الهيئة الاتحادية
للتنافسية والإحصاء
FEDERAL COMPETITIVENESS
AND STATISTICS AUTHORITY

United Arab Emirates

Guide to Reviewing and Auditing National Statistical Survey Data

Standard Manual Series

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Reviewing and Auditing National Statistics Survey Data
This Guide has been prepared according to the Statistical Data Dissemination Manual and the Charter of Best Practices for the Preparation of Official Statistics in the United Arab Emirates

الهيئة الاتحادية للتنافسية والإحصاء
FEDERAL COMPETITIVENESS AND STATISTICS AUTHORITY

The Federal Competitiveness and Statistics Authority (FCSA), is a UAE federal government entity created by Presidential Decree No.6 of the year 2015. The authority's mission is to strengthen and enhance UAE's national data and competitiveness capacities. The FCSA is one of the official government sources for national statistics and is one of the government representatives on matters related to national competitiveness. The FCSA aims at improving the UAE's global competitiveness performance by working with stakeholders on defining and implementing reforms and policies across sectors.

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Knowledge for prosperity

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If ever quoted please refer to this publication as follows:
Federal Competitiveness and Statistics Authority
"Framework - National Framework of Statistical Data Quality"

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The process of building human and cognitive statistical assets is one of the most important priorities of the Federal Competitiveness and Statistics Authority (FCSA) for developing a national statistical system in accordance with international recommendations and best practices. The aim is to produce statistical data characterized by high accuracy, modernity, high quality, and universality that meet all the requirements for planning, building, and sustainable development on a modern scientific basis and vision.

Accordingly, FCSA has issued several specialized standard manuals to ensure governance in the statistical work system and to standardize the methodologies, classifications and standards used by various institutions and data producers in the UAE, be it FCSA or other statistical centers and units, to produce statistical data to ensure their quality, consistency and comparability.

In this context, the "Guide to Reviewing and Auditing National Statistical Survey Data" serves as an official document and the standard guide on defining and controlling the process of reviewing statistical surveys data, which represents one of the main pillars of statistical surveys and opinion polls structure. This process ensures the coverage and comprehensiveness of the target sampling units, eliminates data discrepancies and variance, detects and treats outliers, and fixes data entry errors.

Given the variety and multiplicity of statistical surveys that address economic, social, and cognitive phenomena in society, the content of this guide was developed to focus on reviewing and auditing solely the key variables of statistical surveys and opinion polls and the commonalities between them, leaving finer details to specialized guides.

We hope that this guide contributes to building and spreading the culture of knowledge transfer adopted and implemented by FCSA as an important element in developing team competencies and improving data quality. We also welcome constructive suggestions and observations that will contribute to the development and enrichment of this guide in the future.

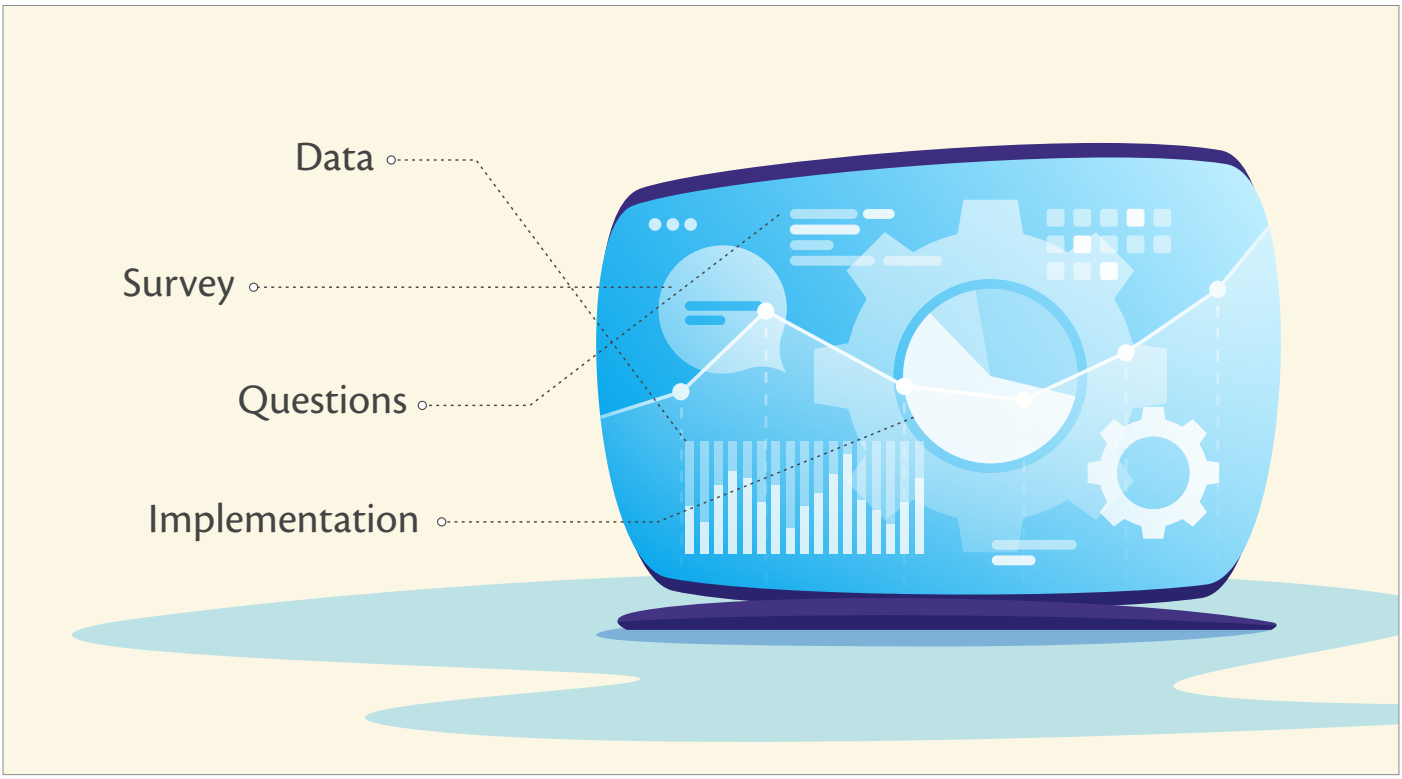
Allah is the Arbiter of Success

Abdullah Naser Lootah
Director General- FCSA

Chapter One

Statistical Surveys Structure

Statistical Surveys Structure



1.1 Preface

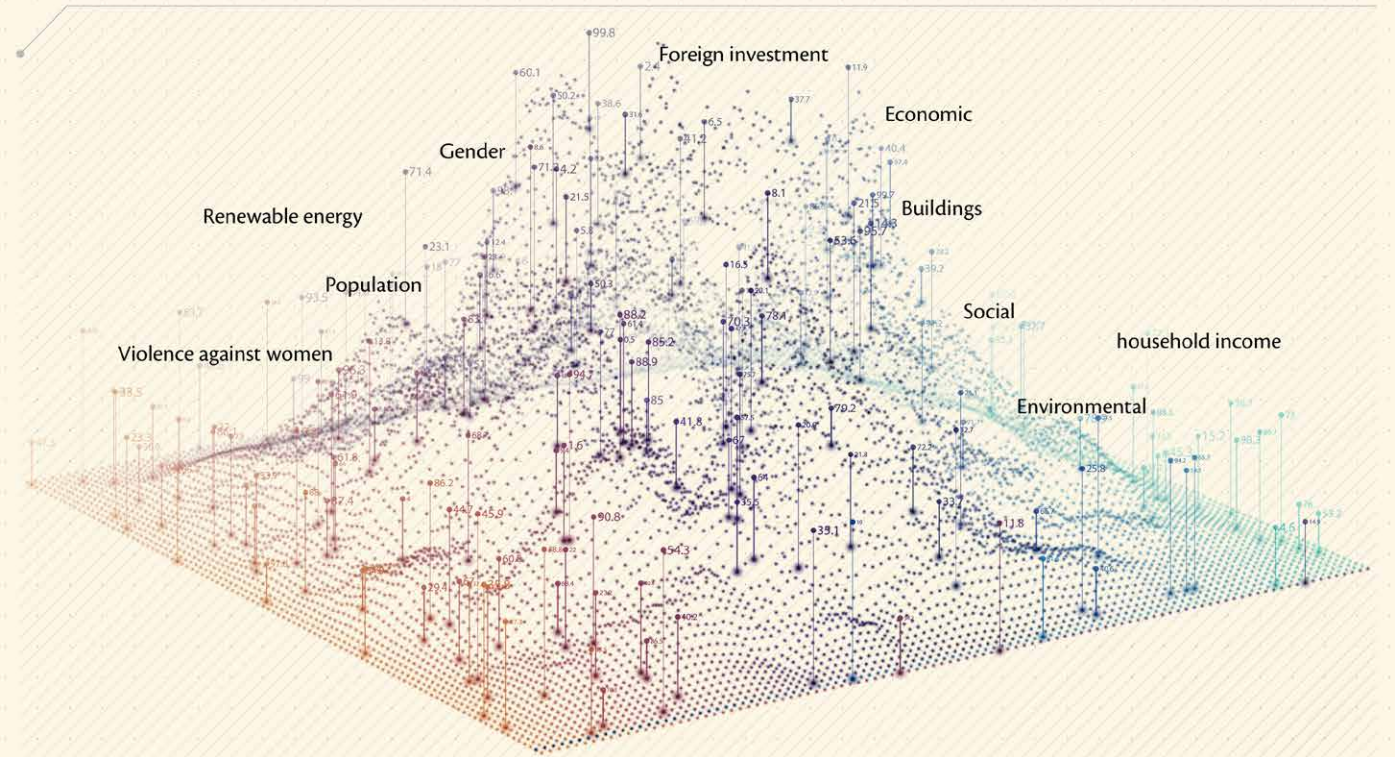
1. It is certain that issuing a consolidated guide that explains the steps and procedures of reviewing and auditing different types of statistical survey data is a challenge specialists face. The reason behind this challenge is that survey types and variables differ from one another due to the varying types and nature of sampling units in each survey. The differences in the variables lead to utilizing different elements and methods for reviewing and auditing data and, consequently, different methods for data processing and cleansing.

2. The variation in sampling unit types, variables, and goals makes it difficult to establish fixed and specific rules for reviewing and auditing every type of statistical survey in a single guide. Hence, this guide shall focus only on the common steps, procedures, and elements in the review and audit process of all statistical surveys, while specialized elements and procedures are included in the review and audit instruction manuals relevant to each survey.

3. Before addressing the content of this guide and its importance, parameters, stages, and tools, it is necessary to state the link between the content of the guide and existing titles, terminologies and names that the guide was built upon until it reached a point where it describes and explains them. The first title addressed is data sources, followed by statistical surveys terminology, tools, and stages.

1.2 Data Sources

Statistical data sources are based on two main types of sources, namely censuses and statistical field surveys and administrative record data. Censuses and statistical field surveys involve collecting data through direct and live interviews with household members and enterprises. Administrative record data are data recorded and archived by service, production, commercial, cultural, social, tourism, and other institutions, whether governmental or non-governmental.



1.3 Statistical Surveys

A statistical survey is defined as a structured statistical work built on scientific basis that aims to provide statistical data on specific characteristics of a unit of the society. It is based on the principle of covering all or part of the population by selecting a sample of the population using one of the probability sampling techniques or by covering all units of the population through a full coverage survey. Statistical surveys and opinion polls are classified into five main categories, namely:

1. Population and demographic surveys such as census of the population, buildings, dwellings, gender, and youth.
2. Social surveys such as surveys about the characteristics of national families, violence against women, and people of determination.
3. Economic survey such as household income and expenditure surveys, foreign investment, and economic surveys.
4. Environmental and agricultural surveys such as surveys on agricultural holdings, renewable energy, and air pollutants.
5. Opinion polls that aim to measure the opinions and impressions of individuals on a social or economic phenomenon; for example, customer satisfaction surveys and happiness and positivity surveys.

1.4 Statistical Survey Questionnaire

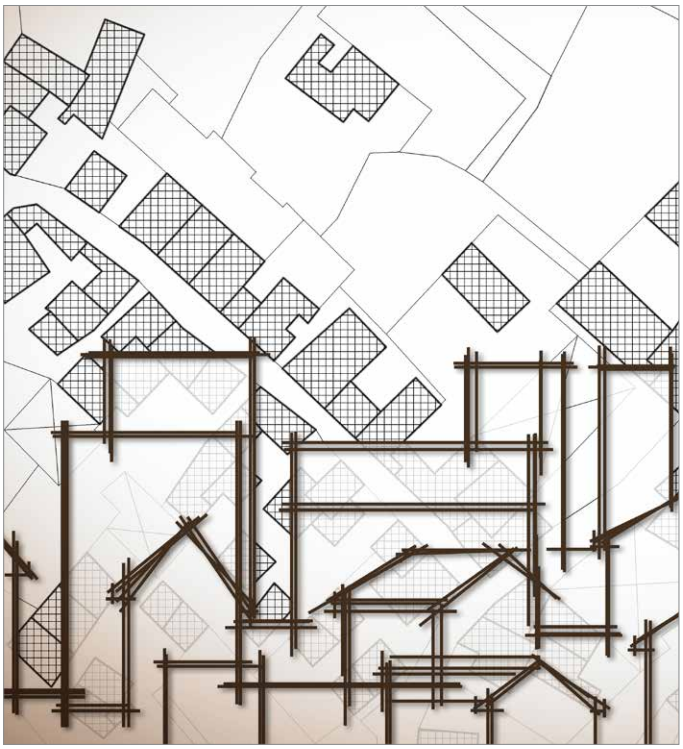
A statistical survey questionnaire is one of the main tools that compose the structure of a statistical survey. It is defined as a structured set of specialized questions that are assigned to a certain period of time. These questions revolve around social, economic, environmental, or other phenomena. Responses to these questions are collected through the questionnaire and then analyzed to obtain results and indicators, which are used in planning, policy-making, and decision-making.

1.5 Statistical Survey Questionnaire Structure

The structure of a statistical survey questionnaire consists of two main components, namely the attributes of the target sampling unit and a set of characteristics of this unit. Each of these components consists of several sub-components as follows:

1. The attributes of the location and the administrative subordination of the sampling unit, including the Emirate, city, district, and street, the sampling unit number and type, the personal, commercial or legal name of the sampling unit , as well as the researcher's name and telephone number and the result of the interview.

2. The variables and characteristics of the sampling unit, whether an individual, family, enterprise, or tenure. This includes the numeric, descriptive, monetary, and quantitative values of the sampling unit, either by selecting them from closed or open lists or by writing expressive texts for some variables, in addition to the constraints and transitions from one variable to another. These values are used to demonstrate the characteristics of most sampling units regardless of the type. For example, an individual is a sampling unit with a numerical value such as age, descriptive value such as nationality, monetary value as in income, and quantitative value as in the consumption of food such as rice or sugar. These characteristics are used in the other aforementioned sampling unit types that are targeted by statistical surveys.



1.6 Statistical Survey Implementation Stages

Statistical surveys are conducted through a set of interrelated processes and multiple procedures that are implemented according to a time-bound schedule and a standardized statistical system. The implementation is based on the general model of statistical processes and procedures, globally known as the "Generic Statistical Business Process Model". This model consists of eight phases starting with "Specify Needs", "Design", "Build", "Collect", "Process", "Analyze", "Disseminate", and finally "Evaluate". By implementing this model, the quality procedures are monitored and controlled at every phase. To serve the objectives of this guide, the eight phases can be grouped into three: preparatory phase, field phase, and review phase. A brief overview of these stages is listed below:

1.6.1 Preparatory Phase

The preparatory phase is the first phase of a statistical field survey, which includes several processes. Among these processes are the preparation of the survey questionnaire, its financial cost, the implementation schedule, the sampling frame, the training guide, and the economic, educational, and other classification manuals. It also entails preparing the paper and digital geospatial maps, the structure of the researchers and their roles, the work area distribution, a training program for the researchers and participants, and the training stations. In addition, it involves building an electronic survey for the questionnaire and its validation rules, loading the classification manuals used in coding the data on tablets, and performing the necessary tests. During this phase, a pilot survey is carried out with all the tools for conducting the survey before going to the field and the necessary adjustments are made based on the results of the pilot survey.

1.6.2 Field Phase

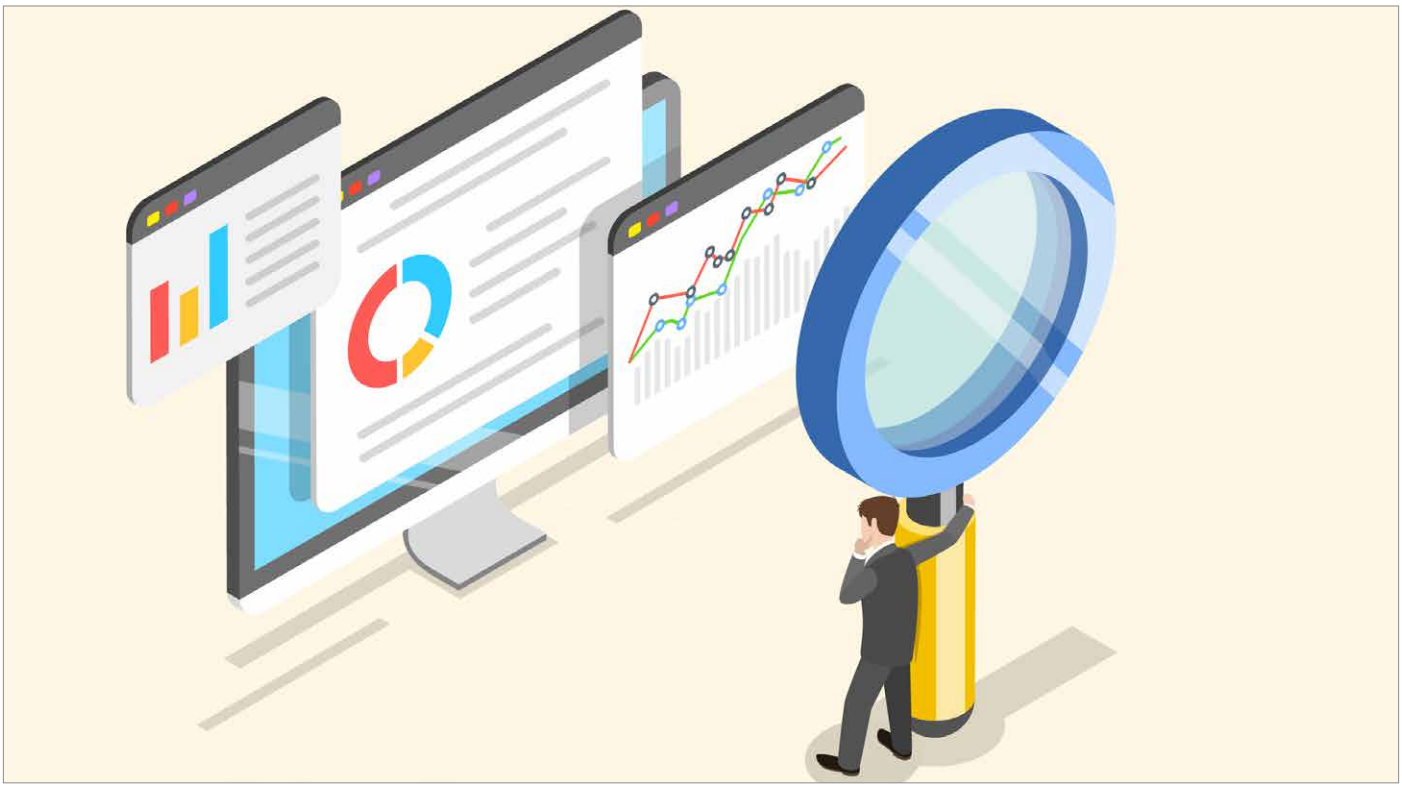
Upon completing the preparatory phase and ensuring the soundness of the processes, procedures, and equipment, the field phase of the statistical survey begins. This includes selecting and training the fieldwork team, distributing the work areas, tools, and supplies among them, and collecting data through interviews with the target sampling units. In addition, data quality checks are performed by selecting a sample of the data collected by the fieldwork team and running the necessary tests to verify the quality of the data and ensure they reflect reality. After covering all the sampling units and assuring the coverage has been achieved, the fieldwork team returns all the tools and supporting supplies, which are then handed over to the survey implementation department.

1.6.3 Office-processing Phase

The office-processing phase of the statistical survey raw data, which were collected from the target sampling units, begins in collaboration and coordination with the IT staff responsible for developing the electronic survey application. Before processing the raw data, the IT staff must take all the necessary technical measures should there be several places to collect raw data, which means there are several database files for the survey. In such cases, the IT staff must exercise caution and care when merging the files as well as keep a backup copy of the databases, regardless of whether or not the files are to be merged, as a preventive measure against any error or risk during the office processing. Finally, all the office processing of the raw database should be limited to a single file under the coordination and supervision of the IT staff.

1.7 Reviewing and Auditing Data

The variety of stages and processes of a statistical survey, the multiplicity of fieldworkers who have different understanding, cultures, and educational levels, and the inability of the validation rules developed in the electronic survey to guarantee data consistency and logic, regardless of how powerful they are at covering all the variables and probabilities to prevent errors, are all indications of the necessity of reviewing and auditing the collected raw data before extracting the final results of the survey. This is not a spur of the moment process, but a process planned within the survey implementation schedule that takes several forms and methods. It covers a large number of major and sub-variables and must be performed by experienced individuals with sufficient competence and experience in this field.



1.8 Reference for Data Auditing

The process of reviewing and auditing data is done according to the reference set by the National Framework of Statistical Data Quality issued by FCSA in the fourth section "Managing Statistical Outputs Quality", which ensures data accuracy and reliability. The most important of these are:

1. Implementation of the standards and procedures of regular periodic examination of data accuracy.
2. Provision of manuals and procedures for examining data accuracy.
3. Provision of a mechanism that includes error handling.
4. Extraction of indicators for measuring data accuracy.
5. Documentation of the results of reviewing and auditing data and data evaluation.

Chapter Two

Reviewing and Auditing Data

Reviewing and Auditing Data

2.1 Concept of Reviewing and Auditing

1. In this context, the concept of reviewing and auditing means examining all the survey variables data, whether texts or values, to ensure their validity in an organized and systematic manner by applying a set of standards, rules, and methods to carry out a systematic and documented examination of these variables. It should be noted that the use of the words “reviewing” and “auditing” together does not imply that they are synonymous but refers to the internal steps and phases that variables pass through. The former term refers to the full and complete review of variables while the latter refers to the auditing of the initial review process in which modifications and corrections were made in order to achieve the required data quality and accuracy.

2. The review and audit process includes all the data of sampling units, irrespective of whether they are attributes or descriptive or numerical characteristics. It also includes reviewing and auditing the coding done by the fieldworkers to convert descriptive text into codes, which is the only method through which data processing tools can schedule and tabulate data and extract results.

2.2 Importance of Reviewing and Auditing

Reviewing and auditing raw databases of statistical surveys is important to maximize the advantage of using such data and to ensure that the data is coherent and cohesive. Such cohesion achieves consistency and logic in the data and contributes to enhancing and improving the quality of their outputs, which in turn is reflected in the integrity and accuracy of the decisions that will rely on the data.

2.3 Objectives of Reviewing and Auditing

Reviewing and auditing processes generally aim to develop a national knowledge framework for the rules and methods of reviewing and auditing statistical surveys raw data. In particular, they aim to achieve the following:

1. Detecting errors that affect the outputs and correcting them.
2. Detecting inconsistencies and outliers and treating them.
3. Providing a clear and documented picture of the accuracy level of the data.
4. Validating the data to achieve the goals for which they were collected.

2.4 Reviewing and Auditing Tools

Prior to commencing the review and audit process, it is vital to ascertain the availability of the tools and requirements of these processes. The most important requirements are establishing rules for managing the process and putting instructions for specialized reviewing and auditing of specific variables, means for detecting errors and contradictions between the variables and treating them, as well as methods to handle missing data. Additionally, coding manuals are required for the variables that are coded as per the manuals of economic activities, occupations, nationality, education, and other national or international manuals. The final requirement is allocating trained and qualified executive staff to review and audit data using the equipment they need to perform their task, as well as supervisory technical staff to supervise the technical and administrative control and implementation of these processes.

2.5 Determinants of Reviewing and Auditing

Data reviewing and auditing determinants include the general framework that is applied at the beginning of the review and audit process to verify the consistency and accuracy of data and, consequently, their usability. The most important of these determinants are:

1. Validity of Data
Validity of data refers to the validity of the answers assigned to the variables. Reviewing and auditing these answers is done by verifying that the answers are correct and ensuring no text appears in numeric fields or vice versa.

2. Missing Data
Missing data refers to incomplete characteristics of the target sampling units. Hence, reviewing and auditing verifies that all the variables of the sampling unit characteristics are completed and that there are no variables for unanswered characteristics.

3. Range
The range refers to the minimum and maximum values of the expected answers of a variable. Reviewing and auditing, which are performed on each variable separately, ensures that the answer values fall within the predefined limits. An example would be defining limits to check the age of respondents to ensure they strictly fall between 0 and 125 years.

4. Frequency
Frequency refers to the records of the target sampling units' data that occur in the database once or more. Therefore, reviewing and auditing ensures that there are no recurrence of the sampling units' data or their unique codes in the database, and in case any duplications of these units are found, they are deleted.

5. Consistency
Consistency refers to the logical relationships and correlation between the variables of the target sampling units. Reviewing and auditing the consistency is performed through linking and comparing variables with one another as well as ensuring the sub and main totals are reasonable.

6. Outliers
Outliers refer to illogical values that fall outside the data pattern, irrespective of whether they are small or large values. They are reviewed and audited after applying all the previously mentioned types of reviews and audits to adopt realistic and reasonable values.

7. Values Outside the Validation Rules
These values result from a defect in the electronic survey while collecting the sampling unit data that disables the validation rules despite their existence. The values could also result from a mistake in the electronic survey.

8. Data Coding
Coding refers to converting textual data into numeric codes, which are validated during the reviewing and auditing process.

9. Comprehensiveness
Comprehensiveness refers to covering all the target sampling units in the survey's sample. Reviewing and auditing verifies that all the target sampling units are recorded in the database. If any of these units is missing, the sample numbers are submitted to adjust their weights when calculating the results.

2.6 Stages of Reviewing and Auditing

Reviewing and auditing processes in statistical surveys are not limited to a particular phase; they are associated with all the phases of the surveys from the preparatory phase, through the field phase, to the office-processing and result extraction phase.

2.6.1 Field Review and Audit

It would be wrong to believe that reviewing and auditing begins when the field phase of statistical survey ends; on the contrary, they start with the beginning of the field phase through monitoring and immediate follow-up of the collected data. This is done by taking samples of the collected data, examining them, and ensuring their validity and conformity to the required specifications, in addition to issuing circulars and instructions to the fieldwork team when errors or inconsistencies are identified in the data. This phase also includes reviewing the comprehensiveness and coverage of the entire target sampling units and the absence of drops and duplications. Drops are target sampling units that have never been visited because they were forgotten or inadvertently dropped from the sampling units distribution sheet to the fieldworkers. Duplications refers to recording target sampling unit data more than once, resulting in the data being repeated in the database.

2.6.2 Office Review and Audit

Office reviewing and auditing generally start where the field phase ends, ensuring the comprehensiveness and coverage of the entire target sampling units and the absence of drops or duplications in the database. If drops of sampling units occur for any reason, a list of these drops is made along with the reasons for not covering them in order to address these cases when distributing the weights of the survey's sample. Duplications, on the other hand, are deleted from the database after the full and complete confirmation of their recurrence by examining and matching the variables with each other. After removing duplicates, the variables are examined as a whole rather than taking samples as was the case during the field phase. The variables are compared to one another and the necessary processes to correct and cleanse data are made when needed.

Form 1 - Reviewing and Auditing Sampling Units Duplications

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Family Type Code M_102	Family Type M_102_D	Head of Household Name M_105	Age M_105	Gender Code M_106	Gender M_106_D
10836	1	Abu Dhabi	Null	Null	Abdelaziz Abdullah	39	Null	Null
10836	1	Abu Dhabi	1	National	Abdelaziz Abdullah	39	1	Male
10836	1	Abu Dhabi	1	National	Null	Null	1	Male
21495	2	Dubai	1	National	Moza Mubarak Saeed	58	2	Female
21495	2	Abu Dhabi	1	National	Moza Mubarak Saeed	58	2	Female
30867	3	Sharjah	2	Non-National	Fouad Mohammed Abdullah	37	1	Male
30867	Null	Null	2	Non-National	Fouad Mohammed Abdullah	37	Null	Null
30867	3	Sharjah	Null	Null	Fouad Mohammed Abdullah	37	1	Male
40529	4	Ajman	1	National	Hajar Mohammed Hussein	61	2	Female
40529	4	Ajman	1	National	Null	61	2	Female

Form 2 - Reviewing and Auditing Sampling Units Drops

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Family Type Code M_102	Family Type M_102_D	Head of Household Name M_105	Age M_105	Gender Code M_106	Gender M_106_D
10604	1	Abu Dhabi	1	National	Jasem Mohammed	54	1	Male
10605	1	Abu Dhabi	Null	Null	Null	Null	Null	Null
10606	1	Abu Dhabi	Null	Null	Null	Null	Null	Null
10607	1	Abu Dhabi	1	National	Fatima Abdullah	46	2	Female
21641	2	Dubai	2	Non-National	Walid Ali Mohammed	43	1	Male
21642	2	Dubai	Null	Null	Null	Null	Null	Null
21643	2	Dubai	1	National	Abdullah Khalaf	43	1	Male
21644	2	Dubai	Null	Null	Null	Null	Null	Null
21645	2	Dubai	1	National	Mohamed Ahmed	62	1	Male
32657	3	Sharjah	2	Non-National	Aisha Bilal	59	2	Female

32658	3	Sharjah	Null	Null	Null	Null	Null	Null
32659	3	Sharjah	Null	Null	Null	Null	Null	Null
46529	4	Ajman	2	Non-National	Abdullah Ali	29	1	Male
46530	4	Ajman	Null	Null	Null	Null	Null	Null
46531	4	Ajman	1	National	Fahad Saeed	43	1	Male
50429	5	Umm Al Quwain	1	National	Maryam Ali Mohamed	58	2	Female
50430	5	Umm Al Quwain	Null	Null	Null	Null	Null	Null
50431	5	Umm Al Quwain	2	Non-National	Suleiman Khaled	36	1	Male
69138	6	Ras Al Khaimah	1	National	Hassan Ali	24	2	Female
69139	6	Ras Al Khaimah	Null	Null	Null	Null	Null	Null
69140	6	Ras Al Khaimah	Null	Null	Null	Null	Null	Null
69141	6	Ras Al Khaimah	2	Non-National	Samiha Ahmed	31	2	Female
70869	7	Fujairah	1	National	Hamid Jumaa	67	1	Male
70870	7	Fujairah	Null	Null	Null	Null	Null	Null
70871	7	Fujairah	1	National	Majed Nasser	49	1	Male

2.7 Reviewing and Auditing Methods

Data reviewing and auditing processes take several forms and methods, the most important of which is the use of automated methods to modify, delete, or correct descriptive or numerical values of variables. The second method is sorting and tracking incorrect or illogical descriptive or numerical values of variables, then making the necessary modifications or corrections. It should be noted that automated methods cannot be used to review, audit, and process all variables; they are only used to treat certain verified cases that are not subject to explanation or interpretation.

2.7.1 Automated Methods

Automated methods are used by formulating specific rules to adjust descriptive, numerical, or financial values through a single automated command that can modify or correct all of these values. For example, if data on the educational certificate level is required for individuals who are 10 years or older, and we discover that this data was collected from all ages in the database, by using a single command, we can exclude or delete this data from all individuals under the age of 10 years.

Form 3 - Automatic Modification of Educational Certificate Level for Individuals under the Age of 10 Years

رقم الأسرة	رمز الإمارة	الإمارة	Gender Code	Gender	Date of Birth	(10 Years and older)		
						Age	Educational Certificate Code	Educational Certificate
Sample No	Emirate Code	Emirate	M_108	M_110	M_111	M_112	M_113	M_114
51266	5	Umm Al Quwain	1	Male	03/24/2009	09	02	Elementary Cycle One
62386	6	Ras Al Khaimah	1	Male	05/18/2016	03	00	Illiterate
10853	1	Abu Dhabi	2	Female	04/18/2012	07	02	Elementary Cycle One
34321	3	Sharjah	2	Female	12/22/2015	02	00	Illiterate
70864	7	Fujairah	2	Female	12/26/2013	04	01	Reads and writes
22367	2	Dubai	2	Female	12/04/2017	00	00	Illiterate
265411	2	Dubai	1	Male	08/25/2010	08	02	Elementary Cycle One
11754	1	Abu Dhabi	1	Male	07/22/2015	03	00	Illiterate
71275	7	Fujairah	1	Male	11/16/2011	06	02	Elementary Cycle One
52348	5	Umm Al Quwain	2	Female	09/24/2015	04	01	Reads and writes
57657	5	Umm Al Quwain	1	Male	05/02/2016	02	00	Illiterate
45436	4	Ajman	2	Female	07/26/2010	08	02	Elementary Cycle One
14578	1	Abu Dhabi	2	Female	04/12/2016	01	00	Illiterate
34532	3	Sharjah	1	Male	01/10/2009	08	03	Preparatory Cycle Two
63214	6	Ras Al Khaimah	1	Male	12/18/2015	02	00	Illiterate
64571	6	Ras Al Khaimah	2	Female	12/20/2017	00	00	Illiterate

2.7.2 Traditional Methods

Traditional methods are used to review and audit descriptive, numerical, or financial values of the target sampling units' characteristics. These methods are considered safe to use for data reviewing and auditing, and they rely on sorting and checking the values of a sampling unit's characteristics and identifying incorrect or illogical values by linking them to other values and characteristics of the sampling unit. For example, suppose there is a female who is "15 years or older", who states under the variable "Relationship to the Head of Household" that she is a "Wife". However, using the sorting method, the records reveal that under the variable "Marital Status", she has "Never Been Married". Hence, this data is illogical; either the relationship to the head of household is wrong or the marital status is wrong. In such cases, other characteristics of the individual are tracked. Suppose we find under the variable "Duration of Married Life" a record of 4 years and under the variable "Number of Births during Marriage" a record of 3 births, and by tracing the rest of the family members, we find the data for these births included in the family. In this situation, the marital status of the wife should be corrected from "Never been Married" to "Married". This method is complex and requires staff with experience, competence and skill in selecting the relationships in order to detect the error as well as the ability to recognize the links between the variables to assess the rationality of data in order to make the modifications or corrections.

Form 4 - Reviewing and Auditing Relationship to the Head of Household and Marital Status

Relationship to the Head of Household Code	Relationship to the Head of Household	Date of Birth	Age	Gender Code	Gender	Marital Status Code	Marital Status
M_103	M_103_D	M_104	M_105	M_106	M_106_D	M_115	M_115_D
2	Husband/Wife	08/07/1968	48	2	Female	1	Never married before
10	Father- or mother-in-law	01/01/1939	78	1	Male	1	Never married before
2	Husband/Wife	08/07/1968	48	2	Female	1	Never married before
10	Father- or mother-in-law	05/01/1939	78	1	Male	1	Never married before
2	Husband/Wife	07/27/1972	44	2	Female	1	Never married before
9	Grandfather / Grandmother	04/06/1937	80	1	Male	1	Never married before
2	Husband/Wife	02/12/1975	42	2	Female	1	Never married before
2	Husband/Wife	01/07/1969	48	2	Female	1	Never married before
6	Son or Daughter-in-law	05/20/1976	40	2	Female	1	Never married before
10	Father- or mother-in-law	09/01/1963	54	2	Female	1	Never married before
5	Mother / Father	01/01/1947	70	2	Female	1	Never married before
10	Father- or mother-in-law	06/01/1942	75	1	Male	1	Never married before
10	Father- or mother-in-law	01/08/1962	55	2	Female	1	Never married before
2	Husband/Wife	08/20/1987	30	1	Male	1	Never married before
2	Husband/Wife	03/01/1962	55	2	Female	1	Never married before
6	Son or Daughter-in-law	06/20/1994	22	2	Female	1	Never married before
5	Mother / Father	07/01/1963	53	1	Male	1	Never married before

2.8 Review and Auditing Attributes of Surveys

The attribute variables of statistical survey sampling units differ from one survey to another; they may be individuals, families, enterprises, agricultural or fishery holdings, or others. However, the variables are compatible with key variables, some of which will be presented in forms as examples for reviewing and auditing.

2.8.1 Distribution of Sampling Units by Administrative and Planning Divisions

The main variables of surveys are similar in terms of the geographical distribution of the sampling units, also known as "administrative and planning divisions" of the UAE. The divisions start at the Emirate level, followed by the city, then the main districts, then the sub-districts, basins, communities, neighborhoods, or blocks, depending on what they are called in each Emirate. Through these distributions, it is necessary to ensure that the sampling units are assigned to this geographic planning distribution and that there are no sampling units in the database that belong to one Emirate but their data are placed under another Emirate, which can occur in the field phase due to errors in selecting the correct geographical distribution. For instance, this can occur when collecting data of a sampling unit in Ras Al Khaimah but selecting Ajman instead, thereby attributing its data to the wrong location. Such cases must be tracked and their data must be adjusted to match with the original sample frame in order to be properly attributed to the correct geographic location.

Form 5 - Reviewing and Auditing Administrative Divisions

رقم المستخدم User no.	الموقع GIS Code	رمز الإمارة Emirate Code	Emirate M_110	Gender Code M_111	Gender M_111	Age M_112	Nationality Code M_113	Nationality M_113
rakenum02@fcsa.gov.ae	6.0101E+13	1	Abu Dhabi	1	Male	37	4	African
ajmenum02@fcsa.gov.ae	4.0102E+12	7	Fujairah	1	Male	32	3	Asian
ajmenum02@fcsa.gov.ae	4.0102E+12	2	Dubai	1	Male	49	2	Arab
ajmenum02@fcsa.gov.ae	4.0102E+12	7	Fujairah	1	Male	52	3	Asian
ajmenum02@fcsa.gov.ae	4.0102E+12	2	Dubai	2	Female	44	4	African
fujenum01@fcsa.gov.ae	7.0101E+12	3	Sharjah	2	Female	23	1	UAE
adenum08@fcsa.gov.ae	1.0101E+12	3	Sharjah	1	Male	48	1	UAE
fujenum01@fcsa.gov.ae	7.0101E+12	1	Abu Dhabi	1	Male	52	2	Arab
fujenum01@fcsa.gov.ae	7.0101E+12	3	Sharjah	2	Female	37	1	UAE
fujenum01@fcsa.gov.ae	7.0101E+12	3	Sharjah	2	Female	45	1	UAE
adenum02@fcsa.gov.ae	1.0111E+12	5	Umm Al Quwain	2	Female	22	1	UAE
duenum01@fcsa.gov.ae	2.0121E+12	3	Sharjah	1	Male	55	5	Westerner

2.8.2 Reviewing and Auditing Household Type of Sampling Units

Sampling units, especially in population or social surveys or some economic surveys, are distributed according to the type of household, which can be classified as "private national family", "private non-national family", "collective family" or "labor camp» as per the classification adopted. This data should be reviewed and audited to ensure there are no cases that are misclassified, such as households being classified as "private national family" when they are not or vice versa. Therefore, this data must be linked to the nationality of the head of household, and modifications are made after verifying the data.

Form 6 - Reviewing and Auditing Household Type and Nationality of the Head of Household

Household Type Code M_102	Household Type M_102_D	Relationship to the Head of Household Code M_103	Relationship to the Head of Household M_103_D	Date of Birth M_104	Age M_105	Nationality Code M_107	Nationality M_107_D
1	National	1	Head of Household	02/05/1947	70	48	Bahrain
1	National	1	Head of Household	10/28/1973	43	12	Algeria
1	National	1	Head of Household	03/11/1958	59	174	Comoros
1	National	1	Head of Household	03/13/1957	60	512	Oman
1	National	1	Head of Household	04/24/1987	30	400	Jordan
1	National	1	Head of Household	04/02/1940	77	818	Egypt
1	National	1	Head of Household	02/24/1974	43	400	Jordan
1	National	1	Head of Household	06/09/1958	58	364	Iran
1	National	1	Head of Household	01/01/1957	60	887	Yemen
1	National	1	Head of Household	07/18/1974	42	400	Jordan
1	National	1	Head of Household	12/15/1936	80	356	India

2.8.3 Reviewing and Auditing the Economic Activity of the Sampling Units

Sampling units of enterprises in economic surveys are distributed according to the type of economic activity of the enterprise. This data should be reviewed and audited to verify the activity classification and to ensure that there are no cases with incorrect activity classification. This is done by comparing the economic activity to the individual data of the enterprise, such as the enterprise name, its sector, its branches, the number of employees, and other individual data. For instance, if an enterprise called "Al Batra Bookshop" has its economic activity classified as "Hospital Activities", all the individual data of the enterprise should be tracked and modifications are made after verifying the data, so either the economic activity is wrong or the enterprise name is wrong.

2.8.4 Reviewing and Auditing Sector Type of Sampling Units

Sampling units of enterprises in economic surveys are distributed according to the type of sector, which can be classified as "federal or local government", "public", "joint", "private", "foreign enterprise", or "non-profit" as per the classification adopted. This data should be reviewed and audited to ensure that none of the cases is misclassified, such as an enterprise classified as federal government, public, or private when it is not. Therefore, this data must be linked to other individual data of the enterprise such as the enterprise name and its economic activity. For example, if an enterprise called «Al Baraha Hospital" is classified as "private" but it is known to be a "government" hospital, then the type of sector should be modified after verifying the data.

Form 7 - Reviewing and Auditing Economic Activity and Sector

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Enterprise Name M_120	Economic Activity Code M_121	Economic Activity M_122	Sector Code M_122	Sector M_123
25436	2	Dubai	Sports Club	9241	Sports activities	1	Federal Government
34267	3	Sharjah	Car Showroom	5010	Sale of Motor Vehicles	9	Other
14783	1	Abu Dhabi	Embassy	9900	Diplomatic Committee	5	Foreign Sector
76549	7	Fujairah	Hairdresser	9302	Hairdressing	1	Federal Government
27854	2	Dubai	Medical Services	7513	Ministry of Economy	1	Federal Government
64318	6	Ras Al Khaimah	Abdullah Family	9309	Home Services	3	Public Sector
57654	5	Umm Al Quwain	Commercial Corporation	5211	Processing and Storing Meat	2	Local Government
78432	7	Fujairah	Municipality	7511	Municipal Services	1	Federal Government
59321	5	Umm Al Quwain	Pharmacy	5231	Sale of Pharmaceuticals	6	Diplomatic Committee
18654	1	Abu Dhabi	Ministry	7523	Security services	2	Local Government
18989	1	Abu Dhabi	Cooperative Society for Fishermen	0501	Fishing	7	Without Establishment
67543	6	Ras Al Khaimah	Cleaning Company	7493	Pest Control	8	Households
46543	4	Ajman	Air Conditioning Workshop	5260	Repair of Electrical Equipment	3	Public Sector
29761	2	Dubai	General Transport Corporation	6023	Road Transport of Goods	2	Local Government

2.9 Reviewing and Auditing the Characteristics of Sampling Units

As mentioned previously, the attribute variables of statistical surveys' sampling units differ from one survey to another. There is also a wider difference between the characteristics of these units; regardless, some of the common characteristics will be presented in forms as examples for reviewing and auditing.

2.9.1 Reviewing and Auditing the Age of Sampling Units

Age is considered one of the most important characteristics of the sampling units; it is also one of the characteristics of individuals on which all plans and subsequent decisions are based since different ages mean different needs and services. Therefore, any mistake in this data will result in errors in decision-making and policy-making that rely on the data, and its negative impact will directly affect both short and long-term plans. Age is the link to other individual characteristics as it determines the individual›s relationship to the head of household, educational level, marital status, and employment status. Thus, data related to the individual's age must be carefully reviewed by linking it to all the variables mentioned earlier. Suppose there is an error or a contradiction between the age and the educational level. All the variables of the individual must be tracked starting with the name, if available, the relationship to the rest of the family members, up to the last characteristic; accordingly, modifications and corrections are made. Suppose we find an individual who has children, the eldest of whom is 13 years old. Yet, the data of the individual reveal that he is 19 years old, his relationship to the head of household is "Head of Household", his educational level is "University", his academic qualification is "Bachelor of Engineering in Information Technology", his marital status is "Married", his employment status is "Employed", and his occupation is "Executive Director in Etisalat". All these data indicate that either the father's age or the son's age is incorrect. Based on the father's other characteristics, it is more likely that his age is recorded incorrectly since all the characteristics are logical and consistent except for the age. After reviewing the son's age and verifying its credibility, the father's age is adjusted to the nearest age. In this case, it will be the sum of the father's age input (19), the son's age (13), and (1) birth year, totaling 33 years of age for the father. The result may not be completely correct, but it is more reasonable and consistent.

2.9.2 Reviewing and Auditing the Occupation of Sampling Units

Occupation is an important characteristic of sampling units through which we can determine whether there is a shortage, surplus, or balance of occupations in the society. If there is a mistake or a contradiction between an individual's occupation and academic qualification, such as an individual whose occupation is "Dentist" and qualification is "Bachelor's Degree in Economics", then one of them must be wrong. Thus, it is necessary to track all the variables of the individual, especially the institution in which he works. If, for example, we found that the individual works in "Dar Al-Shifaa Hospital" and he is 31 years old, then it is reasonable to assume his academic qualification is incorrect, which should be modified to "Bachelor of Dentistry".

Form 8 - Reviewing and Auditing Age and Educational Certificate Level

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Gender Code M_108	Gender M_110	Date of Birth M_111	Age M_112	Educational Certificate Code M_113	Educational Certificate M_114
55312	5	Umm Al Quwain	1	Male	03/23/2009	09	02	Elementary Cycle One
69140	6	Ras Al Khaimah	2	Female	04/18/2005	13	03	Preparatory Cycle Two
72546	7	Fujairah	2	Female	12/22/1993	24	09	Doctorate
49143	4	Ajman	2	Female	01/15/2003	15	04	Secondary Cycle Three
34564	3	Sharjah	1	Male	05/08/1999	19	06	University
56879	5	Umm Al Quwain	2	Female	12/13/2004	14	04	Secondary Cycle Three
25436	2	Dubai	1	Male	11/05/2000	17	07	Postgraduate Diploma
18624	1	Abu Dhabi	1	Male	11/10/2011	06	00	Illiterate
57657	5	Umm Al Quwain	2	Female	04/14/1997	20	07	Postgraduate Diploma
49342	4	Ajman	1	Male	05/21/1995	23	09	Doctorate
36754	3	Sharjah	2	Female	07/26/2010	08	02	Elementary Cycle One
79043	7	Fujairah	1	Male	07/13/2002	16	05	Above Secondary & Below University
26496	2	Dubai	2	Female	12/28/1997	21	08	Masters
19089	1	Abu Dhabi	1	Male	11/10/2007	11	03	Preparatory Cycle Two
69197	6	Ras Al Khaimah	1	Male	12/02/1999	18	06	University
38543	3	Sharjah	2	Female	05/12/1996	22	08	Masters

Form 9 - Reviewing and Auditing Academic Qualification and Occupation

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Individual Serial No. M_110	Age M_111_D	Educational Certificate Code M_114	Educational Certificate M_115	Occupation Code M_118	Occupation M_119
50604	5	Umm Al Quwain	="030101010010001"	45	001	Reads and writes	050	Electric Engineers
30605	3	Sharjah	="030101010010034"	22	000	Illiterate	009	Finance Managers
40606	4	Ajman	="030101010010451"	55	004	Secondary Cycle Three	037	Chemists
20607	2	Dubai	="030101010010697"	39	014	Diploma in Education	067	Pharmacists
71641	7	Fujairah	="030101010018301"	53	002	Elementary Cycle One	076	Secondary School Teacher
21342	2	Dubai	="030101010010549"	43	003	Preparatory Cycle Two	086	Accountants
11643	1	Abu Dhabi	="03010101001056"	58	310	Bachelor of Sociology	052	Communications Engineers
71644	7	Fujairah	="03010101001989"	42	380	Master of Law	060	Specialized Doctors
21045	2	Dubai	="030101010010736"	48	080	Diploma - Teachers Institute	098	Software Developers
32057	3	Sharjah	="030101010010784"	40	344	Bachelor of Accounting	107	Judges
40869	4	Ajman	="030101010010893"	42	003	Preparatory Cycle Two	131	Mechanical Engineering Technicians
50870	5	Umm Al Quwain	="030101010011267"	54	004	Secondary Cycle Three	148	Marine Engineers
10871	1	Abu Dhabi	="030101010010876"	31	001	Reads and Writes	154	Laboratory Technicians

2.9.3 Reviewing and Auditing the Type of Dwelling of Sampling Units

Type of Dwelling is one of the characteristics of sampling units that individuals own or live in, through which we can identify the standard of living of those individuals. Therefore, any error in the type of dwelling affects the determination of the type of living conditions of those individuals. If a contradiction is found between the type of dwelling and the type of building, then all the characteristics of the building and the dwelling should be examined. Upon validating the data, the necessary modifications are made. For instance, if the type of building is "Villa" and the type of dwelling is "Public House", then this is considered incorrect since a building such as "Villa" is only applicable to two types of dwelling, namely "Villa" or "Villa Extension". This suggests that there is an error either in selecting the type of building or in selecting the type of dwelling. In this case, the predominant types of buildings in the area should be reviewed. If they are mostly "Villas", then the type of dwelling is likely to be "Villa", and if the dwellings were mostly "Public Houses", then the type of building is likely to be "Public Houses". In this manner, by depending on determinants and inputs, we can cleanse the data and achieve accuracy, consistency, and logic in the data.

Form 10 - Reviewing and Auditing Type of Building and Type of Dwelling

رقم الأسرة Sample No	رمز الإمارة Emirate Code	الإمارة Emirate	Building Owner's Name C_107	Type of Building Code C_108	Type of Building C_109	Dwelling Location C_110	Type of Dwelling Code C_111	Type of Dwelling C_112
67143	6	Ras Al Khaimah	Mohamed Seif	5	Public house	Entire House	3	Villa
78032	7	Fujairah	Heirs of Jomaa	1	Palace	Entire House	6	Public House
18612	1	Abu Dhabi	Fatima Ibrahim	2	Multi-story building	Arabic House	8	Arabic House
33261	3	Sharjah	Khalifa Musabah	3	Villa	Floor 5 Apartment 504	5	Single-Story Building
41549	4	Ajman	Salem Mohammad	4	Single-Story Building	Entire House	1	Palace
25436	2	Dubai	Zainab Abdul Qader	6	Arabic House	Entire House	9	Warehouse
79432	7	Fujairah	Ali Saed	7	Warehouse	Entire House	7	Part of Public House
55326	5	Umm Al Quwain	Yusuf Ahmed	2	Multi-story building	Entire House	8	Arabic House
69543	6	Ras Al Khaimah	Said Ali Obaid	3	Villa	Entire House	2	Apartment
49843	4	Ajman	Hamad Saif	5	Public house	Entire Part	4	Part of Villa
34096	3	Sharjah	Mohammed Muslim	2	Multi-story building	9th Floor Apartment 28	5	Single-Story Building
59872	5	Umm Al Quwain	Moza Mohammed	6	Arabic House	Entire Part	4	Part of Villa
25436	2	Dubai	Rashed Mohammed	5	Public house	Entire House	8	Arabic House
18624	1	Abu Dhabi	Suhail Abdullah	7	Warehouse	Entire House	6	Public House
41723	4	Ajman	Majed Abdullah	4	Single-Story Building	Entire House	9	Warehouse

2.9.4 Reviewing and Auditing the Financial Values of Sampling Units

Financial values are among the most important variables of the sampling units that are related to economic activities. It is through these values that the profits or losses of economic enterprises can be calculated. They are also used in calculating the value added at the economic activity level, whether industrial, commercial, financial, or services. Therefore, any error in calculating this value leads to errors in the calculation of all other variables. For example, if outliers in sales are examined, and one of the industrial enterprises, such as a dairy factory, is found to have sales of AED 79,367,936 at the end of the year, compared to its production input of AED 734,591,037 for the same year, this indicates a huge loss incurred by this factory. However, this loss is illogical and unjustifiable, especially if its capital does not exceed AED 50,000,000. Thus, all the data of this enterprise should be reviewed, starting with labor cost, followed by the quantity and value of the goods, the quantity and value of the inventory at the beginning and the end of the year, the annual depreciation, and ending with the quantity and value of sales. A careful examination of all these variables reveals that the value of the production amounted to AED 34,591,037 only and not AED 734,591,037, which was entered incorrectly. Errors or irrationality in values or quantities are not limited to a specific variable or economic activity but are a normal phenomenon that appears in several variables and economic activities. However, they can be prevented through ingenuity, professionalism, and skills in order to avoid affecting the credibility, accuracy and integrity of the data.

Form 11 - Reviewing and Auditing Financial Statements of Economic Enterprises

رقم المنشأة Est. No	رمز الإمارة Emirate Code	الإمارة Emirate	Enterprise Name M_106	Economic Activity Code M_107	Economic Activity M_108	Labor Cost (000) M_118	Production Inputs (000) M_126	Revenue (000) M_132
40342	4	Ajman	Contracting Company	4530	Building Fixtures	8,654	624,659	275,359
36754	3	Sharjah	Spare Parts Factory	2811	Manufacture of Metal products	76,701	2,907,432	1,658,824
20936	2	Dubai	Vehicle Showroom	5010	Sale of Motor Vehicles	783	54,098	34,761
18624	1	Abu Dhabi	Exchange Office	6719	Financial Intermediation	1,649	876,074	354,803
56879	5	Umm Al Quwain	Furnishers Factory	3610	Manufacture of Furniture	98,058	1,859,731	1,053,491
73436	7	Fujairah	Hospital	8511	Hospital Activities	6,721	64,694	23,561
25436	2	Dubai	Bank	6517	Monetary Intermediation	27,643	8,659,769	6,834,095
19624	1	Abu Dhabi	University	8030	University Education	3,749	94,247	36,806
57657	5	Umm Al Quwain	Bakery	1541	Manufacture of Bakery Products	836	4,851	2,853
65436	6	Ras Al Khaimah	Real Estate Office	1810	Manufacture of Ready-Made Garments	2,482	649,501	452,692
38624	3	Sharjah	Paint Factory	2422	Manufacture of Paint	3,438	4,781,386	3,680,123
75612	7	Fujairah	Insurance Company	6600	Insurance	94,542	2,973,691	1,954,174
45436	4	Ajman	Garment Factory	1810	Manufacture of Ready-Made Garments	2,482	649,501	452,692

2.10 Coding the Characteristics of Sampling Units

As mentioned previously, the review and audit process also includes reviewing and auditing the coding used to convert descriptive text into codes so that data processing tools can process them when tabulating the data and extracting results. The review and audit of coding often focuses on the manuals used to code the academic qualifications, occupations, and economic activities of the target sampling units. The clearer the descriptive text of the academic qualifications, occupation, or economic activity of the sampling unit is, the easier and more accurate the coding will be and vice versa.

2.11 Reviewing and Auditing the Coding

The coding is reviewed and audited by taking a sample from the database and comparing the descriptive text of some variables with their codes, or by tabulating the intersection of two variables, such as the academic qualification with the occupation. The occupation may not match the academic qualification, such as engineers who do not have a degree in engineering or judges and lawyers who do not have a degree in law. In such cases, the descriptive text of both is reviewed, and based on the available data and the more likely and realistic result, the coding of either one is modified.

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