animals that are more closely related than the average in a population, and crossbreeding is the mating of animals that are less related than the average in a population.³⁷</i></p>	Yes/No
c2_1b3	<p>Indicate whether this establishment uses artificial insemination (AI) for breeding and genetics</p> <p><i>Definition of Artificial insemination: Artificial insemination (AI) is a procedure by which one manually deposits a sperm</i></p>	Yes/No

³⁷ Source: Accessed 11/29/2023.

<https://www.fao.org/3/x3840e/x3840e06.htm#:~:text=Crossbreeding%20and%20inbreeding%20are%20mating,the%20average%20in%20a%20population.>

Number	Instructions	Answer type
	<i>suspension, fresh or frozen-thawed, into the female reproductive tract to overcome logistical problems associated with natural mating.</i> ³⁸	
c2_1b4	<p>Indicate whether this establishment uses selective breeding based on molecular genetics (marker-assisted selection, PCR, DNA sequencing, transgenesis, cloning, genomics) for breeding and genetics</p> <p><i>Definitions: Marker-assisted selection (MAS) is the process of using morphological, biochemical, or DNA markers as indirect selection criteria for selecting agriculturally important traits in crop breeding.³⁹ Polymerase chain reaction (PCR) is a laboratory technique for rapidly producing (amplifying) millions to billions of copies of a specific segment of DNA.⁴⁰ DNA sequencing refers to the general laboratory technique for determining the exact sequence of nucleotides, or bases, in a DNA molecule.⁴¹ Meanwhile, transgenesis is the process of transferring an exogenous DNA segment or gene (transgene) to an animal so that it is able to pass the transgene on to all of the offspring.⁴² Cloning works by producing a genetic replica of an organism created without sexual reproduction.⁴³ Lastly, genomics is the field of science responsible for cataloging billions of DNA base pairs that encode thousands of genes in an organism.⁴⁴</i></p>	Yes/No
c2_1b5	Indicate whether this establishment uses other methods for breeding and genetics	Yes/No
c2_1c	Select from one of the options listed above, the method used more often for breeding and genetics.	Select an option number
c2_1d	Indicate for how long this establishment has been using artificial insemination or selective breeding based on molecular genetics for breeding and	Number of years

³⁸ Source: Accessed 11/29/2023. [https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/artificial-insemination#:~:text=Artificial%20insemination%20\(AI\)%20is%20a,problems%20associated%20with%20natural%20mating.](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/artificial-insemination#:~:text=Artificial%20insemination%20(AI)%20is%20a,problems%20associated%20with%20natural%20mating.)

³⁹ Source: Accessed 11/29/2023. [https://pubmed.ncbi.nlm.nih.gov/22895769/#:~:text=Marker%2Dassisted%20selection%20\(MAS\),important%20traits%20in%20crop%20breeding.](https://pubmed.ncbi.nlm.nih.gov/22895769/#:~:text=Marker%2Dassisted%20selection%20(MAS),important%20traits%20in%20crop%20breeding.)

⁴⁰ Source: Accessed 11/29/2023. [https://www.genome.gov/genetics-glossary/Polymerase-Chain-Reaction#:~:text=Polymerase%20chain%20reaction%20\(abbreviated%20PCR,be%20studied%20in%20greater%20detail.](https://www.genome.gov/genetics-glossary/Polymerase-Chain-Reaction#:~:text=Polymerase%20chain%20reaction%20(abbreviated%20PCR,be%20studied%20in%20greater%20detail.)

⁴¹ Source: Accessed 11/29/2023. <https://www.genome.gov/genetics-glossary/DNA-Sequencing#:~:text=DNA%20sequencing%20refers%20to%20the,use%20to%20develop%20and%20operate.>

⁴² Source: Accessed 11/29/2023. <https://www.nature.com/scitable/knowledge/library/transgenic-animals-in-agriculture-105646080/#:~:text=transgenesis%3A%20The%20process%20of%20transferring,DNA%20into%20its%20germ%2Dline.>

⁴³ Source: Accessed 11/29/2023. <https://www.usda.gov/topics/biotechnology/biotechnology-glossary#:~:text=Clone%3A%20A%20genetic%20replica%20of,from%20which%20genes%20are%20made.>

⁴⁴ Source: Accessed 11/29/2023. <https://www.usda.gov/media/blog/2015/11/19/genomics-and-precision-agriculture-future-farming>

Number	Instructions	Answer type
	<p>genetics.</p> <p><i>Definitions: Artificial insemination (AI) is a procedure by which one manually deposits a sperm suspension, fresh or frozen-thawed, into the female reproductive tract to overcome logistical problems associated with natural mating. Molecular genetics include several methods defined in c2_1b4.</i></p>	
c2_2a1	Indicate whether this establishment implement animal nutrition and feeding procedure in house	Yes/No
c2_2a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c2_2a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c2_2b1	Indicate whether this establishment uses household waste (food leftovers, kitchen residues etc.) for nutrition	Yes/No
c2_2b2	Indicate whether this establishment uses natural grasslands for nutrition	Yes/No
c2_2b3	Indicate whether this establishment uses integrated systems: crop-pasture (e.g. soybean-pasture); tree-crop-pasture; tree-pasture; tree-crop for nutrition	Yes/No
c2_2b4	Indicate whether this establishment uses production of forage crops for nutrition	Yes/No
c2_2b5	Indicate whether this establishment uses supplementary feed to grazing pastures: hay, silage, grains feed for nutrition	Yes/No
c2_2b6	<p>Indicate whether this establishment uses manufactured or mixed feed (use of feed mills on premises) for nutrition</p> <p><i>Definitions: Commercial feed means any materials, used singly or in combination, which are distributed, or are intended to be distributed, for use as feed or for mixing in feed, except unmixed whole seeds and unmixed physically altered seeds, provided the seeds are not chemically changed or adulterated.⁴⁵ Mixed feed for livestock consists of a mixture of wheat particles, bran, middlings, shorts, and other material in various proportions and is a by-product of flour milling.⁴⁶</i></p>	Yes/No
c2_2b7	<p>Indicate whether this establishment uses genetically-modified feed for nutrition</p> <p><i>Definition of GM feed: Genetically modified foods and feed are produced from organisms that have had changes introduced into their DNA using various methods of genetic</i></p>	Yes/No

⁴⁵ Source: Accessed 11/29/2023. <https://www.ndlegis.gov/cencode/t04-1c41.pdf>

⁴⁶ Source: Accessed 11/29/2023. <https://www.merriam-webster.com/dictionary/mixed%20feed#:~:text=%3A%20a%20feed%20for%20livestock%20that,by%2Dproduct%20of%20flour%20milling>

Number	Instructions	Answer type
	<i>engineering</i> . ⁴⁷	
c2_2b8	Indicate whether this establishment uses other methods for nutrition	Yes/No
c2_2c	Select from one of the options listed above, the method used more often for nutrition.	Select an option number
c2_2d	Indicate for how long this establishment has been using supplementary feed to grazing pastures, manufacturing or mixing of feed, or genetically-modified feed for nutrition. Definitions: <i>Commercial feed means any materials, used singly or in combination, which are distributed, or are intended to be distributed, for use as feed or for mixing in feed, except unmixed whole seeds and unmixed physically altered seeds, provided the seeds are not chemically changed or adulterated.</i> ⁴⁸ <i>Mixed feed for livestock consists of a mixture of wheat particles, bran, middlings, shorts, and other material in various proportions and is a by-product of flour milling. Genetically modified foods and feed are produced from organisms that have had changes introduced into their DNA using various methods of genetic engineering.</i>	Number of years
c2_3a1	Indicate whether this establishment implement animal healthcare procedure in house	Yes/No
c2_3a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c2_3a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c2_3b1	Indicate whether this establishment uses rapid diagnostic tests (e.g pathology, bacteriology, parasitology, toxicology, serology, histology, molecular diagnostics, avian flu etc.) for animal healthcare. <i>Definition: Rapid diagnostic tests (RDTs) refer to a group of diagnostics categorized by performance characteristics rather than the specific analyte or test platform. Such assays have relatively short performance times, provide results to inform clinical decision making, and enable management at the point-of-care (POC).</i> ⁴⁹	Yes/No
c2_3b2	Indicate whether this establishment uses pest sprays for animal healthcare.	Yes/No
c2_3b3	Indicate whether this establishment uses vaccines	Yes/No

⁴⁷ Source: Accessed 11/29/2023.

https://en.wikipedia.org/wiki/Genetically_modified_food#:~:text=Genetically%20modified%20foods%20are%20foods,opposed%20to%20traditional%20cross%20breeding.

⁴⁸ Source: Accessed 11/29/2023. <https://www.ndlegis.gov/cencode/t04-1c41.pdf>

⁴⁹ Source: Accessed 11/29/2023. <https://wwwnc.cdc.gov/travel/yellowbook/2024/posttravel-evaluation/rapid-diagnostic-tests-for-infectious-diseases>

Number	Instructions	Answer type
	(live-attenuated, inactivated, or subunit) for animal healthcare	
c2_3b4	Indicate whether this establishment uses DNA or RNA-based vaccine for animal healthcare <i>Definitions: RNA and DNA inoculations are currently being developed to prevent or treat infectious diseases such as rabies, influenza, zoonotic mosquito-borne flaviviruses, coronaviruses, and foot-and-mouth as well as multiple swine viruses.⁵⁰ DNA and RNA vaccines both instruct cells in your body to produce a protein that induces an immune response. Unlike RNA vaccines, DNA vaccines require an electrical impulse to push the genetic message into the cell. And while mRNA vaccines cannot affect your genes, this is a potential risk with DNA vaccines⁵¹</i>	Yes/No
c2_3b5	Indicate whether this establishment uses disease medication (antibiotics, coccidiostats, deworming medicine etc.) for animal healthcare <i>Definitions: Antibiotics are medicines that have activity against bacteria. They may function by either killing the bacteria (bactericidal) or by inhibiting the growth and proliferation of bacteria (bacteriostatic) allowing the animal's immune system to more effectively fight a bacterial infection.⁵² Coccidiostats are antiprotozoal agents that act on coccidia parasites by inhibiting reproduction and retarding the development of the parasite in a host cell.⁵³ Deworming uses an antiparasitic drug (known as an anthelmintic) given to an animal to destroy or inhibit the development of internal parasites.⁵⁴</i>	Yes/No
c2_3b6	Indicate whether this establishment uses other method for animal healthcare	Yes/No
c2_3c	Select from one of the options listed above, the method used more often for animal healthcare.	Select an option number
c2_3d	Indicate for how long the establishment has been using supplementary feed or genetically-modified	Number of years

⁵⁰ Source: Accessed 11/29/2023. <https://www.dvm360.com/view/understanding-mrna-and-dna-vaccines-in-veterinary-medicine#>

⁵¹ <https://www.verywellhealth.com/rna-vs-dna-vaccine-5082285#:~:text=DNA%20and%20RNA%20vaccines%20both,potential%20risk%20with%20DNA%20vaccines>

⁵² Source: Accessed 11/29/2023. <https://ahi.org/animal-antibiotics/#:~:text=Antibiotics%20are%20medicines%20that%20have,effectively%20fight%20a%20bacterial%20infection.>

⁵³ Source: Accessed 11/29/2023. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/coccidiostat#:~:text=Coccidiostats%20are%20antiprotozoal%20agents%20that,observing%20the%20prescribed%20hygiene%20requirements.>

⁵⁴ Source: Accessed 11/29/2023. <https://extension.psu.edu/decoding-dewormers-types-resistance-concerns-and-use-for-horses#:~:text=A%20dewormer%20is%20an%20antiparasitic,the%20development%20of%20internal%20parasites.>

Number	Instructions	Answer type
	feed for animal healthcare.	
c2_4a1	Indicate whether this establishment conduct herd management and monitoring in house.	Yes/No
c2_4a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise.	Yes/No
c2_4a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c2_4b1	Indicate whether this establishment uses human monitoring for herd management and monitoring.	Yes/No
c2_4b2	Indicate whether this establishment uses animal-aided monitoring for herd management and monitoring.	Yes/No
c2_4b3	Indicate whether this establishment uses feedlots or grazing system for herd management and monitoring	Yes/No
c2_4b4	Indicate whether this establishment uses automated cameras and video for herd management and monitoring <i>Definition: A video surveillance system to monitor livestock use the approach of having static cameras to capture the video of the scene, then detects the livestock position, behavior, and amount.⁵⁵</i>	Yes/No
c2_4b5	Indicate whether this establishment uses unmanned aerial vehicles (drones) and photographs/video for herd management and monitoring <i>Definition: The use of drones in herd management and monitoring allows for quick identification of any issues such as animals straying from the herd, signs of distress, or even detecting potential predators. This real-time monitoring capability can save time and effort compared to traditional methods of inspecting the herds on foot or by vehicle each time.⁵⁶</i>	Yes/No
c2_4b6	Indicate whether this establishment uses analog tracking devices attached to animals (tail paints, scratch cards, tags) for herd management and monitoring	Yes/No
c2_4b7	Indicate whether this establishment uses digital tracking device attached to animal (wearable activity monitors, RFID heat-detection tags, calving sensors, ingestible microchips) for herd management and monitoring <i>Definitions: Wearable activity trackers (WAT) are electronic</i>	Yes/No

⁵⁵ Source: Accessed 11/29/2023. <https://dl.acm.org/doi/fullHtml/10.1145/3582099.3582141>

⁵⁶ Source: Accessed 11/29/2023. <https://www.dslrpros.com/livestock-management-drones.html#>

Number	Instructions	Answer type
	<i>monitoring devices that enable users to track and monitor their animals.⁵⁷ Using RFID ear tags for Herd Management is a way to individually identify animals and digitally manage that information. Having these records available digitally helps keep track of an individual animal from birth to death, as well as any significant events in between.⁵⁸ Calving sensors measure contractions and predict when animals, typically cows, will calve. This non-invasive, tail-mounted sensor collects hundreds of data per second. It can accurately predict when your cow is most likely to calve by measuring tail movements triggered by labour contractions.⁵⁹ Meanwhile, ingestible microchip is a small, electronic chip enclosed in a glass cylinder that is about the same size as a grain of rice, It is activated by a scanner that is passed over the area, and the radio waves put out by the scanner activate the chip.⁶⁰</i>	
c2_4b8	Indicate whether this establishment uses other methods for herd management and monitoring.	Yes/No
c2_4c	Select from one of the options listed above, the method used more often for herd management and monitoring.	Select an option number
c2_4d	Indicate for how long the establishment has been using unmanned aerial vehicles or analog tracking devices or digital tracking devices attached to animals for herd management and monitoring.	Number of years
c2_5a1	Indicate whether this establishment transports its product in-house	Yes/No
c2_5a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c2_5a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c2_5b1	Indicate whether this establishment uses manual transport (carried on-foot) for transport.	Yes/No
c2_5b2	Indicate whether this establishment uses non-motorized vehicles (carts, bicycles) for transport.	Yes/No
c2_5b3	Indicate whether this establishment uses motorized vehicles (motorcycles, three-wheelers, cars, buses, trucks etc.) for transport.	Yes/No
c2_5b4	Indicate whether this specialized/climate-controlled vehicles (ventilation, heat control, nonslip floors,	Yes/No

⁵⁷ Source: Accessed 11/29/2023. <https://www.sciencedirect.com/science/article/pii/S1532046419300711>

⁵⁸ Source: Accessed 11/29/2023. <https://www.atlasrfidstore.com/rfid-resources/rfid-applications/rfid-herd-management/#:~:text=Herd%20Management%20With%20RFID,any%20significant%20events%20in%20betwe en.>

⁵⁹ Source: Accessed 11/29/2023. <https://www.ukal-elevage.com/en/moocall-calving-sensor.html#:~:text=Moocall%27s%20calving%20sensors%20measure%20contractions,movements%20triggere d%20by%20labour%20contractions.>

⁶⁰ Source: Accessed 11/29/2023. <https://www.avma.org/resources-tools/pet-owners/petcare/microchips-reunite-pets-families/microchipping-faq>

Number	Instructions	Answer type
	<p>partitioned areas, cold-chain) for transport.</p> <p><i>Definitions: Controlled ventilation (provides a regulated ventilation rate. Inlet air temperature is the same as that outside the vehicle. As air passes over the animals, it 'picks up' heat and moisture from the animals.⁶¹ Heat controlled are equipped with electronic control systems to regulate temperature. Freezer vans have thermostatically controlled cargo compartments, which allow the proper temperature range to be maintained.⁶² Meanwhile, cold chain is a temperature-controlled supply chain comprising refrigerated production, storage and distribution facilities supported by equipment that can constantly maintain the required low-temperature range.⁶³</i></p>	
c2_5b5	Indicate whether this establishment uses other methods for transport.	Yes/No
c2_5c	Select from one of the options listed above, the method used more often for transport.	Select an option number
c2_5d	Indicate for how long the establishment has been using specialized climate-controlled vehicles for transport.	Number of years

10.3 FOOD PROCESSING (MANUFACTURING)

3. Food processing (manufacturing)		
c3_0a1	Indicate whether this establishment is regulated and inspected by a government agency related to food processing	Yes/No
c3_0a2	Indicate the name of the agency that regulates and inspects this establishment	Name
c3_0b1	<p>Indicate whether this establishment's products are shelf stable</p> <p><i>Definition: Shelf-stable food (sometimes ambient food) is food of a type that can be safely stored at room temperature in a sealed container. This includes foods that would normally be stored refrigerated but which have been processed so that they can be safely stored at room or ambient temperature for a usefully long shelf life.</i></p>	Yes/No
c3_0b2	Indicate whether this establishment's products are fresh/perishable	Yes/No

⁶¹ Source: Accessed 11/29/2023.

<https://assets.publishing.service.gov.uk/media/5a78fbd740f0b676f4a7cf14/pb11260-livestock-vehicle-ventilation-051104.pdf>

⁶² Source: Accessed 11/29/2023. <https://www.glacierevehicles.com/wiki/temperature-control/#:~:text=How%20temperature%2Dcontrolled%20vehicle%20units,temperature%20range%20to%20be%20maintained.>

⁶³ Source: Accessed 11/29/2023. <https://www.gep.com/knowledge-bank/glossary/what-is-cold-chain#:~:text=What%20is%20a%20cold%20chain,the%20required%20low%2Dtemperature%20range.>

Number	Instructions	Answer type
c3_1a1	Indicate whether this establishment conduct input testing in house.	Yes/No
c3_1a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c3_1a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c3_1b1	Indicate whether this establishment uses sensory systems (e.g. visual, smell, tactile, color) for input testing	Yes/No
c3_1b2	Indicate whether this establishment uses review of supplier testing on Certificate of Analysis for input testing	Yes/No
c3_1b3	Indicate whether this establishment uses non-computer-controlled testing kits for input testing	Yes/No
c3_1b4	Indicate whether this establishment uses computer testing such as chromatography or spectroscopy for input testing <i>Definitions: Chromatography is a laboratory technique for the separation of a mixture into its components. The mixture is dissolved in a fluid solvent (gas or liquid) called the mobile phase, which carries it through a system (a column, a capillary tube, a plate, or a sheet) on which a material called the stationary phase is fixed.⁶⁴ Meanwhile, spectroscopy is the science that is concerned with the interaction of optical electromagnetic radiation with matter. In many cases, this interaction involves specific transitions between energy levels (states) and is experimentally observed by the absorption or emission of electromagnetic radiation.⁶⁵</i>	Yes/No
c3_1b5	Indicate whether this establishment uses other method for input testing	Yes/No
c3_1c	Select from one of the options listed above, the method used more often for input testing.	Select an option number
c3_1d	Indicate for how long this establishment has been using computer testing for input testing.	Number of years
c3_2a1	Indicate whether this establishment mixes, blends or cooks in house for food preparation	Yes/No
c3_2a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c3_2a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c3_2b1	Indicate whether this establishment uses manual process for mixing, blending or cooking	Yes/No

⁶⁴ Source: Accessed 11/29/2023. <https://en.wikipedia.org/wiki/Chromatography>

⁶⁵ Source: Accessed 11/29/2023.

https://www.photonics.com/Articles/Spectroscopy_Mastering_the_Techniques/a25126

Number	Instructions	Answer type
c3_2b2	Indicate whether this establishment uses mechanical equipment requiring human force to operate for mixing, blending or cooking	Yes/No
c3_2b3	Indicate whether this establishment uses power equipment requiring routine human interaction for mixing, blending or cooking	Yes/No
c3_2b4	Indicate whether this establishment uses power equipment controlled by computers or robotics, with minimal human interaction mixing, blending or cooking <i>Definition: Power equipment in food manufacturing with minimal human interaction includes but is not limited to robots, conveyor systems which transport materials or products from one place to another in a food manufacturing facility. They can be used to move products between different production stages or transport finished products to packaging and storage areas, and mobile robots that can move products or materials around a manufacturing facility.⁶⁶</i>	Yes/No
c3_2b5	Indicate whether this establishment uses other methods for mixing, blending or cooking	Yes/No
c3_2c	Select from one of the options listed above, the method used more often for mixing, blending or cooking.	Select an option number
c3_2d	Indicate for how long this establishment has been using power equipment for mixing, blending or cooking.	Number of years
c3_3a1	Indicate whether this establishment implement anti-bacterial processes in house	Yes/No
c3_3a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c3_3a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c3_3b1	Indicate whether this establishment uses minimal-processing preservation methods for anti-bacterial processes.	Yes/No
c3_3b2	Indicate whether this establishment uses anti-bacterial wash or soaking for anti-bacterial processes.	Yes/No
c3_3b3	Indicate whether this establishment uses thermal processing technologies for anti-bacterial processes.	Yes/No

⁶⁶ Source: Accessed 11/29/2023. <https://www.deskera.com/blog/the-role-of-automation-in-food-manufacturing-processes/>

Number	Instructions	Answer type
	<i>Definition: The conventional process of thermal processing involves sterilization (canning and retorting) and pasteurization. The parameters used to design the thermal processing regime depend on the time (minutes) required to eliminate a known population of bacteria in a given food matrix under specified conditions⁶⁷</i>	
c3_3b4	Indicate whether this establishment uses high-pressure processing (HPP) and pulsed electric field (PEF) for anti-bacterial processes. <i>Definition: High pressure processing allows gentle preservation of food by high pressure without additives or heat. To achieve this a pressure of 6,000 bar – which equals roughly the weight of three jumbo jets acting on a smartphone-sized area - is applied to the products.⁶⁸ Pulsed electric field (PEF) processing is a new food pasteurization method that uses short bursts of high voltage electric fields on foods to achieve desired microbial inactivation or modification of food structure.⁶⁹</i>	Yes/No
c3_3b5	Indicate whether this establishment uses other method for anti-bacterial process	Yes/No
c3_3c	Select from one of the options listed above, the method used more often for anti-bacterial processes.	Select an option number
c3_3d	Indicate for how long the establishment has been using thermal or more advanced anti-bacterial processes for anti-bacterial processes.	Number of years
c3_4a1	Indicate whether this establishment proceed with packaging in house.	Yes/No
c3_4a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c3_4a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c3_4b1	Indicate whether this establishment uses manual packing in bags, bottles or boxes for packaging.	Yes/No
c3_4b2	Indicate whether this establishment uses human operated mechanical equipment for packaging in bags, bottles or boxes for packaging.	Yes/No
c3_4b3	Indicate whether this establishment uses power equipment requiring routine human interaction for	Yes/No

⁶⁷ Source: Accessed 11/29/2023.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9222969/#:~:text=The%20conventional%20process%20of%20thermal,food%20matrix%20under%20specified%20conditions.>

⁶⁸ Source: <https://www.thyssenkrupp-industrial-solutions.com/high-pressure-processing/en/what-is-hpp>

⁶⁹ **Source:** Pulsed electric field (PEF) processing is a new food pasteurization method that uses short bursts of high voltage electric fields on foods to achieve desired microbial inactivation or modification of food structure.

Number	Instructions	Answer type
	packaging	
c3_4b4	Indicate whether this establishment uses power equipment controlled by computers or robotics, with minimal human interaction for packaging <i>Definition: Packing automation works on predetermined actions and schedules. It typically programs the software to function as need by selecting what you would like the robot to do and when. The system continues completing actions based on your requests without interruption so that you can devote your manual team to more complex tasks.⁷⁰</i>	Yes/No
c3_4b5	Indicate whether this establishment uses other methods for packaging.	Yes/No
c3_4c	Select from one of the options listed above, the method used more often for packaging.	Select an option number
c3_4d	Indicate for how long the establishment has been using power equipment for packaging.	Number of years
c3_4e	Does this establishment use any recyclable or bio-degradable materials for packaging?	Yes/No
c3_4f	Does this establishment use any recyclable or bio-degradable materials for packaging?	Percentage (%)
c3_5a1	Indicate whether this establishment stores the food in house	Yes/No
c3_5a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c3_5a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c3_5b1	Indicate whether this establishment uses minimal protection with some exposure to outside elements for food storage.	Yes/No
c3_5b2	Indicate whether this establishment uses ambient conditions in closed building for food storage.	Yes/No
c3_5b3	Indicate whether this establishment uses some climate control in secured building (e.g. partial or seasonal control) for food storage.	Yes/No
c3_5b4	Indicate whether this fully automated climate and security-controlled building for food storage. <i>Definition: A climate-controlled warehouse is a storage facility equipped with environmental control systems that maintain a consistent and precise range of interior factors. These include temperature, humidity, and air quality designed to preserve the quality and integrity of stored goods.⁷¹</i>	Yes/No
c3_5b5	Indicate whether this establishment uses other	Yes/No

⁷⁰ Source: <https://www.tdipacksys.com/blog/robotic-packaging/#:~:text=Robot%20packaging%20systems%20are%20intelligent,in%20your%20tight%20manufacturing%20facility.>

⁷¹ Source: <https://www.thebrimichgroup.com/climate-controlled-warehousing-benefits-and-differences/>

Number	Instructions	Answer type
	method for food storage.	
c3_5c	Select from one of the options listed above, the method used more often for food storage.	Select an option number
c3_5d	Indicate for how long the establishment has been using climate control in secured building for food storage.	Number of years

10.4 WEARING APPAREL (MANUFACTURING)

Wearing apparel (manufacturing)		
c4_0a1	Indicate whether this establishment uses printed fabric (e.g. this establishment assembled the provided fabric) to start production.	Yes/No
c4_0a2	Indicate whether this establishment uses white fabric (e.g. this establishment die the fabric) to start production.	Yes/No
c4_0a3	Indicate whether this establishment uses fabric threads (e.g. this establishment weave the fabric) to start production.	Yes/No
c4_0a4	Indicate whether this establishment uses other method to start production.	Yes/No
c4_0b1	Indicate whether this establishment produces basic-type of garments. Basic: T-Shirt, shorts, cotton, poly, denim.	Yes/No
c4_0b2	Indicate whether this establishment produces fashion-type of garments. Fashion: Complex cuts and stitch, material mix	Yes/No
c4_0b3	Indicate whether this establishment produces sport-type of garments. Sports: alternative finishes such as waterproof, reflective.	Yes/No
c4_0b4	Indicate whether this establishment produces protective-type of garments. Protective apparel: including padding, TPR. <i>Definition: TPR or thermoplastic rubber is typically a copolymer that merges the properties of polystyrene (PS) and butadiene (synthetic) rubber.⁷²</i>	Yes/No
c4_0b5	Indicate whether this establishment produces other-type of garments. Other: not mentioned before.	Yes/No
c4_0c1	Indicate whether silk screen finishing is available in this establishment.	Yes/No
c4_0c2	Indicate whether embroidery finishing is available in this establishment. <i>Definition: Embroidery finishing is a number of procedures</i>	Yes/No

⁷² [https://www.xometry.com/resources/materials/tpr-vs-tpu/#:~:text=TPR%20or%20thermoplastic%20rubber%20is,and%20butadiene%20\(synthetic\)%20rubber.](https://www.xometry.com/resources/materials/tpr-vs-tpu/#:~:text=TPR%20or%20thermoplastic%20rubber%20is,and%20butadiene%20(synthetic)%20rubber.)

Number	Instructions	Answer type
	<i>like thread trimming, removal of excess backing or topping, spot or soil removal or steaming that are performed between completion of embroidery and packaging.</i> ⁷³	
c4_0c3	Indicate whether washing finishing is available in this establishment. <i>Definition: Washing is a wet finishing technique that removes unwanted substances from fabrics and softens them.</i> ⁷⁴	Yes/No
c4_0c4	Indicate whether waterproofing finishing is available in this establishment. <i>Definition: Waterproofing is nothing but preventing the passage of both air and water through a fabric. Fabrics for waterproofing by application of coating materials must generally be prepared in a similar manner as for water repellent finishing. It is important that the fabric surface is smooth and hence most fabrics are singed to remove protruding surface fibers that could either become detached by the action of the doctor knife in coating, or subsequently penetrate through the coating surface to give an uneven coated surface and provide sites in the fabric surface that could promote wicking of liquids.</i> ⁷⁵	Yes/No
c4_0c5	Indicate whether other finishing is available in this establishment.	Yes/No
c4_0d1	Indicate whether the establishment certified in any of the following standards: Environment and labor standards such as OEKO, Made in Green label, and fair wear. <i>Definition: OEKO-TEX is a set of third-party certifications that verify products are free of harmful chemicals. The certification is globally recognized and regulates the manufacturing processes of textiles and leather.</i> ⁷⁶	Yes/No
c4_0d1	Indicate whether the establishment certified in any of the following standards: Use of recycled materials such as Recycled Claim Standard (RCS) <i>Definition: The Recycled Claim Standard (RCS) is an international, voluntary standard that sets requirements for third-party. It is a chain of custody standard to track recycled raw materials through the supply chain. It uses the chain of custody requirements of the Content Claim Standard (CSS)</i> ⁷⁷	Yes/No

⁷³ https://www.textileschool.com/407/finishing-methods/#google_vignette

⁷⁴ <https://www.sciencedirect.com/topics/engineering/chemical-finishing#:~:text=Washing%20is%20probably%20the%20simplest,liquid%20medium%20such%20as%20water.>

⁷⁵ https://textilelearner.net/waterproofing-finishing-in-textile/#google_vignette

⁷⁶ <https://www.oeko-tex.com/en/>

⁷⁷ [https://www.scsglobalservices.com/services/recycled-claim-standard#:~:text=The%20Recycled%20Claim%20Standard%20\(RCS,Content%20Claim%20Standard%20\(CSS\).](https://www.scsglobalservices.com/services/recycled-claim-standard#:~:text=The%20Recycled%20Claim%20Standard%20(RCS,Content%20Claim%20Standard%20(CSS).)

Number	Instructions	Answer type
c4_0d1	Indicate whether the establishment certified in any of the following standards: Social, health and environmental certification such as B Corporation or Bluesign certification	Yes/No
c4_0d1	Indicate whether the establishment certified in any of the following standards: Circular economy certification such as Cradle to Cradle certified company	Yes/No
c4_1a1	Indicate whether clients provide files for design to this establishment.	Yes/No
c4_1a2	Select from one of the options, the method used more often to carry out the task mentioned above.	Yes/No
c4_1a3	Indicate whether this establishment does design drawing in house.	Yes/No
c4_1a4	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c4_1a5	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c4_1b1	Indicate whether this establishment uses manual design and hand drawing for design drawing	Yes/No
c4_1b2	Indicate whether this establishment uses digital or semi-digital design using specialized 2D drawing software for design drawing	Yes/No
c4_1b3	Indicate whether this establishment uses Computer Aided Design (CAD), 3D design, virtual prototyping for design drawing <i>Definitions: CAD (computer-aided design) is the use of computer-based software to aid in design processes. CAD software is frequently used by different types of engineers and designers. CAD software can be used to create two-dimensional (2-D) drawings or three-dimensional (3-D) models.⁷⁸ 3D computer graphics, sometimes called CGI, 3-D-CGI or three-dimensional computer graphics, are graphics that use a three-dimensional representation of geometric data that is stored in the computer for the purposes of performing calculations and rendering digital images, usually 2D images but sometimes 3D images.⁷⁹ Virtual prototyping, often known as VP, is a software-based engineering discipline which involves modelling a system, simulating and visualising its behaviour under real-world operating conditions, and refining its design through an iterative process.⁸⁰</i>	Yes/No
c4_1b4	Indicate whether this establishment uses other	Yes/No

⁷⁸ <https://www.techtarget.com/whatis/definition/CAD-computer-aided-design>

⁷⁹ https://en.wikipedia.org/wiki/3D_computer_graphics

⁸⁰ <https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-virtual-prototyping#:~:text=Virtual%20prototyping%2C%20often%20known%20as,a%20substitute%20for%20rapid%20prototyping.>

Number	Instructions	Answer type
	methods for design drawing	
c4_1c	Select from one of the options listed above, the method used more often for design drawing.	Select an option number
c4_1d	Indicate for how long this establishment has been using specialized software, 3D design, or virtual prototyping for design drawing.	Number of years
c4_2a1	Indicate whether this establishment handle cut processes in house	Yes/No
c4_2a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c4_2a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c4_2b1	Indicate whether this establishment uses manual cutting for cutting	Yes/No
c4_2b2	Indicate whether this establishment uses cutting machine manually operated for cutting	Yes/No
c4_2b3	Indicate whether this establishment uses semi-automatic cutting machine (straight knife, round knife, die cutting machine) for cutting	Yes/No
c4_2b4	Indicate whether this establishment uses automatic or computerized cutting machine (no Laser: water jet, knife, other) cutting <i>Definition: A water jet cutter, also known as a water jet or waterjet, is an industrial tool capable of cutting a wide variety of materials using an extremely high-pressure jet of water, or a mixture of water and an abrasive substance.⁸¹</i>	Yes/No
c4_2b5	Indicate whether this establishment uses automatic/computerized cutting machine (Laser) for cutting <i>Definition: Laser cutting is a technology that uses a laser to vaporize materials, resulting in a cut edge. While typically used for industrial manufacturing applications, it is now used by schools, small businesses, architecture, and hobbyists. Laser cutting works by directing the output of a high-power laser most commonly through optics.⁸²</i>	Yes/No
c4_2b6	Indicate whether this establishment uses other methods for cutting	Yes/No
c4_2c	Select from one of the options listed above, the method used more often for cutting.	Select an option number
c4_2d	Indicate for how long this establishment has been using automatic cutting machines and lasers for cutting.	Number of years

⁸¹ https://en.wikipedia.org/wiki/Water_jet_cutter

⁸² https://en.wikipedia.org/wiki/Laser_cutting

Number	Instructions	Answer type
c4_3a1	Indicate whether this establishment handle sew and joining parts processes in house	Yes/No
c4_3a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c4_3a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c4_3b1	Indicate whether this establishment uses manually sewing for sewing and joining parts.	Yes/No
c4_3b2	Indicate whether this establishment uses machine sewing manually operated for sewing and joining parts.	Yes/No
c4_3b3	Indicate whether this establishment uses semi-automated sewing machines for sewing and joining parts	Yes/No
c4_3b4	Indicate whether this establishment uses automated sewing machines for sewing and joining parts <i>Definition: An automated electric sewing machine sews fabric with thread without the need for complete manual intervention.⁸³</i>	Yes/No
c4_3b5	Indicate whether this establishment uses 3D knitting for sewing and joining parts <i>Definition: 3D knitting machines are custom built to produce knit garments in one complete piece with no seams or sewing, producing less waste.⁸⁴</i>	Yes/No
c4_3b6	Indicate whether this establishment uses other method for sewing and joining parts	Yes/No
c4_3c	Select from one of the options listed above, the method used more often for sewing and joining parts.	Select an option number
c4_3d	Indicate for how long the establishment has been using semi-automated sewing machines or automated sewing machines or 3D knitting for sewing and joining parts.	Number of years
c4_4a1	Indicate whether this establishment handle finishing and ironing processes in house	Yes/No
c4_4a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c4_4a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c4_4b1	Indicate whether this establishment uses basic manual ironing for finishing and ironing.	Yes/No
c4_4b2	Indicate whether this establishment uses electric	Yes/No

⁸³ <https://fashinza.com/manufacturing/industry-4-0/5-types-of-automated-electric-sewing-machine-that-are-changing-the-world-of-apparel-manufacturing/#>

⁸⁴ <https://shopstacia.com/pages/3d-knitting>

Number	Instructions	Answer type
	high-pressure steam iron for finishing and ironing.	
c4_4b3	Indicate whether this establishment uses tunnel finisher for finishing and ironing	Yes/No
c4_4b4	Indicate whether this establishment uses form finishing machine for finishing and ironing <i>Definition: Form finishers are specialized appliances for ironing trousers, jackets, seat covers, shirts, ladies' dresses etc. using air or steam.⁸⁵</i>	Yes/No
c4_4b5	Indicate whether this establishment uses high tech pressing machine for finishing and ironing <i>Definition: High tech pressing machine is digitally programmed to press the shoulder, sleeve head and sleeve cuff in one set-up.⁸⁶</i>	Yes/No
c4_4b6	Indicate whether this establishment uses other methods for finishing and ironing.	Yes/No
c4_4c	Select from one of the options listed above, the method used more often for finishing and ironing.	Select an option number
c4_4d	Indicate for how long the establishment has been using form finishing machines or high-tech pressing machines for finishing and ironing.	Number of years
c4_5a1	Indicate how this establishment dispose of their fabric, threads, labels, all garment parts trash: Regular trash all mixed in	Yes/No
c4_5a2	Indicate how this establishment dispose of their fabric, threads, labels, all garment parts trash: Garment specialized trash company all mixed in	Yes/No
c4_5a3	Indicate how this establishment dispose of their fabric, threads, labels, all garment parts trash: Sorted and disposed through specialized recycling company for each material (fabric, thread, buttons)	Yes/No
c4_5a4	Indicate how this establishment dispose of their fabric, threads, labels, all garment parts trash: Sorted and both reused wastes internally in the factory and disposed through specialized recycling companies	Yes/No
c4_5a6	Indicate how this establishment dispose of their fabric, threads, labels, all garment parts trash: Other	Yes/No
c4_5b	What is the method used more often this establishment to dispose their fabric, threads, labels, and all garment parts trash?	Select an option number

⁸⁵ <https://www.quickclean.co.in/trevil/traditional-form-finishers/#:~:text=Form%20finishers%20are%20specialized%20appliances,reach%20areas%20are%20not%20overlooked.>

⁸⁶ https://www.textileschool.com/481/pressing-equipments-machinery/#google_vignette

Number	Instructions	Answer type
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10.5 AUTOMOTIVE (MANUFACTURING)

5. Automotive (manufacturing)		
c5_1a1	Indicate whether this establishment assemble vehicles in house.	Yes/No
c5_1a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c5_1a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c5_1b1	Indicate whether this establishment uses machines fully controlled by operators for assembly	Yes/No
c5_1b2	Indicate whether this establishment uses Flexible Manufacturing Cells (FMC) or Flexible Manufacturing Systems (FMS) for assembly <i>Definitions: A flexible manufacturing cell (FMC) comprises two or three machines including processing workstations and a parts handling capability. An FMS is larger than an FMC. It is made up of four or more machines and has more supporting parts, including wash stations for parts and pallets, and storage stations. It also has a more advanced computer system with a greater number of functions, such as monitoring and diagnostics.⁸⁷</i>	Yes/No
c5_1b3	Indicate whether this establishment uses lasers used in materials processing (including surface modification) for assembly <i>Definition: In laser material processing, the power can be controlled either internally to the laser using the inherent excitation and light amplification characteristics to advantage, or externally by utilization of a light valve and modulator.⁸⁸</i>	Yes/No
c5_1b4	Indicate whether this establishment uses computer numerically controlled (CNC) machinery for assembly <i>Definition: Computer numerical control (CNC),^[1] is the automated control of tools by means of a computer. It is used to operate tools such as drills, lathes, mills, grinders, routers and 3D printers. CNC transforms a piece of material (metal, plastic, wood, ceramic, stone, or composite) into a specified shape by following coded programmed instructions and without a manual operator directly controlling the machining operation.⁸⁹</i>	Yes/No

⁸⁷ <https://www.unleashedsoftware.com/blog/flexible-manufacturing-in-2021-flexible-manufacturing-systems-explained#:~:text=An%20FMS%20is%20larger%20than,such%20as%20monitoring%20and%20diagnostics.>

⁸⁸ <https://www.sciencedirect.com/topics/engineering/laser-materials-processing>

⁸⁹ https://en.wikipedia.org/wiki/Numerical_control

Number	Instructions	Answer type
c5_1b5	Indicate whether this establishment uses robots for assembly <i>Definition: Assembly line machines are industrial robots designed to carry out repetitive tasks, such as picking, placing, welding, and assembling parts. These robots are equipped with end effectors that enable them to sense and manipulate objects with great precision and accuracy</i> ⁹⁰	Yes/No
c5_1b6	Indicate whether this establishment uses additive manufacturing including rapid prototyping and 3D printers for assembly <i>Definition: Rapid prototyping is the fast fabrication of a physical part, model or assembly using 3D computer aided design (CAD). The creation of the part, model or assembly is usually completed using additive manufacturing, or more commonly known as 3D printing.</i> ⁹¹	Yes/No
c5_1b7	Indicate whether this establishment uses other method for assembly	Yes/No
c5_1c	Select from one of the options listed above, the method used more often for assembly.	Select an option number
c5_1d	Indicate for how long this establishment has been using computer numerically controlled (CNC) machinery, robots, or additive manufacturing for assembly.	Number of years
c5_2a1	Indicate whether this establishment handle body press and welding in house	Yes/No
c5_2a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c5_2a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c5_2b1	Indicate whether this establishment uses pressing of skin panels using operators for body pressing and welding	Yes/No
c5_2b2	Indicate whether this establishment uses pressing of structural components using operators for body pressing and welding	Yes/No
c5_2b3	Indicate whether this establishment uses welding of main body using operators for body pressing and welding	Yes/No
c5_2b4	Indicate whether this establishment uses pressing of skin panels automated using robotics for body pressing and welding <i>Definition: Robotic welding is a highly advanced version of</i>	Yes/No

⁹⁰ <https://www.wevolver.com/article/what-are-robotic-assembly-lines-history-components-advantages-limitations-applications-and-future#>

⁹¹ <https://www.twi-global.com/technical-knowledge/faqs/faq-manufacturing-what-is-rapid-prototyping>

Number	Instructions	Answer type
	<i>automated welding, in which machines conduct the welding, but welders still control and supervise the process.</i> ⁹²	
c5_2b5	Indicate whether this establishment uses pressing of structural components automated using robotics for body pressing and welding <i>Definition: Robotic welding is a highly advanced version of automated welding, in which machines conduct the welding, but welders still control and supervise the process.</i>	Yes/No
c5_2b6	Indicate whether this establishment uses welding of main body automated using robotics for body pressing and welding <i>Definition: Robotic welding is a highly advanced version of automated welding, in which machines conduct the welding, but welders still control and supervise the process.</i>	Yes/No
c5_2b7	Indicate whether this establishment uses other methods for body pressing and welding	Yes/No
c5_2c	Select from one of the options listed above, the method used more often for body pressing and welding.	Select an option number
c5_2d	Indicate for how long this establishment has been using pressing of structural components automated using robotics, welding of main body using operators or welding of main body automated using robotics for body pressing and welding.	Number of years
c5_3a1	Indicate whether this establishment handle painting processes in house	Yes/No
c5_3a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c5_3a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c5_3b1	Indicate whether this establishment uses water-based painting using operators for painting.	Yes/No
c5_3b2	Indicate whether this establishment uses solvent-based painting using operators for painting.	Yes/No
c5_3b3	Indicate whether this establishment uses water-based painting automated using robotics for painting	Yes/No
c5_3b4	Indicate whether this establishment uses solvent-based painting automated using robotics for painting <i>Definition: Industrial paint robots are designed to help standardize the distance and path the automatic sprayer takes, thus eliminating the risk of human error caused by manual spraying. Paint robots are often paired with other automatic painting equipment to maximize the efficiency and</i>	Yes/No

⁹² <https://www.kemppi.com/en-US/support/welding-abc/robotic-welding/#:~:text=Robotic%20welding%20is%20a%20highly,less%20waste%2C%20and%20greater%20safety.>

Number	Instructions	Answer type
	<i>consistency of the paint finish</i> ⁹³	
c5_3b5	Indicate whether this establishment uses other methods for painting	Yes/No
c5_3c	Select from one of the options listed above, the method used more often for painting.	Select an option number
c5_3d	Indicate for how long the establishment has been using water-based painting automated using robotics or solvent-based painting automated using robotics for painting.	Number of years
c5_4a1	Indicate whether this establishment handle plastic injection molding in house.	Yes/No
c5_4a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c5_4a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c5_4b1	Indicate whether this establishment uses molding of non-visible interior plastic components using operators for plastic injection molding.	Yes/No
c5_4b2	Indicate whether this establishment uses molding of plastic exterior body parts using operators for plastic injection molding	Yes/No
c5_4b3	Indicate whether this establishment uses molding of non-visible interior plastic components automated using robotics for plastic injection molding	Yes/No
c5_4b4	Indicate whether this establishment uses molding of plastic exterior body parts automated using robotics for plastic injection molding <i>Definition: Plastic robotic injection molding automates the injection molding process by using a pick-and-place robot to load plastic parts into the molding machine, as well as place the finished products onto a conveyer belt.</i> ⁹⁴	Yes/No
c5_4b5	Indicate whether this establishment uses other methods for plastic injection molding.	Yes/No
c5_4c	Select from one of the options listed above, the method used more often for plastic injection molding.	Select an option number
c5_4d	Indicate for how long the establishment has been using molding of non-visible interior plastic components using robotics or molding of plastic exterior body parts automated using robotics for plastic injection molding.	Number of years
c5_5a1	Indicate whether this establishment implements	Yes/No

⁹³ https://en.wikipedia.org/wiki/Paint_robot

⁹⁴

<https://www.lomont.com/robotics#:~:text=Plastic%20robotic%20injection%20molding%20automates,products%20onto%20a%20conveyer%20belt.>

Number	Instructions	Answer type
	productive asset management in-house	
c5_5a2	Indicate whether the task mentioned on the previous question is done by other unit of the same enterprise	Yes/No
c5_5a3	Indicate whether the task mentioned on the previous question is done by other workers or other enterprises	Yes/No
c5_5b1	Indicate whether this establishment uses breakdown maintenance system for productive asset management.	Yes/No
c5_5b2	Indicate whether this establishment uses preventative or predictive maintenance system for productive asset management.	Yes/No
c5_5b3	Indicate whether this establishment uses model based condition monitoring for productive asset management. <i>Definition: Model based condition monitoring systems are based on mathematical models of the equipment's operation to calculate, based on the measured data, the time and frequency of equipment failures.⁹⁵</i>	Yes/No
c5_5b4	Indicate whether this establishment uses other method for productive asset management.	Yes/No
c5_5c	Select from one of the options listed above, the method used more often for productive asset management.	Select an option number
c5_5d	Indicate for how long the establishment has been using preventive maintenance system or model-based condition monitoring for productive asset management.	Number of years

10.6 PHARMACEUTICAL (MANUFACTURING)

Pharmaceutical processing		
c6_0a1	Whether this establishment produces tablets and capsules	Yes/No
c6_0a2	Whether this establishment produces creams and ointments	Yes/No
c6_0a3	Whether this establishment produces eye and ear solutions	Yes/No
c6_0a4	Whether this establishment produces syrups and dry powders	Yes/No
c6_0b1	The main product produced by this establishment.	Select an option number
c6_0c1	Whether this establishment conduct research associated with new-drug discovery.	Yes/No
c6_0c2	Whether the lead researchers of research projects	Yes/No

⁹⁵ <https://www.artesis.com/model-based-condition-monitoring/>

Number	Instructions	Answer type
	are the direct employees of this establishment.	
c6_1a1	Use of this establishment's facilities for in house production	Yes/No
c6_1a2	Production in other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c6_1a3	Production outsourced to another firm.	Yes/No
c6_1b1	Whether this establishment uses unfiltered air in filling space	Yes/No
c6_1b2	Whether this establishment uses basic air filtration	Yes/No
c6_1b3	Whether this establishment uses HEPA air filtration <i>Definition: HEPA is a type of pleated mechanical air filter. It is an acronym for "high efficiency particulate air [filter]" (as officially defined by the U.S. Dept. of Energy). This type of air filter can theoretically remove at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns⁹⁶</i>	Yes/No
c6_1b4	Whether this establishment uses ultra HEPA air, pressurization control <i>Definition: UltraHEPA air purifiers are able to capture particles 100 times smaller than the HEPA standard, meaning that they're third party tested to remove at least 99.97% of particles as small as 0.003 microns.⁹⁷</i>	Yes/No
c6_1b5	Whether this establishment uses other air filtration system	Yes/No
c6_1c	The air filtration system used more often in this establishment's facilities.	Select an option number
c6_1d	The number of years this establishment has been using HEPA air filtration or ultra HEPA air, pressurization control in its facilities. <i>Definitions: HEPA is a type of pleated mechanical air filter. It is an acronym for "high efficiency particulate air [filter]" (as officially defined by the U.S. Dept. of Energy). This type of air filter can theoretically remove at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns. UltraHEPA air purifiers are able to capture particles 100 times smaller than the HEPA standard, meaning that they're third party tested to remove at least 99.97% of particles as small as 0.003 microns</i>	Number of years
c6_2b1	Whether this establishment uses beam scales	Yes/No
c6_2b2	Whether this establishment uses analog scales	Yes/No
c6_2b3	Whether this establishment uses electronic scales	Yes/No

⁹⁶ <https://www.epa.gov/indoor-air-quality-iaq/what-hepa-filter>

⁹⁷ https://blog.airdoctorpro.com/what-is-hepa?hs_amp=true

Number	Instructions	Answer type
c6_2b4	Whether this establishment uses automated weighing systems <i>Definition: In automatic weighing, the product is brought to the scale via a conveyor or other transport system, where it is weighed. The weighing data is then collected and processed by the computer system for immediate use.⁹⁸</i>	Yes/No
c6_2b5	Whether this establishment uses other weighing scale systems	Yes/No
c6_2c	The weighing scale system used more often by this establishment.	Select an option number
c6_2d	The number of years this establishment has been using automated weighing systems.	Number of years
c6_3b1	Whether this establishment uses manual mixing	Yes/No
c6_3b2	Whether this establishment uses planetary mixers or homogenizers	Yes/No
c6_3b3	Whether this establishment uses high speed, high shear granulators	Yes/No
c6_3b4	Whether this establishment uses fluid bed processors (not with syrups) <i>Definition: A fluid bed processor refers to the entire system comprising air handling components, an air distribution plate, spraying system, a product container and filters. A fluid bed dryer is limited to the drying function and has no spraying system.⁹⁹</i>	Yes/No
c6_3b5	Whether this establishment uses fully automated compounding <i>Definition: An automated compounding device transfers one or more sterile component solutions to a sterile final container for a patient preparation, thereby replacing or decreasing the need for drawing up component solutions with syringes, increasing the accuracy of the ingredient delivery, and reducing preparation time.¹⁰⁰</i>	Yes/No
c6_3b6	Whether this establishment uses other mixing and compounding systems	Yes/No
c6_3c	The mixing and compounding system used more often by this establishment.	Select an option number
c6_3d	The number of years this establishment has been using high speed, high shear granulators, fluid bed processors or automated compounding.	Number of years
c6_4a1	Operation of compression and encapsulation for in-house production in this establishment	Yes/No

⁹⁸ <https://www.ibitek-group.com/en/2023/07/11/automatic-weighing/#:~:text=In%20automatic%20weighing%2C%20the%20product,production%20statistics%2C%20traceability%E2%80%A6>.

⁹⁹ <https://www.syntegon.com/solutions/pharma/fluid-bed-processor/#:~:text=A%20fluid%20bed%20processor%20refers,and%20has%20no%20spraying%20system.>

¹⁰⁰ https://www.pppmag.com/documents/V2N5/V2N5-Auto_compounders.pdf

Number	Instructions	Answer type
c6_4a2	Operation of compression and encapsulation in other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c6_4a3	Outsourcing of compression and encapsulation processes to another firm.	Yes/No
c6_4b1	Whether this establishment uses manual compression or encapsulation with dosing dies	Yes/No
c6_4b2	Whether this establishment uses motorized compression or encapsulation	Yes/No
c6_4b3	Whether this establishment uses automated compression or encapsulation Definition: <i>Automated compression includes automatic table press, which is an automatic continuous production equipment pressing a granular material into diameter not longer than 13mm circle, shaped tablet with text, symbols, and graphic.</i> ¹⁰¹ <i>Automatic encapsulation can fill hundred or thousand capsules per minute depends on machine model, the fast filling speed saves up a great cost of human labor.</i> ¹⁰²	Yes/No
c6_4b4	Whether this establishment uses integrated compression or encapsulation Definition: <i>Integrated compression and encapsulation are part of continuous manufacturing, which is a manufacturing method that produces products without interruption. Raw materials are continuously fed into the process, and products are continuously discharged.</i> ¹⁰³	Yes/No
c6_4b5	Whether this establishment uses other compression or encapsulation methods	Yes/No
c6_4c	The compression and encapsulation processes used more often by this establishment.	Select an option number
c6_4d	The number of years this establishment has been using automate compression or integrated compression in compression or encapsulation processes.	Number of years
c6_5a1	Implementation of in-house quality control by this establishment	Yes/No
c6_5a2	Implementation of quality control by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c6_5a3	Outsourcing of quality control processes to another firm.	Yes/No
c6_5b1	Whether this establishment uses manual,	Yes/No

¹⁰¹ <https://www.ipharmachine.com/tablet-press>

¹⁰² <https://www.ipharmachine.com/automatic-capsule-filling-machine>

¹⁰³ <https://tulip.co/blog/continuous-manufacturing/#:~:text=Continuous%20Manufacturing%20Defined,a%20single%2C%20uninterrupted%20production%20line.>

Number	Instructions	Answer type
	titrimetric/chromatographic analyses	
c6_5b2	Whether this establishment uses electronic chromatography <i>Definition: Electrochromatography is a chemical separation technique in analytical chemistry, biochemistry and molecular biology used to resolve and separate mostly large biomolecules such as proteins.¹⁰⁴</i>	Yes/No
c6_5b3	Whether this establishment uses electronic chromatography with data acquisition <i>Definition: An example of chromatography with data acquisition is a chromatography data management system (CDMS), is a set of dedicated data-collection tools that integrate with a laboratory's chromatography equipment. A base CDS will set up a desired methodology to be used by the chromatography equipment, acquire data from it, process the acquired data, store the information in a database, or in a file manager structure, and interface with other laboratory informatics systems to import and export files and data.¹⁰⁵</i>	Yes/No
c6_5b4	Whether this establishment uses other quality control system	Yes/No
c6_5c	The quality control processes used more often by this establishment	Select an option number
c6_5d	The number of years this establishment has been using electronic chromatography or electronic chromatography with data acquisition for quality control.	Number of years
c6_6a1	Operation of in-house packaging by this establishment	Yes/No
c6_6a2	Operation of in-house packaging by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c6_6a3	Outsourcing of packaging processes to another firm.	Yes/No
c6_6b1	Whether this establishment uses manual filling of pills in bottles OR placement of syrups, powders in bottles or pouches	Yes/No
c6_6b2	Whether this establishment uses slat counters, cottoners, cappers, and labelers for pills OR machine filling of syrups or powders in bottles or pouches	Yes/No
c6_6b3	Whether this establishment uses automated, integrated packaging lines	Yes/No

¹⁰⁴

[https://en.wikipedia.org/wiki/Electrochromatography#:~:text=Electrochromatography%20is%20a%20chemical%20separation,filtration%20chromatography\)%20and%20gel%20electrophoresis.](https://en.wikipedia.org/wiki/Electrochromatography#:~:text=Electrochromatography%20is%20a%20chemical%20separation,filtration%20chromatography)%20and%20gel%20electrophoresis.)

¹⁰⁵ <https://scioninstruments.com/us/blog/scion-compass-chromatography-data-system-cds-overview/>

Number	Instructions	Answer type
	<i>Definition: Automated and integrated packaging streamline process to pack products with the least amount of human assistance. High integration means the data flows into and out of the packaging area to create the work flows for automated packaging.</i> ¹⁰⁶	
c6_6b4	Whether this establishment uses other packaging method	Yes/No
c6_6c	The packaging processes used more often by this establishment	Select an option number
c6_6d	Indicate how long the establishment has been using slat counters, cottoners, cappers, labelers or machine filling automated, integrated packaging lines for packaging.	Number of years

10.7 RETAIL (SERVICES)

7. Retail (services)		
c7_1a1	Provision of customer supporting services in house by this establishment	Yes/No
c7_1a2	Provision of customer services by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c7_1a3	Outsourcing of customer services to another firm.	Yes/No
c7_1b1	Whether this establishment uses in-person customer service at the store	Yes/No
c7_1b2	Whether this establishment uses phone call or call help desk for customer service	Yes/No
c7_1b3	Whether this establishment uses social media (e.g. Facebook, WhatsApp, or similar) for customer service	Yes/No
c7_1b4	Whether this establishment uses online requests (using own website or specialized digital platform or App) for customer service	Yes/No
c7_1b5	Whether this establishment uses chatbots (e.g. a computer program which conducts a conversation via auditory or textual methods without human interaction by the company) for customer service <i>Definition: A chatbot is a software application or web interface that aims to mimic human conversation through text or voice interactions. Modern chatbots are typically online and use generative artificial intelligence systems that are capable of maintaining a conversation with a user in natural language and simulating the way a human would behave as a conversational partner.</i> ¹⁰⁷	Yes/No

¹⁰⁶ <https://www.packsize.com/blog/packaging-automation-versus-packaging-integration/>

¹⁰⁷ <https://en.wikipedia.org/wiki/Chatbot>

Number	Instructions	Answer type
c7_1b6	Whether this establishment uses other customer service channels	Yes/No
c7_1c	The customer services used more often by this establishment.	Select an option number
c7_1d	The number of years this establishment has been using online technologies for customer services.	Number of years
c7_2a1	Decision of pricing strategies by this establishment	Yes/No
c7_2a2	Decision of pricing strategies by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c7_2a3	Outsourcing of pricing strategies to another firm.	Yes/No
c7_2b1	Whether this establishment uses manual cost	Yes/No
c7_2b2	Whether this establishment uses automated markup (excel or similar)	Yes/No
c7_2b3	Whether this establishment uses automated promotional (e.g. planning prices based on seasonality or other predictable events)	Yes/No
c7_2b4	Whether this establishment uses dynamic pricing systems (using specific software to predict demand and adjust prices) <i>Definition: Dynamic pricing, also referred to as surge pricing, demand pricing, or time-based pricing, is a revenue management pricing strategy in which businesses set flexible prices for products or services based on current market demands. Businesses are able to change prices based on algorithms that take into account competitor pricing, supply and demand, and other external factors in the market.</i> ¹⁰⁸	Yes/No
c7_2b5	Whether this establishment uses personalized pricing driven by predictive analytics (e.g. data mining, machine learning) <i>Definition: Personalized pricing makes use of data analytics, such as data mining and machine learning, to dynamically adjust the price of a product at the individual customer level, by utilizing information about customers' characteristics encoded as a d-dimensional feature vector.</i> ¹⁰⁹	Yes/No
c7_2b6	Whether this establishment uses other pricing strategies	Yes/No
c7_2c	The pricing strategies used more often by this establishment.	Select an option number
c7_2d	The number of years this establishment has been using dynamic pricing systems or personalized pricing.	Number of years
c7_2da	Existence of any regulations that limit price mechanism decision of this establishment	Yes/No

¹⁰⁸ https://en.wikipedia.org/wiki/Dynamic_pricing

¹⁰⁹ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2972985

Number	Instructions	Answer type
c7_2db	Name of the agency regulating the price mechanism decision of this establishment	Name of the agency
c7_3a1	Decision of merchandising strategies (e.g. selection of products or displays) by this establishment	Yes/No
c7_3a2	Decision of merchandising strategies by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c7_3a3	Outsourcing of merchandising strategies to another firm.	Yes/No
c7_3b1	Whether this establishment uses manually selecting products	Yes/No
c7_3b2	Whether this establishment uses category management tools (decide how many products of each category to sell)	Yes/No
c7_3b3	Whether this establishment uses retail merchandising systems or digital merchandising (specialized software that takes into account the turnover, inventory, and space) Definition: Retail Merchandising System (RMS), or Merchandising, is used to execute core merchandising activities, including product management, inventory replenishment, purchasing, vendor management, and financial tracking. ¹¹⁰	Yes/No
c7_3b4	Whether this establishment uses product trend analytics (forward-looking strategies based on Big data analytics, or Machine learning) <i>Definition: Product trend analysis is the process of identifying and analysing trends in product sales data.¹¹¹ In order to use artificial intelligence for trend forecasting, you need a machine learning algorithm. This algorithm will analyse past data in order to identify patterns and trends. Once these patterns have been identified, the algorithm can then predict future trends based on this data.¹¹²</i>	Yes/No
c7_3b5	Whether this establishment uses other merchandising strategies	Yes/No
c7_3c	The merchandising strategies used more often by this establishment.	Select an option number
c7_3d	The number of years this establishment has been using digital merchandising or product trend analysis for merchandising.	Number of years
c7_4a1	Management of inventory by this establishment	Yes/No

¹¹⁰ https://docs.oracle.com/cd/F22864_01/

¹¹¹ <https://uk.indeed.com/career-advice/career-development/trend-analysis#:~:text=Product%20trend%20analysis%20is%20the,marketing%20and%20other%20strategic%20decisions.>

¹¹² <https://super-chain.tech/ai-powered-trend-forecasting-how-to-predict-the-future-of-your-industry/>

Number	Instructions	Answer type
c7_4a2	Management of inventory by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c7_4a3	Outsourcing of inventory management to another firm.	Yes/No
c7_4b1	Whether this establishment uses handwritten record keeping	Yes/No
c7_4b2	Whether this establishment uses computer databases with manual updates	Yes/No
c7_4b3	Whether this establishment uses warehouse management system with specialized software	Yes/No
c7_4b4	Whether this establishment uses automated inventory control (CAO), vendor managed inventory, and/or radio-frequency identification Definitions: Computer Assisted Ordering (CAO) module is an inventory replenishment system which can use either sales or inventory algorithms to prepare a suggested re-order. ¹¹³ Vendor-managed inventory (VMI) is an inventory management technique in which a supplier of goods, usually the manufacturer, is responsible for optimizing the inventory held by a distributor. ¹¹⁴ Meanwhile, the use radio-frequency identification (RFID) for inventory management requires a scanner that uses radio waves to communicate with an RFID tag. The tag itself contains a microchip that allows the reader to read data and also write data to the tag for real-time updating in place. Each tag is wrapped in a material like plastic or paper for protection and can be affixed to a variety of surfaces for tracking. ¹¹⁵	Yes/No
c7_4b5	Whether this establishment uses automated storage and retrieval systems (AS/RS) <i>Definition: Automated storage and retrieval systems, sometimes known as ASRS or AS/RS, are made of a variation of computer-controlled systems that automatically place and retrieve loads from set storage locations in a</i>	Yes/No

¹¹³ <https://www.pinncorp.com/wp-content/uploads/2015/05/Product-Sheet-Computer-Assisted-Ordering-CAO.pdf>

¹¹⁴ [https://www.techtarget.com/searcherp/definition/vendor-managed-inventory-VMI#:~:text=Vendor%2Dmanaged%20inventory%20\(VMI\)%20is%20an%20inventory%20management%20technique,inventor%20held%20by%20a%20distributor.](https://www.techtarget.com/searcherp/definition/vendor-managed-inventory-VMI#:~:text=Vendor%2Dmanaged%20inventory%20(VMI)%20is%20an%20inventory%20management%20technique,inventor%20held%20by%20a%20distributor.)

¹¹⁵ [https://www.techtarget.com/searcherp/definition/vendor-managed-inventory-VMI#:~:text=Vendor%2Dmanaged%20inventory%20\(VMI\)%20is%20an%20inventory%20management%20technique,inventor%20held%20by%20a%20distributor.](https://www.techtarget.com/searcherp/definition/vendor-managed-inventory-VMI#:~:text=Vendor%2Dmanaged%20inventory%20(VMI)%20is%20an%20inventory%20management%20technique,inventor%20held%20by%20a%20distributor.)

Number	Instructions	Answer type
	<i>facility with precision, accuracy and speed.</i> ¹¹⁶	
c7_4b6	Whether this establishment uses other inventory methods	Yes/No
c7_4c	The inventory method used more often by this establishment.	Select an option number
c7_4d	The number of years this establishment has been using automated inventory systems.	Number of years
c7_5a1	Implementation of advertisement strategies by this establishment	Yes/No
c7_5a2	Implementation of advertisement strategies by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c7_5a3	Outsourcing of advertisement strategies to another firm.	Yes/No
c7_5b1	Whether this establishment uses paper-based communication: instore signage, newspaper ads, leaflets	Yes/No
c7_5b2	Whether this establishment uses radio, billboards, or TV	Yes/No
c7_5b3	Whether this establishment uses Email or mobile phone	Yes/No
c7_5b4	Whether this establishment uses social media (YouTube, Facebook, Twitter, Instagram) – customer cluster	Yes/No
c7_5b5	Whether this establishment uses search engine marketing to customize advertisement <i>Definition: Search engine marketing (SEM) is a form of Internet marketing that involves the promotion of websites by increasing their visibility in search engine results pages (SERPs) primarily through paid advertising</i> ¹¹⁷	Yes/No
c7_5b6	Whether this establishment uses big data analytics or Artificial Intelligence (AI) to generate personalized advertisement. <i>Definition: Artificial Intelligence (AI) to generate personalized advertisement means to personalize targeting ads on marketing channels like email, website, digital advertising, eCommerce, mobile, or retail personalization through personalized product recommendations, dynamic creative optimization (where ad can change its color, theme, layout, and design according to users' preference), and predictive bidding.</i> ¹¹⁸	Yes/No

¹¹⁶ <https://www.mhi.org/fundamentals/automated-storage#:~:text=Automated%20storage%20and%20retrieval%20systems%2C%20sometimes%20known%20as%20ASRS%20or,with%20precision%2C%20accuracy%20and%20speed.>

¹¹⁷ https://en.wikipedia.org/wiki/Search_engine_marketing

¹¹⁸ <https://smith.ai/blog/ai-powered-advertising-how-to-personalize-targeted-ads-with-artificial-intelligence-solutions>

Number	Instructions	Answer type
c7_5b7	Whether this establishment uses other advertisement channels	Yes/No
c7_5c	The advertisement channels and strategies used more often by this establishment.	Select an option number
c7_5d	The number of years this establishment has been using search engine marketing or big data (artificial intelligence) for advertisement	Number of years
Packaging premises		
c7_6a1	Does this establishment use any of the following measures to reduce waste in packaging?: Makes shopping bags recyclable or reusable	Yes/No
c7_6a2	Does this establishment use any of the following measures to reduce waste in packaging?: Uses recyclable or biodegradable materials for packaging	Yes/No
c7_6a3	Does this establishment use any of the following measures to reduce waste in packaging?: Offers digital receipts instead of paper	Yes/No
c7_6a4	Does this establishment use any of the following measures to reduce waste in packaging?: Recycles packaging from shipments	Yes/No
Packaging e-commerce		
c7_6b1	Does this establishment use any of the following measures to reduce waste in packaging of shipped goods: Recycles packaging from vendor shipments and reuses for order fulfillment	Yes/No
c7_6b2	Does this establishment use any of the following measures to reduce waste in packaging of shipped goods: Uses recyclable or biodegradable materials to ship products to customers	Yes/No
Sourcing green		
c7_6c1	Does this establishment consider sustainability standards (examples) when selecting sourcing or distribution vendors?:	Yes/No
c7_6c2	What percent of your vendors adhere to global sustainability standards (e.g EER – Energy Efficient Rating, green stickers, Eco-labels) <i>Definition: The EER is the ratio of the cooling capacity (in British thermal units (Btu) per hour) to the power input (in watts). The higher the EER rating, the more efficient a machine or appliance is.¹¹⁹ The Green Sticker verifies these natural gas appliances have been properly derated (adjusted)</i>	Select an option number

¹¹⁹ <https://www.energy.gov/energysaver/room-air-conditioners#:~:text=The%20EER%20is%20the%20ratio,more%20efficient%20the%20air%20conditioner.>

Number	Instructions	Answer type
	<i>to safely burn natural gas at your altitude.¹²⁰ Ecolabels are marks placed on product packaging or in e-catalogs that can help consumers and institutional purchasers quickly and easily identify those products that meet specific environmental performance criteria and are therefore deemed “environmentally preferable”¹²¹</i>	

10.8 BANKING (SERVICES)

Banking (services)		
c8_0a	Number of checking accounts managed by this establishment – self-explanatory	Number
c8_0b	Number of savings accounts managed by this establishment – self-explanatory	Number
c8_0c	Number of loans managed by this establishment – self-explanatory	Number
c8_1a1	Provision of customer services related to checking and saving accounts by this establishment	Yes/No
c8_1a2	Provision of customer services related to checking and saving accounts by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c8_1a3	Outsourcing of customer services to another firm.	Yes/No
c8_1b1	Whether this establishment uses teller (Face-to-face)	Yes/No
c8_1b2	Whether this establishment uses ATM machines	Yes/No
c8_1b3	Whether this establishment uses online on company website	Yes/No
c8_1b4	Whether this establishment uses mobile application of the company	Yes/No
c8_1b5	Whether this establishment uses mobile banking <i>Definition: Mobile banking is a service provided by a bank or other financial institution that allows its customers to conduct financial transactions remotely using a mobile device such as a smartphone or tablet. Unlike the related internet banking it uses software, usually called an app, provided by the financial institution for the purpose.¹²²</i>	Yes/No
c8_1b6	Whether this establishment uses other customer services	Yes/No
c8_1c	The customer services (related to checking and	Select an option number

¹²⁰ <https://www.dominionenergy.com/utah/start-stop-service/start-service/green-sticker-guide#:~:text=What%20is%20a%20Green%20Sticker,natural%20gas%20at%20your%20altitude.>

¹²¹ <https://www.epa.gov/greenerproducts/introduction-ecolabels-and-standards-greener-products#:~:text=standards%20and%20ecolabels-,What%20is%20an%20ecolabel%3F,therefore%20deemed%20%E2%80%9Cenvironmentally%20preferable%E2%80%9D.>

¹²² https://en.wikipedia.org/wiki/Mobile_banking

Number	Instructions	Answer type
	saving accounts) used more often by this establishment.	
c8_1d	The number of years this establishment has been using online on company website, mobile application or mobile banking.	Number of years
c8_2a1	Implementation of identity verification and fraud avoidance processes in house by this establishment	Yes/No
c8_2a2	Implementation of identity verification and fraud avoidance processes by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c8_2a3	Outsourcing of identity verification and fraud avoidance processes to another firm.	Yes/No
c8_2b1	Whether this establishment uses teller (Face-to-face) with documentation	Yes/No
c8_2b2	Whether this establishment uses online passwords	Yes/No
c8_2b3	Whether this establishment uses online passwords combined with security Token devices	Yes/No
c8_2b4	Whether this establishment uses digital authentication service provided by specialized firms <i>Definition: Digital authentication is designed to authenticate the identity of clients (or users) by servers (a computer program), and vice versa. It works similar to time-sharing operating systems that allow many users to perform tasks simultaneously using the same computer memory.</i> ¹²³	Yes/No
c8_2b5	Whether this establishment uses biometric identity verification <i>Definition: Biometric verification is a way to identify individuals based on their unique characteristics or body measurements – for example, their face, fingerprints or voice.</i> ¹²⁴	Yes/No
c8_2b6	Whether this establishment uses blockchain <i>Definition: Blockchain verification is the process of confirming the authenticity and validity of transactions and data within a blockchain network. As a decentralized system, blockchains rely on a consensus mechanism to achieve agreement among multiple participants, known as nodes, on the state of the ledger.</i> ¹²⁵	Yes/No
c8_2b7	Whether this establishment uses other verification methods for client identification	Yes/No

¹²³ <https://www.capterra.com/glossary/authentication-service/>

¹²⁴ <https://onfido.com/blog/what-is-biometric-verification/>

¹²⁵ <https://www.linkedin.com/pulse/blockchain-verification-process-explained-solulab#:~:text=Blockchain%20verification%20is%20the%20process,the%20state%20of%20the%20ledger.>

Number	Instructions	Answer type
c8_2c	The identity verification and fraud avoidance processes used more often by this establishment.	Select an option number
c8_2d	The number of years this establishment has been using digital authentication provided by specialized firms, biometry identity verification or block chain.	Number of years
c8_3a1	Process of loan applications in house by this establishment	Yes/No
c8_3a2	Process of loan applications by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c8_3a3	Outsourcing of loan application processes to another firm.	Yes/No
c8_3b1	Whether this establishment uses loan officer, paper based, in the establishment for handling loan applications	Yes/No
c8_3b2	Whether this establishment uses mobile/phone application plus paper based submitted to the establishment for handling loan applications	Yes/No
c8_3b3	Whether this establishment uses channel partners, Loan officer, paper based for handling loan applications	Yes/No
c8_3b4	Whether this establishment uses Internet/mobile phone applications (fully digital process) for handling loan applications <i>Definition: Digital process in loan applications make use of tools that help private lenders in automating the entire loan lifecycle from origin to credit decisions, payment processing, collections, and from accounting to reporting. These tools provide support for consumer, business, home equity and mortgage loans.¹²⁶</i>	Yes/No
c8_3b5	Whether this establishment uses other methods for handling loan applications	Yes/No
c8_3c	The loan application processes used more often by this establishment.	Select an option number
c8_3d	The number of years this establishment has been using internet (plus paper-based) or mobile phone applications for loan application processes.	Number of years
c8_4a1	The approval process of credit applications in house by this establishment.	Yes/No
c8_4a2	The approval process of credit applications by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c8_4a3	Outsourcing of credit application approval processes to another firm.	Yes/No

¹²⁶ <https://privatelenderlink.com/services/technology/loan-servicing-software/#:~:text=Loan%20Servicing%20Software%20is%20a,home%20equity%20and%20mortgage%20loans.>

Number	Instructions	Answer type
c8_4b1	Whether this establishment uses analyst decision based on papers delivered in the application approval processes of credit applications	Yes/No
c8_4b2	Whether this establishment uses analyst decision based on digital information approval processes of credit applications	Yes/No
c8_4b3	Whether this establishment uses automated decision mechanisms using specialized software approval processes of credit applications <i>Definition: Automated Credit Decision is a Credit Decision process that is largely based on automated (digital) processes that do not involve human intervention and/ or judgment that is specific to the decision being taken¹²⁷</i>	Yes/No
c8_4b4	Whether this establishment uses credit appraisal algorithm using Artificial Intelligence (AI) or big data analytics for approval processes of credit applications <i>Definition: AI-based credit decisioning models support banks and leasing companies in 3 areas: Automated credit review (ACR model) which accurately estimates whether a client needs manual attention, automated credit extension (ACE model) provides upcoming extensions with three options: automated approval, explain on warnings only, or extensive assessment; and automated credit applications.¹²⁸</i>	Yes/No
c8_4b5	Whether this establishment uses other approval processes of credit applications	Yes/No
c8_4c	The approval process of credit applications used more often by this establishment.	Select an option number
c8_4d	The number of years this establishment has been using automated decision mechanisms with specialized software, big data or artificial intelligence.	Number of years
c8_5a1	The approval process of credit applications in house by this establishment.	Yes/No
c8_5a2	The approval process of credit applications by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c8_5a3	Outsourcing of credit application approval processes to another firm.	Yes/No
c8_5b1	Whether this establishment uses purely rely on writing records from employees	Yes/No

¹²⁷

https://www.openriskmanual.org/wiki/Automated_Credit_Decision#:~:text=Definition,to%20the%20decision%20being%20taken.

¹²⁸ <https://www.igh.com/ai-credit-decisioning>

Number	Instructions	Answer type
c8_5b2	Whether this establishment uses digital accounting and document management system using PCs <i>Definitions: Digital accounting refers to creating, transferring, managing, and storing financial information in an electronic format. It involves the use of software solutions to digitize and automate many of the manual processes accountants deal with on a regular basis.¹²⁹ A digital document management system is a software or a digital platform using which companies can store, sort, and organize their digital documents.¹³⁰</i>	Yes/No
c8_5b3	Whether this establishment uses digital network (Centralized system across branches)	Yes/No
c8_5b4	Whether this establishment uses other methods for handling operational support area	Yes/No
c8_5c	The method for handling operational support area used more often by this establishment.	Select an option number
c8_5d	The number of years this establishment has been using digital accounting or digital network.	Number of years

10.9 TRANSPORTATION (SERVICES)

9. Transportation (services)		
c9_0a1	The main transportation service at this establishment – passengers	Yes/No
c9_0a2	The main transportation service at this establishment – freight	Yes/No
c9_0a3	The main transportation service at this establishment – other transportation services	Yes/No
c9_0b1	Whether this establishment uses trucks	Yes/No
c9_0b2	Whether this establishment uses cars	Yes/No
c9_0b3	Whether this establishment uses motorcycle	Yes/No
c9_0b4	Whether this establishment uses other type of the fleet	Yes/No
c9_0b5	What is the number of vehicles used by this establishment by type of the fleet?: Trucks	Number
c9_0b6	What is the number of vehicles used by this establishment by type of the fleet?: Cars	Number
c9_0b7	What is the number of vehicles used by this establishment by type of the fleet?: Motorcycles	Number
c9_0b8	What is the number of vehicles with the following features?: Automatic transmission <i>Definition: An automatic transmission is a multi-speed transmission used in motor vehicles that does not require</i>	Number

¹²⁹ <https://penneo.com/blog/audit-accounting-digitization/#:~:text=Digital%20accounting%20refers%20to%20creating,with%20on%20a%20regular%20basis.>

¹³⁰ <https://www.amygb.ai/blog/what-is-a-digital-document-management-system>

Number	Instructions	Answer type
	<i>any input from the driver to change forward gears under normal driving conditions</i> ¹³¹	
c9_0b9	What is the number of vehicles with the following features?: Hybrid or electric <i>Definition: A hybrid is powered by both an internal combustion engine (ICE) and an electric motor, with separate batteries for each. An electric vehicle uses only a battery and an electric motor to run. Both have a lower environmental impact than ICE-only (gas-only) cars</i> ¹³²	Number
c9_0b10	What is the number of vehicles with the following features?: GPS tracking system <i>Definition: Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites</i> ¹³³	Number
c9_0d1	What is the level of carbon emission control by authorities in your region?	Select from options
c9_0d2	What is the percentage of your fleet that comply with carbon emissions regulations?	Percentage
c9_0c1	Does this establishment monitor and have targets for: Drivers speed compliance	Yes/No
c9_0c2	Does this establishment monitor and have targets for: Drivers idle time	Yes/No
c9_0c3	Does this establishment monitor and have targets for: Drivers mileage compliance	Yes/No
c9_0c4	Does this establishment monitor and have targets for: Carbon emissions	Yes/No
c9_1a1	Decision of load optimization plans by this establishment	Yes/No
c9_1a2	Decision of load optimization plans by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c9_1a3	Outsourcing of load optimization plans to another firm.	Yes/No
c9_1b1	Whether this establishment uses handwritten information to create load plans	Yes/No
c9_1b2	Whether this establishment uses information collected by electronic file share (e.g. Email or FAX to create load plans) for transportation planning	Yes/No
c9_1b3	Whether this establishment uses batch information collected by installed software to create ERP generated load plans	Yes/No

¹³¹ https://en.wikipedia.org/wiki/Automatic_transmission

¹³² <https://www.progressive.com/answers/hybrid-vs-electric-cars/>

¹³³ https://en.wikipedia.org/wiki/Global_Positioning_System

Number	Instructions	Answer type
	<i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i>	
c9_1b4	Whether this establishment uses real time information by online software interface with ERP to create load plans <i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i>	Yes/No
c9_1b5	Whether this establishment uses other methods for transportation planning	Yes/No
c9_1c	The transportation planning method (related to checking and saving accounts) used more often by this establishment.	Select an option number
c9_1d	The number of years this establishment has been using batch information or real time information collected by specialized software integrated with ERP to create load plans.	Number of years
c9_1e	Does this establishment uses software for mileage optimization (such as Opti-Time, Tour Solver, Workwave, Route Manager, My Route Online or Road Warrior)? <i>Definition: Software for mileage optimization will calculate the optimum number of drivers to use for your last-mile delivery routes. It can do this quickly by calculating different route options and comparing them to see which is the most mileage efficient.¹³⁴</i>	Yes/No
c9_2a1	Execution of transportation load plans by this establishment	Yes/No
c9_2a2	Execution of transportation load plans by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c9_2a3	Outsourcing of transportation load plan execution to another firm.	Yes/No
c9_2b1	Whether this establishment uses manual process with the support of fax, text, or phone calls	Yes/No
c9_2b2	Whether this establishment uses manual process with the support of digital platforms or mobile apps	Yes/No

¹³⁴ <https://nuvizz.com/blog/7-ways-route-optimization-can-reduce-delivery-miles/#:~:text=Route%20optimization%20software%20will%20calculate,is%20the%20most%20mileage%20efficient.>

Number	Instructions	Answer type
c9_2b3	<p>Whether this establishment uses execution plan exchanged via web based direct to delivery equipment for interface with driver: GPS - routing, tracking, Email, text</p> <p><i>Definition: Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites</i></p>	Yes/No
c9_2b4	<p>Whether this establishment uses specific software interface via Internet: GPS, dynamic routing (weather, traffic), E-log – driver status and safety, load monitoring</p> <p><i>Definition: Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Dynamic routing software is a type of routing software that uses real-time data to plan routes. This means that the software takes into account traffic, weather, and other conditions that could impact the route.¹³⁵ Meanwhile, Electronic logbooks (E-logs) automate Hours of Service records for truck drivers.¹³⁶</i></p>	Yes/No
c9_2b5	<p>Whether this establishment uses file exchange between ERP integrated applications and delivery equipment</p> <p><i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i></p>	Yes/No
c9_2b6	Whether this establishment uses other processes for loading tender, routing, and dispatching	Yes/No
c9_2c	The transportation load plan execution method used more often by this establishment.	Select an option number
c9_2d	The number of years this establishment has been using specialized software for transportation load plan execution.	Number of years
c9_3a1	Operation of in-house transportation monitoring by this establishment	Yes/No
c9_3a2	Operation of transportation monitoring by other	Yes/No

¹³⁵ <https://www.wisesystems.com/blog/dynamic-vs-static-routing-faq/#:~:text=Dynamic%20routing%20software%20is%20a,minute%20changes%20to%20their%20routes.>

¹³⁶ <https://www.geotab.com/blog/electronic-logbook/#:~:text=Electronic%20logbooks%20automate%20Hours%20of,and%20more%20prone%20to%20errors.>

Number	Instructions	Answer type
	establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	
c9_3a3	Outsourcing of transportation monitoring process to another firm.	Yes/No
c9_3b1	Whether this establishment uses event driven at predetermined intervals with the support of fax, text, or phone calls	Yes/No
c9_3b2	Whether this establishment uses event driven at predetermined intervals with the support of digital platforms or mobile apps	Yes/No
c9_3b3	Whether this establishment uses paper documentation exchange on daily, weekly or monthly intervals with data entry into ERP or planning system— invoice, bill of lading, regulatory, etc.	Yes/No
c9_3b4	Whether this establishment uses information collected by software installed on the transportation equipment: GPS, E-log – Driver status, load monitoring <i>Definition: Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Dynamic routing software is a type of routing software that uses real-time data to plan routes. This means that the software takes into account traffic, weather, and other conditions that could impact the route.¹³⁷ Meanwhile, Electronic logbooks (E-logs) automate Hours of Service records for truck drivers.¹³⁸</i>	Yes/No
c9_3b5	Whether this establishment uses file exchange between ERP integrated applications and delivery equipment software application(s) <i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i>	Yes/No
c9_3b6	Whether this establishment uses other systems for monitoring load and delivery	Yes/No
c9_3c	The transportation monitoring system used more often by this establishment.	Select an option number

¹³⁷ <https://www.wisesystems.com/blog/dynamic-vs-static-routing-faq/#:~:text=Dynamic%20routing%20software%20is%20a,minute%20changes%20to%20their%20routes.>

¹³⁸ <https://www.geotab.com/blog/electronic-logbook/#:~:text=Electronic%20logbooks%20automate%20Hours%20of,and%20more%20prone%20to%20errors.>

Number	Instructions	Answer type
c9_3d	<p>The number of years this establishment has been using a system integrated into ERP, specialized software, or batch processing of electronic data exchange for monitoring transportation.</p> <p><i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i></p>	Number of years
c9_4a1	Assessment of transportation performance by this establishment	Yes/No
c9_4a2	Assessment of transportation performance by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c9_4a3	Outsourcing of transportation performance assessment to another firm.	Yes/No
c9_4b1	Whether this establishment uses manually monitored and reported	Yes/No
c9_4b2	Whether this establishment uses computer with non-specialized software such as Excel, Word, Power Point, or equivalent	Yes/No
c9_4b3	Whether this establishment uses computer or apps with specialized transportation reporting applications by service and cost performance metrics	Yes/No
c9_4b4	<p>Whether this establishment uses information collected by software installed on the transportation equipment: GPS, E-log – driver status, load monitoring</p> <p><i>Definition: Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Dynamic routing software is a type of routing software that uses real-time data to plan routes. This means that the software takes into account traffic, weather, and other conditions that could impact the route.¹³⁹ Meanwhile, Electronic logbooks (E-logs) automate Hours of Service records for truck drivers.¹⁴⁰</i></p>	Yes/No
c9_4b5	Whether this establishment uses file exchange	Yes/No

¹³⁹ <https://www.wisesystems.com/blog/dynamic-vs-static-routing-faq/#:~:text=Dynamic%20routing%20software%20is%20a,minute%20changes%20to%20their%20routes.>

¹⁴⁰ <https://www.geotab.com/blog/electronic-logbook/#:~:text=Electronic%20logbooks%20automate%20Hours%20of,and%20more%20prone%20to%20errors.>

Number	Instructions	Answer type
	<p>between ERP integrated applications and delivery equipment software application(s)</p> <p><i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i></p>	
c9_4b6	Whether this establishment uses other transport performance measurement systems	Yes/No
c9_4c	The transport performance measurement system used more often by this establishment.	Select an option number
c9_4d	<p>The number of years this establishment has been using computer with specialized software or Apps or ERP integrated applications reporting performance metrics or fuel consumption.</p> <p><i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities</i></p>	Number of years
c9_5a1	Management of fleet assets by this establishment	Yes/No
c9_5a2	<p>Management of fleet assets by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)</p>	Yes/No
c9_5a3	Outsourcing of fleet asset management to another firm.	Yes/No
c9_5b1	Whether this establishment uses all manual paper driven system (e.g. repair, regulatory, licensing, insurance, warranty, performance, and parts management)	Yes/No
c9_5b2	Whether this establishment uses information collected by electronic file and shared through Email or FAX	Yes/No
c9_5b3	<p>Whether this establishment uses batch information collected by software installed on transportation equipment – ETM (engine monitoring) for fleet management documentation and reporting</p> <p><i>Definition: Engine monitoring is technique that continuously monitors the health of fleet engines. By tracking a known set of parameters, usually altitude, OAT, speed, ITT, N1/N2 RPMs, fuel flow, and vibrations, operators are more able to predict needed maintenance before a failure occurs.¹⁴¹</i></p>	Yes/No

¹⁴¹ <https://www.duncanaviation.aero/intelligence/2020/March/using-engine-condition-trend-monitoring-as-a-standard#:~:text=Essentially%2C%20it's%20a%20technique%20that,maintenance%20before%20a%20failure%20occurs.>

Number	Instructions	Answer type
c9_5b4	<p>Whether this establishment uses data exchange via Web between ERP and software installed on transportation equipment – ETM, (engine monitoring) Elog and GPS (driver monitor) for fleet management documentation and reporting</p> <p><i>Definition of ERP: Enterprise resource planning is a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from many business activities. Engine monitoring is technique that continuously monitors the health of fleet engines. By tracking a known set of parameters, usually altitude, OAT, speed, IIT, N1/N2 RPMs, fuel flow, and vibrations, operators are more able to predict needed maintenance before a failure occurs. Global Positioning System (GPS) is one of the global navigation satellite systems (GNSS) that provide geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Meanwhile, Electronic logbooks (E-logs) automate Hours of Service records for truck drivers.¹⁴²</i></p>	Yes/No
c9_5b5	Whether this establishment uses other fleet management systems	Yes/No
c9_5c	The fleet management system used more often by this establishment.	Select an option number
c9_5d	The number of years this establishment has been using batch information collected by specialized software or real-time information by on-line software interface with ERP.	Number of years
c9_5e	How often does this establishment replace a vehicle in its fleet?	Select an option number

10.10 HEALTH SERVICES (SERVICES)

Health services (services)		
c10_0	The classification of the hospital in terms of level of complexity for treatment care	Select an option number
c10_0a	The average number of patient visits per day in this establishment	Number of patients
c10_0b	The average number of patients spending night in this establishment per day	Number of patients
c10_0c	The number of full-time doctors working in this establishment	Number of full-time doctors
c10_0d	The number of full-time nurses working in this establishment	Number of full-time nurses

¹⁴² <https://www.geotab.com/blog/electronic-logbook/#:~:text=Electronic%20logbooks%20automate%20Hours%20of,and%20more%20prone%20to%20errors.>

Number	Instructions	Answer type
c10_1a1	Whether this hospital has emergency department	Yes/No
c10_1a2	Whether this hospital has postoperative care area	Yes/No
c10_1a3	Whether this hospital has intensive care unit	Yes/No
c10_1a4	Whether this hospital has pretested blood available (blood bank)	Yes/No
c10_1a5	Whether this hospital has a lab to test blood and urine	Yes/No
c10_1a6	Whether this hospital has functioning X-ray machine	Yes/No
c10_1a7	Whether this hospital has functioning ultrasound machine	Yes/No
c10_1a8	Whether this hospital has functioning Computerized Tomography (CT) scan <i>Definition: A computerized tomography (CT) scan combines a series of X-ray images taken from different angles around your body and uses computer processing to create cross-sectional images (slices) of the bones, blood vessels and soft tissues inside your body. CT scan images provide more-detailed information than plain X-rays do.</i> ¹⁴³	Yes/No
c10_1a9	Whether this hospital has functioning MRI machine <i>Definition: Magnetic resonance imaging is a medical imaging technique used in radiology to form pictures of the anatomy and the physiological processes of the body. MRI scanners use strong magnetic fields, magnetic field gradients, and radio waves to generate images of the organs in the body.</i> ¹⁴⁴	Yes/No
c10_1a10	Whether this hospital has functioning ultrasound machine <i>Definition: The ultrasound machine directs high-frequency sound waves at the internal body structures being examined. The reflected sounds, or echoes, are recorded to create an image that can be seen on a monitor. The sound waves are emitted and received from a small, hand-held probe.</i> ¹⁴⁵	Yes/No
c10_1a11	Whether this hospital has pulse oximetry <i>Definition: Pulse oximetry is a noninvasive method for monitoring a person's blood oxygen saturation. Peripheral oxygen saturation readings are typically within 2% accuracy of the more accurate reading of arterial oxygen saturation from arterial blood gas analysis.</i> ¹⁴⁶	Yes/No
c10_1a12	Whether this hospital has other	Yes/No

¹⁴³ <https://www.mayoclinic.org/tests-procedures/ct-scan/about/pac-20393675>

¹⁴⁴ https://en.wikipedia.org/wiki/Magnetic_resonance_imaging

¹⁴⁵ <https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/ultrasound-scan#:~:text=The%20ultrasound%20machine%20directs%20high,small%2C%20hand%2Dheld%20probe.>

¹⁴⁶ https://en.wikipedia.org/wiki/Pulse_oximetry

Number	Instructions	Answer type
	infrastructure/technologies	
c10_2a1	Management of appointment scheduling by this establishment	Yes/No
c10_2a2	Management of appointment scheduling by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c10_2a3	Outsourcing of appointment scheduling to another firm.	Yes/No
c10_2b1	Whether this hospital uses personal visit and paper for scheduling systems	Yes/No
c10_2b2	Whether this hospital uses phone call, SMS, or Email for scheduling systems	Yes/No
c10_2b3	Whether this hospital uses specialized software or mobile app for appointment WITHOUT automated reminders for scheduling systems	Yes/No
c10_2b4	Whether this hospital uses specialized software or mobile app for appointment WITH automated reminders and confirmation for scheduling systems <i>Definition: Healthcare appointment scheduling software is a digital technology that improves patient engagement and ensures easier access to appointments. Not only do consumers love these solutions, but they also have various back-end benefits for healthcare organizations.¹⁴⁷</i>	Yes/No
c10_2b5	Whether this hospital uses other scheduling systems	Yes/No
c10_2c	The appointment scheduling system used more often by this establishment.	Select an option number
c10_2d	The number of years this establishment has been scheduling appointments with specialized software, webpage, or mobile app.	Number of years
c10_3a1	Management of patient records by this establishment	Yes/No
c10_3a2	Management of patient records by other establishments (excluding this establishment) of the same firm. (Note: This question is asked only for multi-establishment firms.)	Yes/No
c10_3a3	Outsourcing of patient record management to another firm.	Yes/No
c10_3b1	Whether this hospital uses handwritten process	Yes/No
c10_3b2	Whether this hospital uses digital patient records using standard software, such as Excel and Word	Yes/No
c10_3b3	Whether this hospital uses Electronic Health Records (EHR) with specialized software	Yes/No

¹⁴⁷ <https://qless.com/major-technological-innovations-in-healthcare-appointment-scheduling-software/#:~:text=Healthcare%20appointment%20scheduling%20software%20is,end%20benefits%20for%20healthcare%20organizations.>

Number	Instructions	Answer type
	<i>Definition: Electronic Health Records (EHR) software is a computer system that helps healthcare providers manage patient medical records and automate clinical workflows. EHR systems allow providers to: Create customizable templates for taking notes during patient encounters.</i> ¹⁴⁸	
c10_3b4	Whether this hospital uses cloud-based Electronic Health Records (EHR) integrated to analytical and management tools <i>Definition: Electronic Health Records (EHR) integration is the process of enabling medical records to seamlessly be accessed across electronic software solutions. For practice management and patient engagement solutions, this means medical records such as personal information, medical history, and more can be accessed easily across solutions.</i> ¹⁴⁹	Yes/No
c10_3b5	Whether this hospital uses other patient record keeping systems	Yes/No
c10_3c	The patient record keeping system used more often by this establishment.	Select an option number
c10_3d	The number of years this establishment has been using electronic health records.	Number of years
c10_4a1	Ownership of a pharmacy to provide medication to patients in house by this establishment.	Yes/No
c10_4b1	The process of handing the stock of medication in the (internal) pharmacy in this establishment.	Select an option number
c10_4b2	The process of handing the stock of medication in the (internal) pharmacy in this establishment.	Select an option number
c10_4c1	Whether this hospital uses handwritten monitoring administration of medicine	Yes/No
c10_4c2	Whether this hospital uses barcode or electronic identification for medicine administration to patients	Yes/No
c10_4c3	Whether this hospital uses other medication management and administration systems	Yes/No
c10_4d	The number of years this establishment has been barcode identification for medicine administration to patients. <i>Definition: Barcoded Medication Administration (BCMA) is an inventory control system that uses barcodes to prevent human errors in the distribution of prescription medications at hospitals.</i> ¹⁵⁰	Number of years
c10_5a1	Whether treatment with antibiotics is available in	Select an option number

¹⁴⁸ <https://www.advancedmd.com/emr-ehr-software/#:~:text=EHR%20%2F%20EMR%20software%20is%20a,taking%20notes%20during%20patient%20encounters>

¹⁴⁹ <https://www.nexhealth.com/resources/ehr-integration>

¹⁵⁰ [https://www.techtarget.com/searchhealthit/definition/Bar-Coded-Medication-Administration#:~:text=Barcoded%20Medication%20Administration%20\(BCMA\)%20is,of%20prescription%20medications%20at%20hospitals.](https://www.techtarget.com/searchhealthit/definition/Bar-Coded-Medication-Administration#:~:text=Barcoded%20Medication%20Administration%20(BCMA)%20is,of%20prescription%20medications%20at%20hospitals.)

Number	Instructions	Answer type
	this establishment	
c10_5a2	Whether treatment with advanced therapies, such as resuscitation, mechanical ventilation, glucose control, and renal control is available in this establishment	Select an option number
c10_5b1	Whether Cesarean Section is available in this establishment <i>Definition: Caesarean section, also known as C-section or caesarean delivery, is the surgical procedure by which one or more babies are delivered through an incision in the mother's abdomen.</i> ¹⁵¹	Select an option number
c10_5b2	Whether high-risk labor is available in this establishment	Select an option number
c10_5c1	Whether Traction (closed fracture) is available in this establishment	Select an option number
c10_5c2	Whether Open Treatment of Fracture is available in this establishment <i>Definition: An open fracture (or compound fracture) refers to a broken bone that causes an open wound or break in the skin. This type of traumatic injury requires emergency treatment to set the bone and prevent infection in the wound.</i> ¹⁵²	Select an option number
c10_5d1	Whether Defibrillation is available in this establishment <i>Definition: Defibrillation is a treatment for life-threatening cardiac arrhythmias, specifically ventricular fibrillation (V-Fib) and non-perfusing ventricular tachycardia (V-Tach). A defibrillator delivers a dose of electric current (often called a counter-shock) to the heart.</i> ¹⁵³	Select an option number
c10_5d2	Whether Coronary Angiography or Multivessel coronary revascularization is available in this establishment <i>Definitions: Coronary angiography is a procedure that uses a special dye (contrast material) and x-rays to see how blood flows through the arteries in your heart. Coronary angiography is performed to detect obstruction in the coronary arteries of the heart.</i> ¹⁵⁴ <i>In multivessel coronary artery disease (MVCAD), myocardial revascularisation can be achieved by percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), with complete</i>	Select an option number

¹⁵¹ https://en.wikipedia.org/wiki/Caesarean_section

¹⁵² <https://stanfordhealthcare.org/medical-conditions/bones-joints-and-muscles/open-fractures.html>

¹⁵³ <https://en.wikipedia.org/wiki/Defibrillation>

¹⁵⁴ <https://www.mountsinai.org/health-library/tests/coronary-angiography#:~:text=Coronary%20angiography%20is%20a%20procedure,coronary%20arteries%20of%20the%20heart.>

Number	Instructions	Answer type
	<i>revascularisation on all diseased coronary segments or with incomplete revascularisation on selectively targeted lesions.</i> ¹⁵⁵	

10.11 LEATHER AND FOOTWEAR (MANUFACTURING)

11.0 LEATHER AND FOOTWEAR (MANUFACTURING)		
c11_01a	What of the following material does this establishment use to start production?: Finished natural Leather	Yes/No
c11_01b	What of the following material does this establishment use to start production?: Man-made leather/ Synthetic	Yes/No
c11_01c	What of the following material does this establishment use to start production?: Textile (i.e, Mesh/ engineering mesh/ canvas etc)	Yes/No
c11_01d	What of the following material does this establishment use to start production?: Synthetic + Textile (mix-components man made) <i>Definitions: Faux leather, also known as synthetic leather, begins with a fabric base such as polyester. The fabric is then given an imitation leather finish and texture with wax, dye, polyvinyl chloride (PVC), or polyurethane.</i> ¹⁵⁶ <i>Meanwhile, Textile is an umbrella term that includes various fiber-based materials, including fibers, yarns, filaments, threads, different fabric types, etc.</i> ¹⁵⁷	Yes/No
c11_01e	What of the following material does this establishment use to start production?: Synthetic + Textile + Leather (mix components-natural and man-made) <i>Definitions: Faux leather, also known as synthetic leather, begins with a fabric base such as polyester. The fabric is then given an imitation leather finish and texture with wax, dye, polyvinyl chloride (PVC), or polyurethane.</i> ¹⁵⁸ <i>Meanwhile, Textile is an umbrella term that includes various fiber-based materials, including fibers, yarns, filaments, threads, different fabric types, etc.</i> ¹⁵⁹	Yes/No
c11_01f	What of the following material does this establishment use to start production?: Other	Yes/No

¹⁵⁵

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5872375/#:~:text=In%20multivessel%20coronary%20artery%20disease,revascularisation%20on%20selectively%20targeted%20lesions.>

¹⁵⁶ [https://buffalojackson.com/blogs/insight/what-is-faux-leather-made-out-of#:~:text=How%20Faux%20Leather%20is%20Created,\(PVC\)%2C%20or%20polyurethane.](https://buffalojackson.com/blogs/insight/what-is-faux-leather-made-out-of#:~:text=How%20Faux%20Leather%20is%20Created,(PVC)%2C%20or%20polyurethane.)

¹⁵⁷ <https://en.wikipedia.org/wiki/Textile>

¹⁵⁸ [https://buffalojackson.com/blogs/insight/what-is-faux-leather-made-out-of#:~:text=How%20Faux%20Leather%20is%20Created,\(PVC\)%2C%20or%20polyurethane.](https://buffalojackson.com/blogs/insight/what-is-faux-leather-made-out-of#:~:text=How%20Faux%20Leather%20is%20Created,(PVC)%2C%20or%20polyurethane.)

¹⁵⁹ <https://en.wikipedia.org/wiki/Textile>

c11_02a	What of the following footwear/ Leather goods is produced by this establishment?: Basic (i.e: Footwear> oxford/ derby/ moccasin etc/ wallet/ carry bags etc)	Yes/No
c11_02b	What of the following footwear/ Leather goods is produced by this establishment?: Fashion (fashion shoe, fashion accessories/ sling bag, vanity bag etc.)	Yes/No
c11_02c	What of the following footwear/ Leather goods is produced by this establishment?: Sports or specific purpose (travel bags, sports bags, summer sandal, running shoe, hiking shoe, water sports shoe etc)	Yes/No
c11_02d	What of the following footwear/ Leather goods is produced by this establishment?: Protective shoes (industrial use) <i>Definition: Protective shoes (industrial use) are designed to protect feet against a wide variety of injuries. Impact, compression, and puncture are the most common types of foot injury.¹⁶⁰</i>	Yes/No
c11_02e	What of the following footwear/ Leather goods is produced by this establishment?: Other	Yes/No
c11_03a	What of the following finishes are available in this establishment?: Screen print/ heat transfer	Yes/No
c11_03b	What of the following finishes are available in this establishment: Embroidery	Yes/No
c11_03c	What of the following finishes are available in this establishment: Seamless (no stitch)	Yes/No
c11_03d	What of the following finishes are available in this establishment?: Ink or Wax Polishing	Yes/No
c11_03e	What of the following finishes are available in this establishment?: Waterproofing Definition: The term 'waterproof' is normally taken to represent the conditions in which a textile can prevent the absorption of water and also the penetration of water into its structure. Waterproofing is nothing but preventing the passage of both air and water through a fabric. ¹⁶¹	Yes/No
c11_03f	What of the following finishes are available in this establishment?: Other	Yes/No
Design		
c11_1a1	Do clients provide files for design to this establishment?	Yes/No
c11_1a2	What is the most common file provided by clients for design?	Select an option number

¹⁶⁰

<https://www.ccohs.ca/oshanswers/prevention/ppe/footwear.html#:~:text=Safety%20footwear%20is%20desig ned%20to,are%20required%20in%20your%20jurisdiction.>

¹⁶¹ https://textilelearner.net/waterproofing-finishing-in-textile/#google_vignette

c11_1a3	Does this establishment do design drawing in house?	Yes/No
c11_1a4	Is this task outsourced to another unit of the same firm?	Yes/No
c11_1a5	Is this task outsourced to another firm?	Yes/No
c11_1b1	Does this establishment use any of the following design drawing processes?: Manual design and hand drawing	Yes/No
c11_1b2	Does this establishment use any of the following design drawing processes?: Digital or semi-digital design using specialized 2D drawing software	Yes/No
c11_1b3	Does this establishment use any of the following design drawing processes?: Computer Aided Design (CAD), 3D design, virtual prototyping <i>Definitions: Computer-aided design (CAD) is a way to digitally create 2D drawings and 3D models of real-world products before they're ever manufactured. With 3D CAD, you can share, review, simulate, and modify designs easily, opening doors to innovative and differentiated products that get to market fast.¹⁶² 3D design refers to using software to create a digital model of a three-dimensional shape or object.¹⁶³ Virtual prototyping, often known as VP, is a software-based engineering discipline which involves modelling a system, simulating and visualising its behaviour under real-world operating conditions, and refining its design through an iterative process.¹⁶⁴</i>	Yes/No
c11_1b4	Does this establishment use any of the following design drawing processes?: Other	Yes/No
c11_1c	What is the most used design drawing process by this establishment?	Select an option number
c11_1d	For how many years this establishment has been using specialized software, 3D design, or virtual prototyping?	Number (years)
Cutting		
c11_2a1	Does this establishment handle cutting process in house?	Yes/No
c11_2a2	Is this task outsourced another unit of the same firm?	Yes/No
c11_2a3	Is this task outsourced to another firm?	Yes/No
c11_2b1	Does this establishment use any of the following cutting methods?: Manual cutting	Yes/No
c11_2b2	Does this establishment use any of the following cutting methods?: Cutting machine manually operated	Yes/No
c11_2b3	Does this establishment use any of the following	Yes/No

¹⁶² <https://www.ptc.com/en/technologies/cad>

¹⁶³ <https://www.coursera.org/articles/3d-design>

¹⁶⁴ <https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-virtual-prototyping>

	cutting methods?: Semi-Automatic cutting machine (straight knife, round knife, die cutting machine)	
c11_2b4	Does this establishment use any of the following cutting methods?: Automatic or Computerized cutting machine (no Laser: water jet, knife, other) <i>Definition: A water jet cutter, also known as a water jet or waterjet, is an industrial tool capable of cutting a wide variety of materials using an extremely high-pressure jet of water, or a mixture of water and an abrasive substance.¹⁶⁵</i>	Yes/No
c11_2b5	Does this establishment use any of the following cutting methods?: Automatic/Computerized cutting machine (Laser) <i>Definition: Laser cutting is a technology that uses a laser to vaporize materials, resulting in a cut edge. While typically used for industrial manufacturing applications, it is now used by schools, small businesses, architecture, and hobbyists. Laser cutting works by directing the output of a high-power laser most commonly through optics.¹⁶⁶</i>	Yes/No
c11_2b6	Does this establishment use any of the following cutting methods?: Other	Yes/No
c11_2c	What is the most used cutting method in this facility?	Select an option number
c11_2d	For how many years this establishment has been using automatic cutting machines and lasers?	Number (years)
Sewing and Joining Parts		
c11_3a1	Does this establishment handle sewing process in house?	Yes/No
c11_3a2	Is this task outsourced to another unit of the same firm?	Yes/No
c11_3a3	Is this task outsourced to another firm?	Yes/No
c11_3b1	What sewing method is used by this establishment?: Manually sewing	Yes/No
c11_3b2	What sewing method is used by this establishment?: Machine sewing manually operated	Yes/No
c11_3b3	What sewing method is used by this establishment?: Semi-automated sewing machines	Yes/No
c11_3b4	What sewing method is used by this establishment?: Automated sewing machines <i>Definition: A computerized sewing machine is a really high-tech automated electric sewing machine. The biggest advantage of these machines is that they can be connected to the computer and the internet. This way the computerized sewing machine can set up programs and undertake</i>	Yes/No

¹⁶⁵ https://en.wikipedia.org/wiki/Water_jet_cutter

¹⁶⁶ https://en.wikipedia.org/wiki/Laser_cutting

	<i>embroidery sewing work. With these machines, you will have various options to combine embroidery stitches in any manner you see fit.</i> ¹⁶⁷	
c11_3b5	What sewing method is used by this establishment?: 3D Knitting <i>Definition: The 3D knitting begins with a three-dimensional digital model, similar to what you'd encounter in a CAD (computer-aided design) program. Once a design is created, it can be transferred, downloaded, and knit on any 3D-knitting machine, anywhere.</i> ¹⁶⁸	Yes/No
c11_3b6	What sewing method is used by this establishment?: Other (non-sewing/ seamless)	Yes/No
c11_3c	What is the most used sewing method in this facility?	Select an option number
c11_3d	For how many years this establishment has been using semi-automated sewing machines or automated sewing machines or 3D knitting?	Number (years)
Assembly - Finishing		
c11_4a1	Does this establishment handle assembly and finishing process in house?	Yes/No
c11_4a2	Is this task outsourced another to unit of the same firm?	Yes/No
c11_4a3	Is this task outsourced to another firm?	Yes/No
c11_4b1	What assembly and finishing method is used by this establishment? : Manual one station-based finishing and assembly method	Yes/No
c11_4b2	What assembly and finishing method is used by this establishment? : Conveyor based finishing and assembly method (Static/semi-automated conveyor system)	Yes/No
c11_4b3	What assembly and finishing method is used by this establishment? : Conveyor based finishing and assembly method (Dynamic/automated conveyor system) <i>Definition: An automated conveyor system is a network of conveyors that automatically move materials and products from one location to another. Conveyor systems are used in many industries and can be used as standalone pieces of equipment or as part of larger automated system</i> ¹⁶⁹	Yes/No
c11_4b4	What assembly and finishing method is used by	Yes/No

¹⁶⁷ <https://fashinza.com/manufacturing/industry-4-0/5-types-of-automated-electric-sewing-machine-that-are-changing-the-world-of-apparel-manufacturing/>

¹⁶⁸ [https://www.oliver-charles.com/pages/3d-knitting#:~:text=It's%20in%20the%20name%3B%20these,computer%20Aided%20design\)%20program.](https://www.oliver-charles.com/pages/3d-knitting#:~:text=It's%20in%20the%20name%3B%20these,computer%20Aided%20design)%20program.)

¹⁶⁹ <https://www.bastiansolutions.com/solutions/technology/conveyor-systems/#:~:text=Automated%20Conveyor%20&%20Conveyor%20Systems%20for,part%20of%20larger%20automated%20systems.>

	<p>this establishment? : Injection machine & finishing line- DIP</p> <p><i>Definition: Direct injection Process (DIP) is the process of introducing a molten material, commonly TPR, PVC or PU, into the cavity of a mold to achieve the desired shape. This process can be used for the production of outsoles, decorative details or to join an outsole to upper directly. The latter is known as DIP or Direct Injection Process. The investment to set up a DIP line is high due to the cost of molds which are big in size but also needs to be very precise. The benefit of DIP is the high production efficiency and low material wastage during production.</i>¹⁷⁰</p>	
c11_4b5	<p>What assembly and finishing method is used by this establishment? : 3D printing / assembly</p> <p><i>Definition: 3D printing or additive manufacturing is the construction of a three-dimensional object from a CAD model or a digital 3D model. It can be done in a variety of processes in which material is deposited, joined or solidified under computer control, with the material being added together, typically layer by layer</i>¹⁷¹</p>	Yes/No
c11_4b6	<p>What assembly and finishing method is used by this establishment? : Other</p>	Yes/No
c11_4b1	<p>What assembly and finishing method is used by this establishment? : Manual one station-based finishing and assembly method</p>	Yes/No
c11_4c	<p>What is the most used assembly and finishing method in this facility?</p>	Select an option number
c11_4d	<p>For how many years this establishment has been using dynamic/ automated conveyor-based finishing and assembly method, injection machine & finishing line, or 3D/printing/assembly?</p>	Number (years)
Water management		
c11_5a1	<p>Which of the following practices the establishment currently uses for its water management? : Recycle process water</p>	Yes/No
c11_5a2	<p>Which of the following practices the establishment currently uses for its water management? : Reuse water in whole facility</p>	Yes/No
c11_5a3	<p>Which of the following practices the establishment currently uses for its water management? : Rainwater collection system</p>	Yes/No
c11_5a4	<p>Which of the following practices the establishment currently uses for its water management? : Uses drums with automatic humidity and temperature controls</p>	Yes/No

¹⁷⁰ <https://www.findsourcing.com/articles/construction/direct-injection-process-dip>

¹⁷¹ https://en.wikipedia.org/wiki/3D_printing

	<i>Definition: Drums with automatic humidity and temperature controls simulate the effects that a range of temperature and humidity conditions have on a product or material, for example telecommunications equipment or photovoltaic solar panels that are exposed to outdoor temperature and humidity conditions.</i> ¹⁷²	
Certifications		
c11_6a1	Does the establishment has any of the following certifications? : Zero discharge of hazardous chemicals (ZDHC) <i>Definition: ZDHC or "Zero Discharge of Hazardous Chemicals", and the Roadmap to Zero Program (*1) of ZDHC aims to restrict the use of hazardous substances at the time of manufacturing textile, leather and footwear value chain.</i> ¹⁷³	Yes/No
c11_6a2	Does the establishment has any of the following certifications? : LWG certification <i>Definition: LWG stands for Leather Working Group, which is a non for profit organization, responsible for the worlds leading environmental certification for the leather manufacturing industry. The audit protocol carefully accesses the environmental performance of leather manufacturers from all over the world</i> ¹⁷⁴	Yes/No
c11_6a3	Does the establishment has any of the following certifications? : Restricted Substances, Compliance & Chromium VI (CrVI) Management <i>Definition: The Restriction of Hazardous Substances (RoHS) is a set of regulations that control the use of hazardous substances in electrical and electronic equipment.</i> ¹⁷⁵	Yes/No
Waste management		
c11_7a1	How does this establishment dispose of their fabric, leather cuts, foams, and other waste? :	Yes/No

¹⁷² [https://www.labcompare.com/Environmental-Test-Equipment/10-Temperature-Humidity-Chambers-Climate-Test-Chambers/#:~:text=Temperature%20humidity%20chambers%20\(also%20known,outdoor%20temperature%20and%20humidity%20conditions.](https://www.labcompare.com/Environmental-Test-Equipment/10-Temperature-Humidity-Chambers-Climate-Test-Chambers/#:~:text=Temperature%20humidity%20chambers%20(also%20known,outdoor%20temperature%20and%20humidity%20conditions.)

¹⁷³

<https://nctexchem.com/sustainability/zdhc/#:~:text=ZDHC%20is%20an%20abbreviation%20for,leather%20and%20footwear%20value%20chain.>

¹⁷⁴ <https://www.mybag.com/blog/lifestyle/our-guide-to-lwg-what-is-lwg-brands-to-know/#:~:text=LWG%20stands%20for%20Leather%20Working,from%20all%20over%20the%20world.>

¹⁷⁵ <https://www.ul.com/services/restriction-hazardous-substances-directive-rohs-compliance-services/#:~:text=Understanding%20and%20complying%20with%20RoHS%20The%20Restriction,and%20cadmium%20in%20electrical%20and%20electronic%20equipment.>

	Regular trash all mixed in	
c11_7a2	How does this establishment dispose of their fabric, leather cuts, foams, and other waste? : Specialized trash company all mixed in	Yes/No
c11_7a3	How does this establishment dispose of their fabric, leather cuts, foams, and other waste? : Sorted and disposed through specialized recycling company for each material (leather, foams, fabrics)	Yes/No
c11_7a4	How does this establishment dispose of their fabric, leather cuts, foams, and other waste? : Sorted and both reused wastes internally in the factory and disposed through specialized recycling companies	Yes/No
c11_7a6	How does this establishment dispose of their fabric, leather cuts, foams, and other waste? : Other	Yes/No
c11_7b	What is the method used more often this establishment to dispose their fabric, leather cuts, foams, and other waste?	Select from option number

10.12 ACCOMMODATIONS (SERVICES)

12.0 ACCOMMODATIONS (SERVICES)		
c12_0	How is this accommodation classified based on its accreditation from the Department of Tourism?	Select from option number
c12_0a	What is the total number of (accommodation) rooms available in this establishments?	Number
c12_0b	What is the maximum capacity of guests in this establishments?	Number
c12_0c	What is the total number of (accommodation) rooms with the following features?: Internet connectivity to guests	Number
c12_0d	What is the total number of (accommodation) rooms with the following features?: Air condition	Number
c12_0e	What is the total number of (accommodation) rooms with the following features?: TV	Number
c12_0f	What is the total number of (accommodation) rooms with the following features?: Cable Channels	Number
c12_0g	What is the total number of (accommodation) rooms with the following features?: Minibar/refrigerator	Number
c12_0h	What is the total number of (accommodation) rooms with the following features?: Coffee maker	Number
c12_0i	What is the total number of (accommodation) rooms with the following features?: Telephone	Number
c12_0j	What is the total number of (accommodation)	Number

	rooms with the following features?: Hairdryer	
c12_1k	For how many years this establishment has been using offering Internet connectivity to guests?	Number (years)
12.1 RESERVATIONS/BOOKINGS/ROOM INVENTORY		
c12_1a1	Does this establishment handle reservations/bookings in house?	Yes/No
c12_1a2	Is this task outsourced to another unit of the same firm?	Yes/No
c12_1a3	Is this task outsourced to another firm?	Yes/No
c12_1b1	Does this establishment use any of the following systems to handle reservations/bookings? : Handwritten process	Yes/No
c12_1b2	Does this establishment use any of the following systems to handle reservations/bookings? : Digital reservation records using standard software, such as Excel and Word	Yes/No
c12_1b3	Does this establishment use any of the following systems to handle reservations/bookings? : Dedicated reservation/booking specialized software <i>Definition: Reservation/booking specialized software refer to software as a service (SaaS) application used by hospitality businesses to provides guests with the opportunity to reserve a property online. In computer programming, an engine is a program that performs a core or essential function for other programs.¹⁷⁶</i>	Yes/No
c12_1b4	Does this establishment use any of the following systems to handle reservations/bookings? : Property management software (PMS) <i>Definition: Property Management Systems (PMS), under business, terms may be used in real estate, manufacturing, logistics, intellectual property, government, or hospitality accommodation management. They are computerized systems that facilitate the management of properties, personal property, equipment, including maintenance, legalities and personnel all through a single piece of software.¹⁷⁷</i>	Yes/No
c12_1b5	Does this establishment use any of the following systems to handle reservations/bookings? : Cloud-based systems integrated to analytical and management tools <i>Definition: A cloud based appointment booking system is a software that allows customers to book appointments online. The software is typically hosted in the cloud, meaning that</i>	Yes/No

¹⁷⁶ <https://www.techtarget.com/whatis/definition/booking-engine#:~:text=A%20booking%20engine%20is%20a,essential%20function%20for%20other%20programs.>

¹⁷⁷ https://en.wikipedia.org/wiki/Property_management_system

	<i>customers can book appointments from anywhere with an internet connection. This type of system is beneficial for businesses as it gives them more control over the scheduling process and it eliminates the need for manual scheduling.</i> ¹⁷⁸	
c12_1b6	Does this establishment use any of the following systems to handle reservations/bookings? : Other	Yes/No
c12_1c	What is the booking management system used more often by this establishment?	Select from option number
c12_1d	For how many years this establishment has been using electronic reservation/booking systems?	Number (years)
c12_e1	Does this establishment use any online travel agency for booking (e.g. Booking, Trip Advisor, Agoda, Expedia)?	Yes/No
c12_e2	What is the share of booking through online travel agency?	Yes/No
c12_e3	What is the online travel agency most used by this establishment for booking?	Name
c12_e4	What of the following online travel agencies are used by this establishment for booking?	Select from option number
c12_e5	Please describe what online travel agencies are used by this establishment for booking?	Name
12.2 Pricing		
c12_2a1	Does this establishment decide the pricing strategies in house?	Yes/No
c12_2a2	Is this task outsourced to another unit of the same firm?	Yes/No
c12_2a3	Is this task outsourced to another firm?	Yes/No
c12_2b1	Does this establishment use any of the following pricing strategies? : Manual Cost	Yes/No
c12_2b2	Does this establishment use any of the following pricing strategies? : Automated markup (excel or similar)	Yes/No
c12_2b3	Does this establishment use any of the following pricing strategies? : Automated promotional (e.g. planning prices based on seasonality or other predictable events)	Yes/No
c12_2b4	Does this establishment use any of the following pricing strategies? : Dynamic pricing systems (using specific software to predict demand and adjust prices) <i>Definition: Dynamic pricing is product pricing based on various external factors, including current market demand, the season, supply changes and price bounding. With dynamic pricing, product prices continuously adjust – sometimes in minutes – in response to real-time supply and</i>	Yes/No

¹⁷⁸ <https://bookafy.com/cloud-based-appointment-booking-system/#:~:text=A%20cloud%20based%20appointment%20booking%20system%20is%20a%20software%20that,anywhere%20with%20an%20internet%20connection.>

	<i>demand.</i> ¹⁷⁹	
c12_2b5	Does this establishment use any of the following pricing strategies? : Personalized pricing driven by predictive analytics (e.g. data mining, machine learning) <i>Definition: Personalized pricing systems dynamically adjust the price of a product at the individual customer level, by utilizing information about customers' characteristics encoded as a d-dimensional feature vector.</i> ¹⁸⁰	Yes/No
c12_2b6	Does this establishment use any of the following pricing strategies? : Other	Yes/No
c12_2c	What is the pricing strategy used more often by this establishment?	Select from option number
c12_2d	For how many years this establishment has been using dynamic pricing systems or personalized pricing for pricing strategies?	Number (years)
c12_2da	Is there any significant regulation that limits price mechanism decision of this establishment?	Yes/No
c12_2db	What is the agency regulating the price mechanism for this establishment?	Name
12.3 Housekeeping system		
c12_3a1	Does this establishment handle housekeeping in house?	Yes/No
c12_3a2	Is this task outsourced to another unit of the same firm?	Yes/No
c12_3a3	Is this task outsourced to another firm?	Yes/No
c12_3b1	Does this establishment use any of the following housekeeping systems? : Handwritten process	Yes/No
c12_3b2	Does this establishment use any of the following housekeeping systems? : Digital room records using standard software, such as Excel and Word	Yes/No
c12_3b3	Does this establishment use any of the following housekeeping systems? : Dedicated housekeeping management specialized software <i>Definition: Reservation/ booking specialized software refer to software as a service (SaaS) application used by hospitality businesses to provides guests with the opportunity to reserve a property online. In computer programming, an engine is a program that performs a core or essential function for other programs.</i> ¹⁸¹	Yes/No
c12_3b4	Does this establishment use any of the following housekeeping systems? : Property management system (PMS) software	Yes/No

¹⁷⁹ <https://www.business.com/articles/what-is-dynamic-pricing-and-how-does-it-affect-ecommerce/>

¹⁸⁰ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2972985

¹⁸¹ <https://www.techtarget.com/whatis/definition/booking-engine#:~:text=A%20booking%20engine%20is%20a,essential%20function%20for%20other%20programs.>

	<i>Definition: Property Management Systems (PMS), under business, terms may be used in real estate, manufacturing, logistics, intellectual property, government, or hospitality accommodation management. They are computerized systems that facilitate the management of properties, personal property, equipment, including maintenance, legalities and personnel all through a single piece of software.</i> ¹⁸²	
c12_3b5	Does this establishment use any of the following housekeeping systems? : Cloud-based systems integrated to analytical and management tools <i>Definition: A cloud based appointment booking system is a software that allows customers to book appointments online. The software is typically hosted in the cloud, meaning that customers can book appointments from anywhere with an internet connection. This type of system is beneficial for businesses as it gives them more control over the scheduling process and it eliminates the need for manual scheduling.</i> ¹⁸³	Yes/No
c12_3b6	Does this establishment use any of the following housekeeping systems? : Other	Yes/No
c12_3c	What is the housekeeping system used more often by this establishment?	Select from option number
c12_3d	For how many years this establishment has been using electronic housekeeping systems?	Number (years)
c12_3e1	Does this establishment use vacuum cleaner for cleaning the rooms?	Yes/No
c12_3e2	How many vacuum cleaners are used by this establishment for cleaning the rooms?	Number
12.4 Laundry		
c12_4a1	Does this establishment handle laundry in house?	Yes/No
c12_4a2	Is this task outsourced to another unit of the same firm?	Yes/No
c12_4a3	Is this task outsourced to another firm?	Yes/No
c12_4b1	Does this establishment use any of the following methods for bed sheet and towel laundry? : Manual	Yes/No
c12_4b2	Does this establishment use any of the following methods for bed sheet and towel laundry? : Domestic washing machines	Yes/No
c12_4b3	Does this establishment use any of the following methods for bed sheet and towel laundry? : Industrial washing machines without automatic bed sheet folding	Yes/No
c12_4b4	Does this establishment use any of the following methods for bed sheet and towel laundry? :	Yes/No

¹⁸² https://en.wikipedia.org/wiki/Property_management_system

¹⁸³ <https://bookafy.com/cloud-based-appointment-booking-system/#:~:text=A%20cloud%20based%20appointment%20booking%20system%20is%20a%20software%20that,anywhere%20with%20an%20internet%20connection.>

	Industrial washing machines with automatic bed sheet folding	
c12_4b5	Does this establishment use any of the following methods for bed sheet and towel laundry? : Other	Yes/No
c12_4c	What is the laundry system used more often by this establishment?	Select from option number
c12_4d	For how many years this establishment has been using Industrial washing machines with automatic bed sheet folding?	Number (years)
12.5 Point of sales		
c12_5a1	Does this establishment offer food and beverage services in addition to breakfast (e.g. restaurants and bars) in house?	Yes/No
c12_5a2	Is this task outsourced to another unit of the same firm?	Yes/No
c12_5a3	Is this task outsourced to another firm?	Yes/No
c12_5b1	Does this establishment use any of the following management systems to handle different points of sales? : Handwritten process	Yes/No
c12_5b2	Does this establishment use any of the following management systems to handle different points of sales? : Digital customer records using standard software, such as Excel and Word	Yes/No
c12_5b3	Does this establishment use any of the following management systems to handle different points of sales? : Point of Sales (POS) specialized software. <i>Definition: A POS system manages customer purchases, accepts payments and provides receipts. A point of sale is also where a merchant and customer conduct a retail transaction. It is where the merchant calculates the sale price for the customer, creates a record of the transaction and provides payment options¹⁸⁴</i>	Yes/No
c12_5b4	Does this establishment use any of the following management systems to handle different points of sales? : POS with PMS integration <i>Definition: A PMS-POS (Property Management System-Point of Sales) integration allows guest billing information from each of your necessary touchpoints (front desk, bar, spa etc) to be sent to your PMS and added to a centralised guest account. It works like this: the POS system sends a message to the PMS that a charge needs to be made.¹⁸⁵</i>	Yes/No
c12_5b5	Does this establishment use any of the following management systems to handle different points of	Yes/No

¹⁸⁴ <https://www.nerdwallet.com/article/small-business/what-is-a-pos-system#:~:text=A%20POS%20system%20manages%20customer,transaction%20and%20provides%20payment%20options.>

¹⁸⁵ <https://prenohq.com/blog/whats-the-difference-between-a-pms-and-a-pos/#:~:text=A%20PMS%20DPOS%20integration%20allows,charge%20needs%20to%20be%20made.>

	<p>sales? : Cloud-based systems integrated to analytical and management tools</p> <p><i>Definition: A cloud-based POS system is a way of managing payments and transactions for any kind of business where information is stored on external servers located in the cloud. It consists of front-end hardware that guests and employees at your hotel will interact with directly from a tablet, smartphone, or internet-enabled device. The backend contains software that allows you to manage data, customer profiles, insights, and more from any web browser.</i>¹⁸⁶</p>	
c12_5b6	Does this establishment use any of the following management systems to handle different points of sales? : Other	Yes/No
c12_5c	What is the point of sales system used more often by this establishment?	Select from option number
c12_5d	For how many years this establishment has been using electronic post of sales systems?	Number (years)
c12_6a1	For each online travel agency used by this establishment, please add the number of costumer review: Booking.com. Note: This makes use of information publicly available from the internet	Number
c12_6b1	For each online travel agency used by this establishment, please add the number of costumer review: Trip Advisor Note: This makes use of information publicly available from the internet	Number
c12_6c1	For each online travel agency used by this establishment, please add the number of costumer review: Expedia Note: This makes use of information publicly available from the internet	Number
c12_6d1	For each online travel agency used by this establishment, please add the number of costumer review: AirBnB Note: This makes use of information publicly available from the internet	Number
c12_6a2	For each online travel agency used by this establishment, please add the rate (review score): Booking.com. Note: This makes use of information publicly available from the internet	Number
c12_6b2	For each online travel agency used by this establishment, please add the rate (review score): Trip Advisor Note: This makes use of information publicly available from the internet	Number
c12_6c2	For each online travel agency used by this	Number

¹⁸⁶ <https://www.mews.com/en/blog/cloud-based-pos-system>

	establishment, please add the rate (review score): Expedia Note: This makes use of information publicly available from the internet	
c12_6d2	For each online travel agency used by this establishment, please add the rate (review score): AirBnB Note: This makes use of information publicly available from the internet	Number

10.13 BRICKS AND TILE MAKING (MANUFACTURING)

13.0 BRICKS AND TILE MAKING (MANUFACTURING)		
c13_01a	Does the firm produces any of the following products?: Solid bricks	Yes/No
c13_01b	Does the firm produces any of the following products?: Hollow bricks	Yes/No
c13_01c	Does the firm produces any of the following products?: Refractory bricks <i>Definition: Refractory brick is a ceramic material that is normally used in high-temperature environments because of its lack of flammability and because it is a decent insulator, which reduces the amount of energy loss. Refractory brick is typically comprised of aluminum oxides and silica. It is also known as "firebrick."</i> ¹⁸⁷	Yes/No
c13_01d	Does the firm produces any of the following products?: Tiles <i>Definition: Tiles are usually thin, square or rectangular coverings manufactured from hard-wearing material such as ceramic, stone, metal, baked clay, or even glass. They are generally fixed in place in an array to cover roofs, floors, walls, edges, or other objects such as tabletops</i> ¹⁸⁸	Yes/No
13.1 Extraction of raw materials		
c13_1a1	Does this establishment perform mining of raw materials?	Yes/No
c13_1a2	Is this task outsourced to another unit of the same firm?	Yes/No
c13_1a3	Is this task outsourced to another firm?	Yes/No
c13_1b1	Does this establishment use any of the following processes for mining raw materials?: Manual extraction	Yes/No
c13_1b2	Does this establishment use any of the following processes for mining raw materials?: Extraction	Yes/No

¹⁸⁷ <https://www.corrosionpedia.com/definition/6647/refractory-brick>

¹⁸⁸ <https://en.wikipedia.org/wiki/Tile>

	with light machinery (tractor, backhoe)	
c13_1b3	Does this establishment use any of the following processes for mining raw materials?: Extraction with heavy machinery (excavator) <i>Definition: Excavators are heavy construction equipment consisting of a boom, dipper, bucket and cab on a rotating platform known as the "house". The house sits atop an undercarriage with tracks or wheels.¹⁸⁹</i>	Yes/No
c13_1b4	Does this establishment use any of the following processes for mining raw materials?: Other	Yes/No
13.2 Aging of raw materials		
c13_2a1	Does this establishment perform aging of raw materials (i.e. clay) in house?	Yes/No
c13_2a2	Is this task outsourced another unit of the same firm?	Yes/No
c13_2a3	Is this task outsourced to another firm?	Yes/No
c13_2b1	Does this establishment use any of the following methods for aging of raw materials (i.e. clay)?: Aging in open ceiling	Yes/No
c13_2b2	Does this establishment use any of the following methods for aging of raw materials (i.e. clay)?: Aging in open storage rooms	Yes/No
c13_2b3	Does this establishment use any of the following methods for aging of raw materials (i.e. clay)?: Aging in dark chambers	Yes/No
c13_2b4	Does this establishment use any of the following methods for aging of raw materials (i.e. clay)?: Aging in dark chambers with automatic temperature and humidity controls <i>Definition: Temperature-controlled aging chambers simulate the long-term effects of temperature, humidity, light exposure and intense conditions on products to predict a product's lifespan and ensure quality standards are met before releasing a product on the market.¹⁹⁰</i>	Yes/No
c13_2b5	Does this establishment use any of the following methods for aging of raw materials (i.e. clay)?: Other	Yes/No
c13_2c	What is the most used aging method in this establishment?	Select from option number
c13_2d	For how many years this establishment has been aging raw materials using dark chambers with automatic temperature and humidity controls?	Number (years)
13.3 Mixing of raw materials		

¹⁸⁹ <https://en.wikipedia.org/wiki/Excavator>

¹⁹⁰

<https://www.memmertusa.com/C/76/AcceleratedAgingChambers#:~:text=Accelerated%20aging%20chambers%20simulate%20the,a%20product%20on%20the%20market.>

c13_3a1	Does this establishment performs mixing of raw materials process in house?	Yes/No
c13_3a2	Is this task outsourced to another unit of the same firm?	Yes/No
c13_3a3	Is this task outsourced to another firm?	Yes/No
c13_3b1	What mixing method is used by this establishment?: Kneading with feet or animal energy	Yes/No
c13_3b2	What mixing method is used by this establishment?: Kneading of clays using rolling mills	Yes/No
c13_3b3	What mixing method is used by this establishment?: Blade mill	Yes/No
c13_3b4	What mixing method is used by this establishment?: Hammer mill	Yes/No
c13_3b5	What mixing method is used by this establishment?: Disc mill <i>Definition: A disc mill is a type of crusher that can be used to grind, cut, shear, shred, fiberize, pulverize, granulate, crack, rub, curl, fluff, twist, hull, blend, or refine.</i> ¹⁹¹	Yes/No
c13_3b6	What mixing method is used by this establishment?: Pendulum mill <i>Definition: A pendulum mill is a vertical mill that compresses material by using pendulums to grind rollers. The grinding rollers rotate on their axis and travel at medium speeds on a grinding ring. The centrifugal forces crush the material between the rollers and the ring</i> ¹⁹²	Yes/No
c13_3b7	What mixing method is used by this establishment?: Kneading clay with paddle kneader <i>Definition: Paddles are used to shape clay by gently patting it. They can also be used to add sharp edges and planes, and to alter wheel-thrown forms. Paddling compresses the clay, which makes it stronger and more stable.</i> ¹⁹³	Yes/No
c13_3b8	What mixing method is used by this establishment?: Other	Yes/No
c13_3c	What is the most used mixing method in this establishment?	Select from option number
c13_3d	For how many years this establishment has been using Disc mill , Pendulum mill or Kneading clay with paddle kneader?	Number (years)

¹⁹¹

https://en.wikipedia.org/wiki/Disc_mill#:~:text=A%20disc%20mill%20is%20a,hull%2C%20blend%2C%20or%20refine.

¹⁹² <https://www.directindustry.com/prod/poittemill-forplex/product-21948-795061.html#:~:text=Description,that%20rotates%20upon%20its%20axis.>

¹⁹³ <https://www.baileypottery.com/store-dept-pottery-ceramic-tools/store-decorating-pottery-tools/store-decorating-pottery-tools-paddles.html#:~:text=Paddles%20are%20used%20to%20hit,and%20stability%20to%20the%20piece.>

13.4 Forming		
c13_4a1	Does this establishment performs the forming process in house?	Yes/No
c13_4a2	Is this task outsourced another to unit of the same firm?	Yes/No
c13_4a3	Is this task outsourced to another firm?	Yes/No
c13_4b1	What forming method is used by this establishment? : Manual in wooden or metal molds	Yes/No
c13_4b2	What forming method is used by this establishment? : Extruder <i>Definition: Extruder enables the creation of objects of a fixed cross-sectional profile by pushing material through a die of the desired cross-section¹⁹⁴</i>	Yes/No
c13_4b3	What forming method is used by this establishment? : Vacuum extruder (high pressure) <i>Definition: Vacuum extrusion is a method of removing volatiles from an extrusion process continuously. Wintek designs vacuum systems for several of the largest vacuum extruder manufacturers in the USA. We sell vacuum systems to large capacity, industrial-scale extruders to smaller, lab-scale extruders indiscriminately.¹⁹⁵</i>	Yes/No
c13_4b4	What forming method is used by this establishment? : Extruder with multiple dies <i>Definition: Extrusion dies are metal channels that impart a specific cross-sectional shape to a polymer stream. The design difficulty centers on achieving the desired shape within set limits of dimensional uniformity at the highest production rate possible¹⁹⁶</i>	Yes/No
c13_4b5	What forming method is used by this establishment? : Extruder with steam kneading <i>Definition: The extruder with steam kneading works by feeding the raw materials, such as clay, into the machine. Inside the extruder, a rotating screw pushes the material forward while steam is injected into the mixture. The steam helps to soften the clay and improve its plasticity, making it easier to shape and mold.</i>	Yes/No
c13_4b6	What forming method is used by this establishment? : Other	Yes/No
c13_4c	What is the most used forming method in this	Select from option number

¹⁹⁴ <https://en.wikipedia.org/wiki/Extrusion>

¹⁹⁵ <https://wintek-corp.com/industries-applications/vacuum-extrusion/#:~:text=Vacuum%20extrusion%20is%20a%20method,%2C%20lab%2Dscale%20extruders%20indiscriminately.>

¹⁹⁶ <https://www.sciencedirect.com/topics/engineering/extrusion-dies#:~:text=Extrusion%20dies%20are%20metal%20channels,the%20highest%20production%20rate%20possible.>

	establishment?	
c13_4d	For how many years this establishment has been using Vacuum extruder (high pressure), Extruder with multiple dies, or Extruder with steam kneading?	Number (years)
13.5 Cutting		
c13_5a1	Does this establishment performs the cutting process in house?	Yes/No
c13_5a2	Is this task outsourced another to unit of the same firm?	Yes/No
c13_5a3	Is this task outsourced to another firm?	Yes/No
c13_5b1	What cutting method is used by this establishment?: Manual	Yes/No
c13_5b2	What cutting method is used by this establishment?: Automatic cutting	Yes/No
c13_5b3	What cutting method is used by this establishment?: Multi wire cutter	Yes/No
c13_5b4	What cutting method is used by this establishment?: Automatic cutting machine with high precision cutting and beveling chamfering <i>Definition: High precision cutting for brick and tile making automates the cutting process and allows for special shapes to be produced. The internal cut and bond angles also know as a “dogleg” – provides a faster and better looking alternative to using cut standard bricks with a mortar joint. Stretched bond is easily obtained with using cuts placed next to the special and true vertical corners can easily be achieved due to the regular shape of the brick.¹⁹⁷</i>	Yes/No
c13_5b5	What cutting method is used by this establishment?: Automatic cutting and stacking on drying racks or wagons <i>Definition: The automatic brick stacker stacks the bricks on to metal pallets so that they can be easily transported to the drying shed using a fork lift. The bricks are arranged on the pallets so that they can be quickly air dried. Using brick stacker helps in greatly reducing labour requirements and increasing the finish quality of bricks.¹⁹⁸</i>	Yes/No
c13_5b6	What cutting method is used by this establishment?: Other	Yes/No
c13_5c	What is the most used cutting method in this establishment?	Select from option number
c13_5d	For how many years this establishment has been using Automatic cutting machine with high precision cutting and beveling chamfering or Automatic cutting and stacking on drying racks or wagons?	Number (years)

¹⁹⁷ <https://www.bricktechnicalservices.com/precision-brick-cutting/>

¹⁹⁸ <https://vegobrickmachines.com/automatic-brick-stacker/>

13.6 Drying		
c13_6a1	Does this establishment perform the drying process in house?	Yes/No
c13_6a2	Is this task outsourced another to unit of the same firm?	Yes/No
c13_6a3	Is this task outsourced to another firm?	Yes/No
c13_6b1	What drying method is used by this establishment?: Natural with or without covered roof	Yes/No
c13_6b2	What drying method is used by this establishment?: Drying chambers and external heat source (coal, biomass)	Yes/No
c13_6b3	What drying method is used by this establishment?: Drying chambers with recovery of hot air from the firing process	Yes/No
c13_6b4	What drying method is used by this establishment?: Tunnel dryer (biomass, coal, natural gas)	Yes/No
c13_6b5	<p>What drying method is used by this establishment?: Fast drying (tray or roller dryer)</p> <p><i>Definition: A tray dryer is an equipment that uses hot air to remove moisture from the materials being dried whereas A vacuum tray dryer is under a vacuum. The drying chamber is sealed and a vacuum is created inside the chamber by using a vacuum pump.¹⁹⁹ Roll Drying is a continuous process that creates dry powders and flakes from a liquid feedstock. The liquid feed is sprayed onto or in between two rotating drums. The drums are heated internally with steam to increase the surface temperature. As the material is sprayed onto the drums, it sticks and dries to the surface. To obtain the desired specifications, the drum's rotation speed, steam pressure and the gap between the drums can be varied. The dried material is peeled from the drums using a knife system.²⁰⁰</i></p>	Yes/No
c13_6b6	What drying method is used by this establishment?: Other	Yes/No
c13_6c	What is the most used drying method in this establishment?	Select from option number
c13_6d	For how many years this establishment has been using Drying chambers with recovery of hot air from the firing process or Tunnel dryer, or Rapid tray or roller dryer?	Number (years)
13.7 Firing		

¹⁹⁹ <https://pharmaguddu.com/tray-dryer-principle-construction-working-and-usage/#:~:text=A%20tray%20dryer%20is%20an,by%20using%20a%20vacuum%20pump.>

²⁰⁰ <https://www.aveka.com/processing/roll-drying/#:~:text=Dry%20high%20solids%2C%20viscous%20materials,to%20your%20desired%20particle%20size.>

c13_7a1	Does this establishment performs the firing process in house?	Yes/No
c13_7a2	Is this task outsourced another to unit of the same firm?	Yes/No
c13_7a3	Is this task outsourced to another firm?	Yes/No
c13_7b1	What firing method is used by this establishment?: Open fire kilns (biomass, thick size coal)	Yes/No
c13_7b2	What firing method is used by this establishment?: Inverted draft kilns	Yes/No
c13_7b3	What firing method is used by this establishment?: Mobile metal kilns	Yes/No
c13_7b4	What firing method is used by this establishment?: Semi-continuous kilns “Hoffmann” and continuous cameras <i>Definition: The Hoffmann kiln is a series of batch process kilns. Hoffmann kilns are the most common kiln used in production of bricks and some other ceramic products²⁰¹ Thermal scanners and cameras enable such continuous surveillance of the kiln shell temperature and therefore have a central position in the control room of hundreds of modern cement plants around the world.²⁰²</i>	Yes/No
c13_7b5	What firing method is used by this establishment?: Continuous kilns “Tunnel” <i>Definition: Tunnel kiln is a continuous moving ware kiln in which the clay products to be fired are passed on cars through a long horizontal tunnel. The firing of products occurs at the central part of the tunnel. The tunnel kiln is considered to be the most advanced brick making technology. The main advantages of tunnel kiln technology lie its ability to fire a wide variety of clay products, better.²⁰³</i>	Yes/No
c13_7b6	What firing method is used by this establishment?: Roller kilns (gas) <i>Definition: RollerKiln is a continuous fast firing kiln that transports products on rollers inside the kiln. It offers excellent temperature uniformity, cleanliness, and thermal efficiency. The system provides firing conditions that meet customer needs through atmosphere controls for air, N2, O2, N2 + H2, and other gases, as well as precision temperature controls for each of the preheating, firing, and cooling zones. The system contributes to the production of all solid-state batteries and cathode and anode materials for lithium-ion batteries, essential for applications targeting carbon</i>	Yes/No

²⁰¹ https://en.wikipedia.org/wiki/Hoffmann_kiln

²⁰² <https://hgh-infrared.com/thermal-warp-monitoring-industrial-thermography/>

²⁰³ <https://www.shareweb.ch/site/Climate-Change-and-Environment/about%20us/about%20gpcc/Documents/07%20Tunnel%20Kiln.pdf>

	<i>neutrality, for a carbon-zero society.</i> ²⁰⁴	
c13_7b7	What firing method is used by this establishment?: Other	Yes/No
c13_7c	What is the most used firing method in this establishment?	Select from option number
c13_7d	For how many years this establishment has been using Continuous kilns “Tunnel” or Roller kilns (gas)?	Number (years)

10.14 IRON AND STEEL (MANUFACTURING)

14.0 IRON AND STEEL (MANUFACTURING)		
c14_0a	Does the firm produces any of the following materials?: Pig iron	Yes/No
c14_0b	Does the firm produces any of the following materials?: Cast iron	Yes/No
c14_0c	Does the firm produces any of the following materials?: Plain carbon steel	Yes/No
c14_0d	Does the firm produces any of the following materials?: Low alloy steel	Yes/No
c14_0e	Does the firm produces any of the following materials?: High alloy steel Definition: High alloy steel has alloying elements (not including carbon or iron) that make up more than 8% of its composition. These alloys are less common because most steel only dedicates a few percent to the additional elements. ²⁰⁵	Yes/No
14.1 Crushing and grinding		
c14_1a1	Does this establishment perform crushing and grinding of iron ore in house?	Yes/No
c14_1a2	Is this task outsourced another unit of the same firm?	Yes/No
c14_1a3	Is this task outsourced to another firm?	Yes/No
c14_1b1	Does this establishment use any of the following methods for crushing and grinding of iron ore?: Jaw crusher	Yes/No
c14_1b2	Does this establishment use any of the following methods for crushing and grinding of iron ore?: Gyratory/cone crusher	Yes/No
c14_1b3	Does this establishment use any of the following methods for crushing and grinding of iron ore?: Ball or rod mills	Yes/No
c14_1b4	Does this establishment use any of the following	Yes/No

²⁰⁴ <https://www.ngk-insulators.com/en/product/hd-roller-kiln.html>

²⁰⁵ <https://www.industrialmetalsupply.com/blog/what-is-alloy-steel#:~:text=High%20alloy%20steel%20has%20alloying,least%2010.5%25%20chromium%20by%20mass.>

	methods for crushing and grinding of iron ore?: Wet autogenous – Ball mill	
c14_1b5	Does this establishment use any of the following methods for crushing and grinding of iron ore?: High pressure grinding rolls (HPGR) <i>Definition: HPGR technology uses inter-particle grinding to reduce particle size and increase grinding efficiency by transferring pressure to particles from multiple directions. The breaking and fracturing of particles only happens when the material compressive strength is exceeded. Given high pressure grinding rolls (HPGR) are pressure controlled rather than gap controlled, they ensure the right pressure is applied to suit the material being processed.</i> ²⁰⁶	Yes/No
c14_1b6	Does this establishment use any of the following methods for crushing and grinding of iron ore?: Vertimill <i>Definition: Vertimill® is an energy-efficient grinding machine with an agitating screw suspended into the grinding chamber, supported by spherical roller bearings and driven by a fixed speed motor through a planetary gearbox. The capacity of each unit size is relative to the required power input for the intended grind, however, mills have been operated with throughputs exceeding 750 mtpb.</i> ²⁰⁷	Yes/No
c14_1b7	Does this establishment use any of the following methods for crushing and grinding of iron ore?: Other	Yes/No
c14_1c	What is the most used crushing and grinding method in this establishment?	Select from option number
c14_1d	For how many years this establishment has been crushing using wet autogenous ball mill, high pressure grinding rolls or vertimill?	Number (years)
14.2 Concentration		
c14_2a1	Does this establishment perform concentration process in house?	Yes/No
c14_2a2	Is this task outsourced to another unit of the same firm?	Yes/No
c14_2a3	Is this task outsourced to another firm?	Yes/No
c14_2b1	What concentration method is used by this establishment?: Magnetic separation	Yes/No
c14_2b2	What concentration method is used by this establishment?: Gravity separation	Yes/No
c14_2b3	What concentration method is used by this establishment?: Flotation	Yes/No
c14_2b4	What concentration method is used by this establishment?: Leaching	Yes/No

²⁰⁶ <https://www.global.weir/product-catalogue/high-pressure-grinding-rolls/>

²⁰⁷ <https://www.metso.com/portfolio/vertimill/>

	<i>Definition: Leaching is the process of a solute becoming detached or extracted from its carrier substance by way of a solvent. Leaching is a naturally occurring process which scientists have adapted for a variety of applications with a variety of methods.</i> ²⁰⁸	
c14_2b5	What concentration method is used by this establishment?: Bio-processing <i>Definition: A bioprocess is a specific process that uses complete living cells or their components to obtain desired products. Transport of energy and mass is fundamental to many biological and environmental processes.</i> ²⁰⁹	Yes/No
c14_2b6	What concentration method is used by this establishment?: Other	Yes/No
c14_2c	What is the most used concentration method in this establishment?	Select from option number
c14_2d	For how many years this establishment has been using leaching or bio-processing?	Number (years)
14.3 Charging		
c14_3a1	Does this establishment performs the charging process in house?	Yes/No
c14_3a2	Is this task outsourced another to unit of the same firm?	Yes/No
c14_3a3	Is this task outsourced to another firm?	Yes/No
c14_3b1	What charging method is used by this establishment? : Batch charging	Yes/No
c14_3b2	What charging method is used by this establishment? : Continuous charging	Yes/No
c14_3b3	What charging method is used by this establishment? : Top charging	Yes/No
c14_3b4	What charging method is used by this establishment? : Side charging	Yes/No
c14_3b5	What charging method is used by this establishment? : Bell less top charging <i>Definition: Modern blast furnaces use bell-less top systems for the charging of the solid feed into the furnace. The complete potential of the charging system for distributing the material in the furnace cross-section in any desired profile can be achieved only by using a suitable charge distribution model.</i> ²¹⁰	Yes/No
c14_3b6	What charging method is used by this establishment? : Other	Yes/No
c14_3c	What is the most used charging in this establishment?	Select from option number

²⁰⁸ [https://en.wikipedia.org/wiki/Leaching_\(chemistry\)](https://en.wikipedia.org/wiki/Leaching_(chemistry))

²⁰⁹ <https://en.wikipedia.org/wiki/Bioprocess>

²¹⁰

<https://www.sciencedirect.com/science/article/pii/S095915240000263#:~:text=Modern%20blast%20furnaces%20use%20bell,a%20suitable%20charge%20distribution%20model.>

c14_3d	For how many years this establishment has been using Continuous charging, top charging, side charging, or Bell less top charging?	Number (years)
14.4 Smelting		
c14_4a1	Does this establishment performs the smelting process in house?	Yes/No
c14_4a2	Is this task outsourced another to unit of the same firm?	Yes/No
c14_4a3	Is this task outsourced to another firm?	Yes/No
c14_4b1	What smelting method is used by this establishment?: Blast furnace (BF)	Yes/No
c14_4b2	What smelting method is used by this establishment?: Direct reduced iron (DRI) <i>Definition: Direct reduced iron (DRI), also called sponge iron,[1] is produced from the direct reduction of iron ore (in the form of lumps, pellets, or fines) into iron by a reducing gas or elemental carbon produced from natural gas or coal. Many ores are suitable for direct reduction.²¹¹</i>	Yes/No
c14_4b3	What smelting method is used by this establishment?: Electric arc furnace (EAF) <i>Definition: The EAF process uses electricity to melt scrap steel and other sources of metallic iron such as direct-reduced iron or hot metal, and additives are used to adjust the steel composition to the desired specifications.²¹²</i>	Yes/No
c14_4b4	What smelting method is used by this establishment?: Other	Yes/No
c14_4c	What is the most smelting method in this establishment?	Select from option number
c14_4d	For how many years this establishment has been using direct reduced iron or electric arc furnace?	Number (years)
14.5 Refining		
c14_5a1	Does this establishment perform the refining process in house?	Yes/No
c14_5a2	Is this task outsourced another to unit of the same firm?	Yes/No
c14_5a3	Is this task outsourced to another firm?	Yes/No
c14_5b1	What method is used by this establishment to identify impurities before the refining process?: Visual	Yes/No
c14_5b2	What method is used by this establishment to identify impurities before the refining process?: Scanning Electron Microscopy	Yes/No

²¹¹ https://en.wikipedia.org/wiki/Direct_reduced_iron

²¹² <https://www.sciencedirect.com/topics/engineering/electric-arc-furnace-process#:~:text=The%20EAF%20process%20uses%20electricity,composition%20to%20the%20desired%20specifications.>

	<p><i>Definition: A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the surface topography and composition of the sample. The electron beam is scanned in a raster scan pattern, and the position of the beam is combined with the intensity of the detected signal to produce an image.</i>²¹³</p>	
c14_5b3	<p>What method is used by this establishment to identify impurities before the refining process?: X-Ray Fluorescence</p> <p><i>Definition: X-ray fluorescence (XRF) is the emission of characteristic "secondary" (or fluorescent) X-rays from a material that has been excited by being bombarded with high-energy X-rays or gamma rays. The phenomenon is widely used for elemental analysis and chemical analysis, particularly in the investigation of metals, glass, ceramics and building materials, and for research in geochemistry, forensic science, archaeology and art objects such as paintings</i>²¹⁴</p>	Yes/No
c14_5b4	<p>What method is used by this establishment to identify impurities before the refining process?: Optimal emission spectrometry</p> <p><i>Definition: Optical emission spectrometry involves applying electrical energy in the form of spark generated between an electrode and a metal sample, whereby the vaporized atoms are brought to a high energy state within a so-called "discharge plasma".</i>²¹⁵</p>	Yes/No
c14_5b5	<p>What method is used by this establishment to identify impurities before the refining process?: Inductively coupled plasma</p> <p><i>Definition: An inductively coupled plasma (ICP) or transformer coupled plasma (TCP) is a type of plasma source in which the energy is supplied by electric currents which are produced by electromagnetic induction, that is, by time-varying magnetic fields.</i></p>	Yes/No
c14_5b6	<p>What method is used by this establishment to identify impurities before the refining process?: Other</p>	Yes/No
c14_5c	<p>What is the most used refining method in this establishment?</p>	Select from option number
c14_5d	<p>For how many years this establishment has been</p>	Number (years)

²¹³ https://en.wikipedia.org/wiki/Scanning_electron_microscope

²¹⁴ https://en.wikipedia.org/wiki/X-ray_fluorescence

²¹⁵ <https://www.shimadzu.com/an/products/elemental-analysis/oes-app/principle-of-optical-emission-spectrometry/index.html#:~:text=Optical%20emission%20spectrometry%20involves%20applying,%2Dcalled%20%22discharge%20plasma%22>.

	using Optimal emission spectrometry or Inductively coupled plasma?	
14.6 Casting		
c14_6a1	Does this establishment performs the casting process in house?	Yes/No
c14_6a2	Is this task outsourced another to unit of the same firm?	Yes/No
c14_6a3	Is this task outsourced to another firm?	Yes/No
c14_6b1	What casting method is used by this establishment?: Ingot casting	Yes/No
c14_6b2	What casting method is used by this establishment?: Continuous casting	Yes/No
c14_6b3	What casting method is used by this establishment?: Centrifugal casting <i>Definition: The centrifugal casting method is the method to produce pipes by pouring molten metal into a rapidly spinning cylindrical mold in which centrifugal force from the rotation exerts pressure on the molten metal.²¹⁶</i>	Yes/No
c14_6b4	What casting method is used by this establishment?: Investment casting <i>Definition: Investment casting is a manufacturing process in which a liquid material is poured into a ceramic mold, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is the casting, which is broken away from the ceramic mold to complete the process.²¹⁷</i>	Yes/No
c14_6b5	What casting method is used by this establishment?: Sand casting <i>Definition: Sand casting is a commonly employed and very ancient metal casting technique. It involves forming cavities within packed and bonded sand that is then charged with molten metal. The chosen metal solidifies to reproduce the cavity shape in fine detail.²¹⁸</i>	Yes/No
c14_6b6	What casting method is used by this establishment?: Other	Yes/No
c14_6c	What is the most used casting method in this establishment?	Select from option number
c14_6d	For how many years this establishment has been	Number (years)

²¹⁶

https://www.kubota.com/products/materials/technology/centrifugal_casting/#:~:text=The%20centrifugal%20casting%20method%20is,pressure%20on%20the%20molten%20metal.

²¹⁷ <https://www.aerometals.com/metal-casting-101/casting-process#:~:text=Investment%20casting%20is%20a%20manufacturing%20process%20in%20which%20a%20liquid,mold%20to%20complete%20the%20process.>

²¹⁸ <https://www.xometry.com/resources/casting/sand-casting/#:~:text=Sand%20casting%20is%20a%20commonly,cavity%20shape%20in%20fine%20detail.>

	using Centrifugal, Investment, or sand casting?	
14.7 Environmental practices		
c14_7a1	Which of the following practices the establishment currently uses in its production process? : Waste heat recovery	Yes/No
c14_7a2	Which of the following practices the establishment currently uses in its production process? : Use air pollution techniques such as bag filters, Electrostatic precipitators, Flue Gas Treatment, or Wastewater Neutralization <i>Definitions: Bag filters are used for the clarification/filtration of fluids that have a relatively small loading of particles to be removed. The particle suspension passes through and the particles settle in the bag.²¹⁹ An electrostatic precipitator (ESP) removes particles from a gas stream by using electrical energy to charge particles either positively or negatively. The charged particles are then attracted to collector plates carrying the opposite charge.²²⁰ Flue gas treatment is the process of reducing the amount of pollutants that are emitted when fossil fuels, including wood, natural gas, oil, and coal are burnt at a power plant, an industrial facility, or any other place.²²¹ Lastly, wastewater neutralization works by adjusting the pH value to meet the requirements of the different processing units in the wastewater treatment system.²²²</i>	Yes/No
c14_7a3	Which of the following practices the establishment currently uses in its production process? : Insulates and maintains insulation for equipment, piping, or buildings	Yes/No
c14_7a4	Which of the following practices the establishment currently uses in its production process? : Uses slags in other industrial applications <i>Definition: Slag is a by-product of smelting ores and recycled metals. Slag is mainly a mixture of metal oxides and silicon dioxide.²²³ Slag could be used to treat acid soils or acid mine drainage. Doing so would both offset the cost of restoring abandoned mine areas, as well as decrease steel manufacturers' current waste footprint²²⁴</i>	Yes/No

²¹⁹ <https://www.sciencedirect.com/topics/engineering/bag-filter#:~:text=Bag%20filters%20are%20used%20for,m3%2Fm2%20h.>

²²⁰ [https://www.epa.gov/air-emissions-monitoring-knowledge-base/monitoring-control-technique-electrostatic-precipitators#:~:text=An%20electrostatic%20precipitator%20\(ESP\)%20removes,plates%20carrying%20the%20opposite%20charge.](https://www.epa.gov/air-emissions-monitoring-knowledge-base/monitoring-control-technique-electrostatic-precipitators#:~:text=An%20electrostatic%20precipitator%20(ESP)%20removes,plates%20carrying%20the%20opposite%20charge.)

²²¹ <https://sodimate.com/flue-gas-treatment/#:~:text=Flue%20gas%20treatment%20is%20the,facility%2C%20or%20any%20other%20place.>

²²² https://www.neutralac.com/wastewater_neutralisation.html

²²³ <https://en.wikipedia.org/wiki/Slag>

²²⁴ <https://www.usgs.gov/news/science-snippet/slag-what-it->

	unit operation to increase consistency of raw materials and solid fuel to ensure product quality and operational stability. Although modern technology and improved methodologies has greatly influenced to bring down inconsistency in raw materials through mine planning ²²⁷	
c15_1b7	Does this establishment use any of the following methods for crushing and homogenization?: Pre-homogenization automated tracking via control room Definition: Automated tracking on pre-homogenization refer to a system designed to provide automated homogenization using the same generator probe movement as a manual handheld homogenizer operated by a laboratory technician. During processing, the motorheads are capable of both vertical and horizontal intra-tube movement to maximize sample contact with the generator probes in order to ensure complete homogenization ²²⁸	Yes/No
c15_1b8	Does this establishment use any of the following methods for crushing and homogenization?: Other	Yes/No
c15_1c	What is the most used crushing and homogenization method in this establishment?	Select from option number
c15_1d	For how many years this establishment has been crushing using Pre-homogenization automated tracking via control room?	Number (years)
15.2 Pre-heating		
c15_2a1	Does this establishment perform pre-heating process in house?	Yes/No
c15_2a2	Is this task outsourced to another unit of the same firm?	Yes/No
c15_2a3	Is this task outsourced to another firm?	Yes/No
c15_2b1	What pre-heating method is used by this establishment?: Wet process	Yes/No
c15_2b2	What pre-heating method is used by this establishment?: Dry with preheater <i>Definition: Preheaters are used industrial dry kiln cement production plants to heat the raw mix and drive off carbon dioxide and water before it is fed into the kiln. An analytical model of a generalized four-stage suspension cyclone preheater system is presented.²²⁹</i>	Yes/No

²²⁷ <https://www.cementindusneed.com/pre-homogenizationstacking-and-reclaiming/>

²²⁸ <https://us.omni-inc.com/prep96-automated-homogenizer.html>

²²⁹

<https://www.sciencedirect.com/science/article/pii/S2214157X16301253#:~:text=Preheaters%20are%20used%20industrial%20dry,cyclone%20preheater%20system%20is%20presented.>

c15_2b3	What pre-heating method is used by this establishment?: Dry with pre-heater and in line calciner <i>Definition: A separate line calciner (SLC) is a type of off-line calciner with a separate preheater string. Off-line calciners are installed away from the kiln exhaust gas flow. Combustion takes place in pure air, which also lifts up the meal.²³⁰</i>	Yes/No
c15_2b4	What pre-heating method is used by this establishment?: Dry with pre-heater and separate line calciner	Yes/No
c15_2b5	What pre-heating method is used by this establishment?: Automated tracking via control room <i>Definition: Automated tracking via control in cement production refers to the use of advanced automation systems and control technologies to monitor and regulate various aspects of the cement manufacturing process. It involves the implementation of centralized control systems, computer programs, and sensors to track and optimize the production parameters in real-time.</i>	Yes/No
c15_2b6	What pre-heating method is used by this establishment?: Other	Yes/No
c15_2c	What is the most used pre-heating method in this establishment?	Select from option number
c15_2d	For how many years this establishment has been using preheating via Automated tracking via control room?	Number (years)
15.3 Clinker production		
c15_3a1	Does this establishment perform the clinker production process in house?	Yes/No
c15_3a2	Is this task outsourced another to unit of the same firm?	Yes/No
c15_3a3	Is this task outsourced to another firm?	Yes/No
c15_3b1	What clinker production method is used by this establishment? : Coal grinding – ball mill	Yes/No
c15_3b2	What clinker production method is used by this establishment? : Coal grinding – Vertical roller mill	Yes/No
c15_3b3	What clinker production method is used by this establishment? : RDF production <i>Definition: RDF fuel rotary kiln is a rotary kiln product that uses refuse-derived fuel (RDF) as fuel. Refuse-derived fuel (RDF) refers to waste-derived fuel, also known as</i>	Yes/No

²³⁰ <https://www.cemnet.com/Forum/thread/107963/calciner-types.html#:~:text=Off%2DLine%20Calciners%20are%20installed,with%20a%20separate%20preheater%20string>.

	<i>Solid recovered fuels (SRF), which can be granular, columnar, or honeycomb in shape. The fuel manufacturing plant sorts out waste plastics, waste slag, wood chips, PVC, etc. from general garbage, and after crushing, drying, pressing, and solidification, it becomes harmless RDF solid fuel.</i> ²³¹	
c15_3b4	What clinker production method is used by this establishment? : Kiln Definition: Cement kilns are used for the pyroprocessing stage of manufacture of portland and other types of hydraulic cement, in which calcium carbonate reacts with silica-bearing minerals to form a mixture of calcium silicates. ²³²	Yes/No
c15_3b5	What clinker production method is used by this establishment? : Automated tracking via control room <i>Definition: Automated tracking via control in cement production refers to the use of advanced automation systems and control technologies to monitor and regulate various aspects of the cement manufacturing process. It involves the implementation of centralized control systems, computer programs, and sensors to track and optimize the production parameters in real-time.</i>	Yes/No
c15_3b6	What clinker production method is used by this establishment? : Other	Yes/No
c15_3c	What is the most used clinker production in this establishment?	Select from option number
c15_3d	For how many years this establishment has been doing clinker production using Automated tracking via control room ?	Number (years)
c15_3e1	Which of the following processes or technologies are incorporated into the production process? : Baghouse filter	Yes/No
c15_3e2	Which of the following processes or technologies are incorporated into the production process? : ESP Filter <i>Definition: An electrostatic precipitator (ESP) is a filterless device that removes fine particles, such as dust and smoke, from a flowing gas using the force of an induced electrostatic charge minimally impeding the flow of gases through the unit.</i> ²³³	Yes/No
c15_3e3	Which of the following processes or technologies are incorporated into the production process? : Carbon capture utilization and storage	Yes/No

²³¹ <https://www.rotarykilnfactory.com/rdf-fuel-rotary-kiln/>

²³² https://en.wikipedia.org/wiki/Cement_kiln

²³³ https://en.wikipedia.org/wiki/Electrostatic_precipitator

	<i>Definition: Carbon capture, utilization and storage (CCUS), also referred to as carbon capture, utilization and sequestration, is a process that captures carbon dioxide emissions from sources like coal-fired power plants and either reuses or stores it so it will not enter the atmosphere.²³⁴</i>	
15.4 Cooling		
c15_4a1	Does this establishment performs the cooling process in house?	Yes/No
c15_4a2	Is this task outsourced another to unit of the same firm?	Yes/No
c15_4a3	Is this task outsourced to another firm?	Yes/No
c15_4b1	What cooling method is used by this establishment?: Planetary cooling <i>Definition: Planetary cooling are tubes with internal fins that are made from different types of metal. They are attached to the outside of a kiln using mounting systems and material chutes.²³⁵</i>	Yes/No
c15_4b2	What cooling method is used by this establishment?: Cross bar cooling <i>Definition: The Cross-Bar Cooler's self-adjusting Mechanical Flow Regulators (MFRs) control airflow across the whole clinker bed – irrespective of clinker bed height, particle size, distribution or temperature. This optimises heat recuperation and air distribution, reducing your fuel costs and meaning you need fewer cooling fans.²³⁶</i>	Yes/No
c15_4b3	What cooling method is used by this establishment?: Automated tracking via control room and advanced analytics <i>Definition: Automated tracking via control in cement production refers to the use of advanced automation systems and control technologies to monitor and regulate various aspects of the cement manufacturing process. It involves the implementation of centralized control systems, computer programs, and sensors to track and optimize the production parameters in real-time.</i>	Yes/No
c15_4b4	What cooling method is used by this establishment?: Other	Yes/No
c15_4c	What is the most cooling method used in this establishment?	Select from option number
c15_4d	For how many years this establishment has been	Number (years)

²³⁴ <https://www.energy.gov/carbon-capture-utilization-storage>

²³⁵ [https://industrialkiln.com/parts/satellite-coolers#:~:text=Satellite%20\(Planetary\)%20Coolers&text=Satellite%20coolers%20are%20manufactured%20with,mounting%20systems%20and%20material%20chutes.](https://industrialkiln.com/parts/satellite-coolers#:~:text=Satellite%20(Planetary)%20Coolers&text=Satellite%20coolers%20are%20manufactured%20with,mounting%20systems%20and%20material%20chutes.)

²³⁶ <https://ieeexplore.ieee.org/document/848517>

	using Automated tracking via control room and advanced analytics?	
15.5 Cement mill		
c15_5a1	Does this establishment performs the cement mill process in house?	Yes/No
c15_5a2	Is this task outsourced another to unit of the same firm?	Yes/No
c15_5a3	Is this task outsourced to another firm?	Yes/No
c15_5b1	What method is used by this establishment to perform the cement mill process?: Ball mill with mechanical separator	Yes/No
c15_5b2	What method is used by this establishment to perform the cement mill process?: Ball mill with no separator	Yes/No
c15_5b3	What method is used by this establishment to perform the cement mill process?: Vertical roller mill <i>Definition: Vertical roller mill is a type of grinder used to grind materials into extremely fine powder for use in mineral dressing processes, paints, pyrotechnics, cements and ceramics.²³⁷</i>	Yes/No
c15_5b4	What method is used by this establishment to perform the cement mill process?: Roller press <i>Definition: Roller presses developed for grinding a range of raw materials, are often used in the cement industry for grinding limestone (raw meal), cement clinker and blast furnace slag. The roller press can work together with a ball mill for pre-grinding or be used alone for the finish-grinding of the material.²³⁸</i>	Yes/No
c15_5b5	What method is used by this establishment to perform the cement mill process?: Other	Yes/No
c15_5c	What is the most used cement mill method in this establishment?	Select from option number
c15_5d	For how many years this establishment has been using Roller press?	Number (years)
15.6 Environmental practices		
c15_6a1	Which of the following practices the establishment currently uses in its production process?: Recycle and reuses waste material such as fly ash	Yes/No
c15_6a2	Which of the following practices the establishment currently uses in its production process?: Uses slags in other industrial applications	Yes/No

²³⁷ https://en.wikipedia.org/wiki/Vertical_roller_mill

²³⁸ <https://www.welding-alloys.com/industry-application/roller-presses/>

	<i>Slag could be used to treat acid soils or acid mine drainage. Doing so would both offset the cost of restoring abandoned mine areas, as well as decrease steel manufacturers' current waste footprint²³⁹</i>	
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²³⁹ <https://www.usgs.gov/news/science-snippet/slag-what-it-good#:~:text=Although%20the%20construction%20industry%20does,steel%20manufacturers'%20current%20waste%20footprint.>