

Design of data application for implementation of North Macedonian Labour Force survey

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Abstract

The improvement in the Labor Force Survey is a high priority. Especially, when IESS regulation was accepted and implemented by the EU countries the SSO faced more difficulties in fulfilling the given recommendation. The main base for a fully integrated LFS survey was changes that need to be implemented in the frame of survey design in preparation for electronic questionnaires.

The new form of data collection has a huge impact on the improvement and standardization process in creating data entry applications for data collection mix mode. The electronic form of data collection allows for high-quality data, reducing cost and time for data processing and dissemination.

The used Labor Force application was built in Database Microsoft SQL Server 2017 in link with existing systems in the State Statistical Office compatible with 1. Windows XP 2. Windows 7 3. Windows 10 Pro 4. Windows 10, synchronized with Windows Server 2012 standard and NET Framework 4.5.2 3. IIS 8.0.

The LFS application was developed in the electronic form of a questionnaire for computer-assisted data collection and development of software for managing activities (preparation, running, and closing the survey) for both modes CAPI and CATI. All the logical expressions defined in the LFS structured questionnaire and used in data collection have been covered by management modules in the data entry application. The specificity in the definition of the modules in the application was based on the methodological recommendations in the dynamics section, the survey period, and the roles that have strictly defined tasks in the household rotation cycle according to the selected sample.

The application solution for collecting data from the field is in operation daily and helps in monitoring the dynamics in the field, the quality of the data, and efficiently organizing the work with other users in the process. It also helps in the efficient preparation of annual questionnaires by including ad hoc modules.

Keywords: data application, data collection, logical controls, roles, users

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1. Introduction

The Labor Force (LFS) survey is one of the priorities in Macedonian statistics.

Since 1996 LFS became a key element in social statistics with all relevant information disseminated for economic indicators.

Following European and methodological recommendations based on international labor organization LFS was developed through the high statistical quality measurements policy in the SSO.

From 1996 to 2011 paper questionnaires were the main form of data collection. In 2011, was started with CAPI and CATI mixed collection mode.

This form of data collection was improved through the years and was based on fundamental changes given according to EU and ILO regulations. The beginning on use of computer-assisted questionnaires was started in 2011, on behalf of support under the IPA 2009. In this period LFS made significant changes in the process of designing the survey based on data collection and data process. CAPI and CATI modes were implemented through the Blaise application. CATI mode of data collection was continuously established, but CAPI mode, previously used in PAPI mode, was replaced due to the technical exchanges between regional offices with the ordinary. According to the project activities under the IPA 2015 electronic mode of data collection was reestablished. So far SSO had supportive electronic applications for LFS data collection. In 2021 when new changes on the methodological side of survey design SSO was faced with significant difficulties in maintaining change in the existing application. Due to the available sources and outscore company the new application was built.



Computer-assisted methods for data collection give new opportunities and efficiency of LFS survey, obtaining better quality incoming data and reducing costs and time on long-term sustainability. At the same time decreases the employee's burden, speeding up the data production, lowering the costs, and improving the accuracy and timeliness of data.

LFS application for two-mode CAPI and CATI is an online application for creating, and maintaining LFS questionnaires and on the other side is a main tool for collecting, controlling, and synchronizing LFS data. The application as a tool for data collection uses the Microsoft platform (Visual Studio and MS SQL Server) for both data process mode CAPI and CATI with built-in logical controls for data checking and validation rules and providing standardization for filed activities management, checking interviews and control of interviewers, for assessing quality of collected data, control and finalize payment.

As an integrated tool for the engineering part of the harmonization data collection process in alignment with EU regulation, intensify efforts to improve the quality of LFS, particularly in parts of the data production process.

2. Workflow of LFS application

The design application as a tool for LFS data processing is a functional IT system for two main purposes:

1. Data collection and managing interviewing with integrated two modes of data collection CAPI and CATI;
2. Data management tools for field activities and supervisory tasks at Regional offices and SSO.



2.1 Application for data collection

Application for data collection and managing interviewing contains an electronic questionnaire for CAPI and CATI mode and a data entry form with built-in logical controls and validation rules. The content of the questionnaire, code lists, classifications, logical controls, and validation rules are implemented according to methodological guidance from the LFS. The applications developed for CATI and CAPI data collection are almost the same. The main functionalities relevant to both data collection modes implemented in the system are the following:

- Each interviewer has a list of interviews which has to be done;
- Filter is reporting period, available are current and previous week;
- There is household info, phone number, interview status, and appointment on the list;
- Function Make appointment opens the view to make an appointment for a specific date and time based on the status of the interview;
- Notifying the interviewer if there is an appointment coming up;

2.2 Application for managing interviewing in LFS

The developed management application is used by different users to complete different tasks. Only registered users have access to the management application. Accordingly, to the security system and users roll through the login screen users can enter the application. The user's rights are adapted according to determinate actions allocated in the two modules. The different roles are allocated to different users. The following roles are determined: Manager, CATI controller, Regional coordinator, CATI Interviewer, CAPI Interviewer.



The functionality of the application is determined according to task rolls. For the particular role following activities are available:

1. Manager

- Manage reporting periods (weeks)
- Import new households
- Monitoring data collection process
- Check interviews and control of interviews
- Export interviews for data editing in SAS
- Prepare enumeration districts for the next wave
- Control and finalize payment

2. CATI controller

- Assigning enumeration districts to interviewers
- Monitoring CATI interviewing
- Check interviews and control the interviewers
- Edit interviews for error corrections
- Switch data collection mode from CATI to CAPI for one interview
- Coding professions and activities
- Calculate the payment

3. Regional Coordinator

- Assigning enumeration districts to interviewers
- Monitoring CAPI interviewing
- Check interviews and control the interviewers
- Edit interviews for error corrections
- Coding professions and activities
- Calculate the payment

4. CATI interviewer

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- Perform interviewing according to assigned enumeration districts
- See current and previous reporting period
- Introducing new households if there is a new household at the same address

5. CAPI interviewer

- Synchronize the laptop with the main server
- Perform interviewing according to assigned enumeration districts
- See current and previous reporting period
- Introducing new households if there is a new household at the same address

The main focus on determinate tasks in the application was creating roles for each user who has access to the application allocated with two modules (Management application and CAPI/CATI application).

The management application is used in the central State Statistical Office by methodological staff experts, CATI controllers, and CATI interviewers. Regional coordinators and interviewers use it in regional offices.

Only registered users have access to the management application.

After login, the system enables adaptation to user rights. Managers can see all data, CATI controllers can see only CATI data, Regional coordinators can see only data for their region, and Interviewers can see only enumeration districts that were assigned to them.

Data are collected in four waves. The first two by CAPI and the last two by CATI. The first wave is declared by the research manager, the person responsible for the sample design. That info should be imported into the system. The second wave starts after 13 weeks. The next two quarters (6 months) are omitted. The third and fourth waves are active in two consecutive quarters again, the same as the first two quarters.



E.g.: if a household enters the sample in the first week of this year, the second wave is in the fourteenth week of this year, the third wave is in the first week of the next year and the fourth wave is in the fourteenth week of next year.

This system allows the Manager role to view a list of all users, create new users, and edit existing user data. The list view displays relevant information such as first and last names, regions, roles, and active status. Access is controlled based on the IsActive status of the user, and certain functions may be restricted based on the user's role.

The CATI controller can assign and monitor the interviewing, check and control data, edit interviews for error corrections, manage data collection mode from CATI to CAPI, Code professions and activities, and calculate the payment. The same roles have Regional controls but only for the CAPI interviewing. For a CATI (Computer-Assisted Telephone Interviewing) interviewer, the primary responsibilities typically include conducting interviews over the phone within assigned enumeration districts. The CAPI interviewers after the synchronization between the laptop and the main server have a role to collect relevant information about the household recording the data in the CAPI application.

3. MANAGEMENT APPLICATION – MODULES

The management application is divided according to the user's applicability into five modules:

- USERS
- REPORTING PERIODS (weeks)
- ENUMERATION DISTRICTS
- VIEW ENUMERATION DISTRICT DETAILS
- REPORTS



The first module where the main roles of all users are defined following management operational tasks is as an open gate to the system. According to the creating functionalities in this module, the Manager can effectively manage users within the system, including creating new users, editing existing user information, and ensuring that only active users have access to the system. Additionally, the system provides visibility into user data, such as first and last names, regions, roles, and active status, facilitating efficient user management.

In the module REPORTING PERIODS (weeks), the Manager can effectively manage reporting periods within the system, including creating new reporting periods, editing existing ones, and importing data from external sources. This setup provides comprehensive visibility and control over reporting period data.

By implementing the features and functionalities of management with viewing and operating enumeration district distribution, the system effectively supports the management of enumeration districts, assignment of interviewers, tracking of progress, and overall administration of the data collection.

The module of implementing features of viewing enumeration districts ensures the system provides detailed information and functionalities for managing and controlling interviews within the enumeration district. Users can efficiently edit, control, and update the status of interviews, as well as perform coding activities and manage data collection methods.

The module of reports provides comprehensive insights into various aspects of the data collection process, including synchronization status, payment details, coding issues, control data, and unfinished interviews. Access control ensures that users can only view data relevant to their roles and regions.

3.1 CAPI/CATI APPLICATION

The part of the application for CAPI/CATI interweaving includes functionalities that are responsible for ensuring LFS interweaving. This module includes the following function divided according to the type of activities used:

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1. *List of Interviews:*

- Each interviewer has a list of interviews to be done.
- Filter by reporting period, with options for the current and previous week.
- Includes household information, phone number, interview status, and appointment details.

1. *Functions:*

- **Start Interview:** Initiates the interview process for the selected household. The interview is conducted based on a questionnaire and a list of controls. If the interview is finished, the status changes to "Interview finished." If the interview is saved but unfinished, the status changes to "Interview saved," and the interviewer can resume that interview later. During the interview, functions such as making an appointment and recording refusal are available.
- **Start Test Interview:** Initiates a test interview, with data saved in a test database.
- **Make Appointment:** Opens a view to schedule an appointment for a specific date and time. Changes the status of the interview to "Appointment."
- **Status:** Allows changing the status of the interview to options such as "Refusal," "Wrong phone number," "Fax," "Answering machine," or "Nobody answers."
- **Notification of Upcoming Appointments:** The system notifies the interviewer if there is an upcoming appointment.

1. *Adding New Household:*

- Interviewers have the option to add a new household if the household information has changed.
- Changes the status of the current household to "Household changed."



- The new household gets a reserve number and must have a relation to the old household.
- It takes the number of the wave and continues the rotation where the first household stops.

1. *Synchronize Data:*

- Retrieves new tasks from the server and sends finished interviews to the server.
- New tasks should be available three days before the start of a new reporting period.
- New tasks should be available on Friday for the next week.

These functionalities facilitate efficient management of CATI interviews, ensuring interviewers can conduct interviews, schedule appointments, record interview statuses, and manage household information effectively. By synchronizing data according to the specified schedule, the CAPI\CATI application ensures smooth operation and efficient management of interviews.

4. Conclusions

LFS data entry application production began in January 2021 and, it has been used daily until now, we have continuously used it on daily base we have been used. Modifying EU recommendations was made to the end of 2023, including an ad-hoc module for 2024. The experience with this system is that needs to be continuously in progress according to the new specifying needs for maintaining high quality in LFS.

Collected data using an application can be available for further processing in checking and controlling. The manual coding process is eliminated and data is inputted in standardized form in the system. The system enables active communication with interweaves and continuous monitoring of the process of filling in electronic form

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questionnaires and requirements for data corrections. The most important benefit is incorporating validation rules for respondents' answers which improves the data quality of the survey. Compared with the paper form questionnaire, and manual work of data processing, the LFS application gives time cost-efficient work because processing data entry after fieldwork is eliminated. The data-controlling process is of high-level quality. that is another advanced step improved in the statistical business process for data processing. Another step for improving quality in processes is accelerated time of running data reports from the interviewing with immediate access to results. The system ensures access to data during the period of interviewing and the methodological staff controllers can have and control data reports in the process of fieldwork. The disadvantage of the system is defining the status of the household in front of the fieldwork. According to the wave of the survey, defined with the sample, households get status CAPI or CATI, in continuous work type of status, can be changed depending on the available information of telephone number or respondent's flexibility on positive response in the survey. Another problem is the finalization of the interviewing household and individual records. Once when this button is pushed the records go in completed finalize status. Other changes and corrections later are not possible. A third problem of the system is a list of the answered questions that appear on the screen, with the possibility to return, if the interviewer made some mistakes or incorrect answers answered from the respond side. In that case, the storage data report remains the existing (previous, one of these) answers listed on the screen.

Data synchronization from the new system requires updating to complete the migration of all necessary data from the existing SSO environment (import from Excel files) used in the process of data preparation in previous SAS scripts, to avoid additional changes in the existing data procedure.

Above mention issues require constantly improving the LFS survey system, particularly in the integration of new functionality in survey design questionnaire and data process



technology. Accordingly, this system needs to be further developed to meet recent changing needs and expectations.

All these issues could address potential technology problems to be solved. Therefore, web-based surveys present a constant challenge for improving the system with updated and additional functionalities included.