A smart household budget survey. First results and experiences

Keywords: Household expenditure, Sensor data, App-assisted surveys

1. INTRODUCTION

We discuss the potential of smart features for the Household Budget Survey (HBS). Within projects funded by Eurostat, research and development is on-going since 2019 aiming at a smart household budget survey.

Smart devices offer attractive options to collect more traditional types of data (e.g. survey questions, along with new forms of data. A smart device offers the following features for collecting, linking or processing data

1. Device intelligence: It can use the intelligence (computing, storage) of the device, e.g. it can apply pre-trained machine learning models for image recognition of receipts;
2. Internal sensors: It can employ the sensors that are available in the device, e.g. the location sensors to detect visits to shops or the camera to scan receipts and/or barcodes;
3. External sensors: It can communicate through the device with sensor systems close by, e.g. shop scanner systems through Bluetooth or NFC;
4. Public online data: It can go online and extract publicly available data, e.g. open streetmaps data to link points-of-interest;
5. Personal online data: It can go online and request access to existing external personal data, e.g. bank transaction data or shop loyalty card data;
6. Linkage consent: It can ask consent to link external personal data already in possession of the survey institute, e.g. shop scanner data or public transport data.

Smart features are especially interesting when survey topics are burdensome or time-consuming, when survey topics require specialist knowledge or information, and/or when survey questions pose relatively weak proxies of the concepts of interest. For HBS, the first two motives hold: HBS is time-consuming and asks for information that most respondents do not have readily available.

The smart features themselves are more or less promising for the HBS. Like direct survey questions, they are subject to undercoverage, nonresponse and measurement errors. Furthermore, the use of sensors may still be burdensome to respondents and pose additional costs. For this reason, in Eurostat funded projects, such features are developed and tested.

2. A SMART HOUSEHOLD BUDGET SURVEY

Household expenditure surveys typically stretch out over a number of weeks in which respondents need to list all or a subset of expenditures. Surveys are typically burdensome due to the length and detail of required information. Surveys also require information that respondents do not know, such as quantities and prices of products they bought and/or calorie intake associated with the consumption. As an archetype example of such surveys, we take the Household Budget Survey (HBS), which is a mandatory survey in the European Statistical System (ESS) and conducted in relatively similar designs across many countries. A standard design is a mix of a recruitment survey plus paper and/or online

diaries. The HBS deals with all kinds of purchases and expenditures, both small and large, and both frequent and infrequent. Some of these purchases are done on site, such as shops, restaurants and cinemas, others online such as booking websites or retail website, and yet others are periodic payments such as insurances, mortgages and energy.

Within project @HBS, funded by Eurostat, an app-assisted tool was developed and tested in Finland, The Netherlands and Slovenia. An open source English demo version can be found at

https://gitlab.com/tabi/hbs-budget-app/budget-app-cbs.

The app is available as Household Budget Survey in app stores. Figure 1 presents screenshots taken from the Household Budget Survey app.

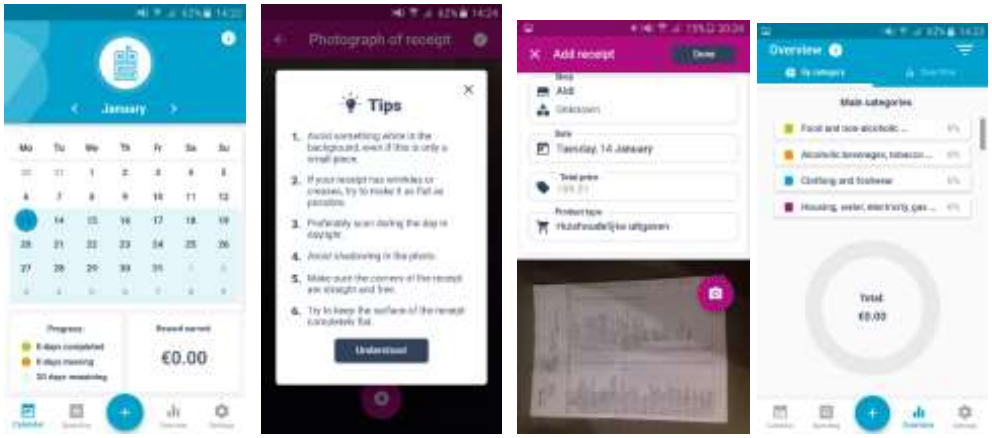

Figure 1: Screenshots of the Household Budget Survey app.

Currently, the HBS app is tested and evaluated within ESSnet Smart Surveys, funded by Eurostat. The focus in the ESSnet is the distinction between generic and country-specific functionality, the need for interviewer assistance in recruitment and motivation and in the utility of individual respondents HBS statistics as part of incentive schemes.

3. FIRST RESULTS AND EXPERIENCES

Results and experiences from project @HBS and ESSnet Smart Surveys will be presented and discussed at the NTSS.

The main conclusions from project @HBS are:

- An app-assisted approach is received very well by test persons in all three countries
- Test persons view an HBS app not just as an official statistics tool, but also as a personal tool; expenditure statistics are perceived as useful
- The most complex features in an HBS app are product search lists and reporting prices for products with certain types of discounts (e.g. take three, buy two)
- Country-specific features of a basic HBS app are (apart from NSI logo and app name) user interface language, product search lists, store search lists, helpdesk contact information and the type of feedback on incentives earned
- Country-specific features of a receipt scanning HBS app are receipt format and structure, and the availability of GTIN/EAN product descriptions for matching receipt text
- Product search lists are time-consuming to prepare and need constant updating

- Tests suggest that respondent recruitment and instruction are crucial, but, once recruited, respondents remain motivated and perceive the respondent burden as relatively low
- Consent questions for linkage to loyalty card data, scanner data and bank transactions data require a careful design of the UI; adding these additional data sources to the app may make reporting expenses more complicated and may have relatively limited added value as respondents see entering expenses in the app by themselves as rather easy.
- Willingness to consent to linkage to bank transactions data demands very convincing arguments that linkage removes respondent burden and is safe
- Linkage to loyalty card data and/or scanner data was perceived as a more natural option, but still demands convincing arguments
- Geo-locations as reminders of shops that have been visited were perceived as hardly useful and intrusive in the context of the HBS

The main recommendations from @HBS are :

- Harmonize product search lists across ESS countries
- Develop a full receipt scan processing pipeline with instant feedback of classified receipts to respondents
- Devote extra care and effort to material for recruiting and instructing respondents
- Further explore consent to link bank transactions data and the utility of such data, especially in designing the user interface such that it supports and not complicates the response task
- Further explore consent to link scanner data as a precursor to digital receipts

ESSnet Smart Survey anticipates on both usability tests and field tests. Functional tests are conducted in quarters 3 and 4 of 2020 in six additional countries: Belgium, Germany, Luxemburg, Norway, Poland and Spain. At the time of writing, these results are not yet available. Furthermore, preparations are made for large-scale field tests to be conducted in 2021. At the NTTS designs will be presented and some first outcomes will be discussed.