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Modernization of the online questionnaire of the Swiss Structural Survey – an answer to the demands of the digital age

Note by Swiss Federal Statistical Office*

Summary

   The online questionnaire of the Swiss Structural Survey ("eCensus") was reprogrammed for the 2018 survey. The background to this was the desire to motivate interviewees to give preference to using the eCensus. A user-friendly and modern solution, Responsive Web Design, was implemented which automatically adapts to the size of the screen of the terminal device used (personal computer, notebook, tablet, smartphone). This was accompanied by a new "online first" procedure when the survey material was first sent to interviewees.

   Interviewees have the option of providing their answers online via the eCensus or on the paper questionnaire. Until the 2017 survey, the response rate via the eCensus channel was about 30 per cent. This paper shows how the procedure for the 2018 survey was adapted to achieve a response via the eCensus channel of over 70 per cent. The accompanying measures that made such a procedure possible are also discussed.

   With this new procedure, the data quality of the survey was considerably improved. The most important key figures from the survey are presented.

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I.   Introduction

1.   This paper is organized as follows. First give a very brief overview is given of the Swiss census and one of its components, the structural survey. The paper then describes the "online first" test that was conducted in parallel to the 2017 structural survey and present the main findings. The setup of the 2018 structural survey will be discussed and preliminary results will be given. The paper concludes with an outlook, a list of future improvements and a conclusion.

2.   The motivation for the modernization of the online questionnaire of the Structural Survey (eCensus) and the new "online first" procedure was to increase considerably the Internet response rate and to provide its users with a user-friendly and modern solution.

II.   The Swiss Census[1]

3.   From 1850 to 2000, the census provided important information every 10 years on the structure of the population, households, buildings and dwellings in Switzerland. To this end, the entire population, property owners and rental agencies were sent paper questionnaires. Since 2010, the census has been conducted annually by the Federal Statistical Office (FSO). In order to ease the burden on the population, the information is drawn primarily from communal and cantonal population registers, the federal population registers and the Federal Buildings and Dwellings register, and is supplemented by sample surveys. Only a small proportion of the population is surveyed in writing or by telephone.

4.   Thus, Switzerland has a modern statistical system which makes it possible to observe on a continuous basis the structures and the development of the population and households, as well as of buildings and dwellings. Thanks to this population census system, economic and social change can be analyzed effectively. The results cover a wide range of topics.

5.   The Swiss census system consists of four components. A register survey evaluates existing administrative data. To this end, the FSO uses cantonal and communal population registers, federal registers of persons and the Federal Register of Buildings and Dwellings. Information that is not contained in a register is collected with additional sample surveys: an annual structural survey of 200,000 people (cantons and cities can enlarge the sample for their area); thematic surveys of 10,000 or 40,000 persons (five themes, a different one each year); and an omnibus survey of 3,000 persons on topical issues.

III.   The Swiss Structural Survey

A.   Characteristics of the structural survey

6.   In the annual structural survey, a small proportion of the population is surveyed in writing. The survey complements the information from the registers and provides additional statistics on the structure of the population. The first results are available one year after the reference day, which is 31 December. Cumulative results are subsequently made available for periods of three and five years.

7.   Since only approximately one third of the cantons enlarge their sample size, the gross sample size over the last years was around 320,000 persons. The structural survey is compulsory. People that have been randomly selected in the sample have to respond. This is why there is a first and a second reminder. The survey material is sent out in early January. The lists for the first and second reminders are selected around 7 February and 21 March, respectively.

8.   The structural survey includes persons from the age of 15 upwards, living in a private household.

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[1] Reference: https://www.bfs.admin.ch/bfs/en/home/basics/census.html

9.   The people who receive the survey material can either respond through the Internet questionnaire, called eCensus, or fill out a paper questionnaire. For the structural surveys of 2010 to 2017, the survey material sent out in early January always consisted of an invitation letter to the survey, also containing some practical information about the survey, the paper questionnaire on which the username and password for the eCensus access were printed, a leaflet with some general information about the survey and some specific results, and a response envelope. For the first reminder in February, only a letter with username and password for the eCensus was sent out. The second reminder in March contained a paper questionnaire again.

10.   The paper questionnaires are available in German, French, Italian and Rhaeto-Romanic. The eCensus questionnaire is available in German, French, Italian and English. While filling out the eCensus questionnaire, one can easily switch between these four languages.

11.   A free census hotline is available seven days a week such that people can ask questions regarding the survey, data protection etc. or can order additional paper questionnaires in another language. A translation aid is also available for the 10 languages most spoken in Switzerland. It can be ordered through the hotline or downloaded from the survey website.

B.   Data treatments during the survey phase

12.   When the completed paper questionnaires are returned to the scanning centre, the envelopes are opened, and the questionnaires are unfolded and scanned. Through an optical character recognition procedure, the scanned images are converted into electronic information or data. This data is then sent to the FSO over a secure data exchange platform (sedex[2]).

13.   The data coming from the scanning centre and the online questionnaires are validated in information technology (IT) applications that have been designed specifically for the structural survey. The data are validated automatically with a set of pre-defined rules. Automatic codification also occurs. Data that cannot be validated or codified automatically are treated manually in the FSO by a team of temporary employees. Questionnaires that hold incomplete or inconsistent information go into a telephone call-back procedure, carried out by an external market research institute.

14.   Later in the process, data are further edited, imputed and linked with data from the register survey. At the end, they are stored in the company-wide data warehouse in a pseudonymized format.

IV.   The demands of the digital age

15.   The demands of the digital age are numerous.[3] Simplification of processes with new technologies must take place in a seamless way, ensuring alignment with the needs of stakeholders and taking into account the needs of interviewees in particular. The digital age also offers potential for process automation.

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[2]   https://www.bfs.admin.ch/bfs/en/home/registers/population-register/sedex.html

[3]   See for example: https://www.destatis.de/DE/Service/OpenData/Publikationen/digitale-agenda.html

V. "Online first" test

A. Evolution of the eCensus return rate

16.   The first experiences with an online census questionnaire were gained through the 2000 census. At that time, the return rate for this channel was around 4 per cent.

17.   The following table shows how the eCensus return rate has slowly evolved for the structural surveys from 2010 to 2016.

Table 1
Evolution of the eCensus return rate for the structural surveys 2010 to 2016

2010	2011	2012	2013	2014	2015	2016
23.6%	25.8%	26.9%	27.2%	27.4%	28.6%	30.1%

18.   A slow increase up to 2016 is observed. The demands of the digital and especially mobile age led the FSO to the conclusion that the online questionnaire of the structural survey had to be modernized in order to considerably increase the return rate via this channel. The initial goal was a return rate of at least 65 per cent.

B. The test setup

19.   It was decided to first conduct a test in parallel to the 2017 structural survey with a new procedure called "online first" (analogous to the approach used in Germany). It consists of no longer sending a paper questionnaire to every person in the sample, but only an invitation letter that holds access information (username and password) to the eCensus questionnaire.

20.   During the previous surveys, it was observed that age is the most important variable that defines whether or not a person will respond via the eCensus channel. Therefore, it was decided to subdivide the sample into age classes such that the return rate via the eCensus channel would be similar within each class. The test sample was defined in the following way:

Table 2
Definition of the test sample (gross)

Age class	Sample size
15–44	4,000
45–59	4,000
60–74	4,000
75+	4,000
Total	**16,000**

21.   In this way it was possible to measure the return rate for each age class with the same accuracy. It is to be noted that this sample does not match the age distribution of the real structural survey sample.

22.   The goals for this test were defined as follows:

(a)   Measuring the overall response rate and the eCensus return rate;

(b)   Measuring the number of contacts to the hotline, in particular the number of orders of additional paper questionnaires;

(c)   Measuring data quality, in particular the number of manual treatments and telephone inquiries needed.

23. The measurement of possible method effects was not an objective of this test since the goal was to move towards an online first procedure anyway.

C. The test results

24. This chapter gives the main results gathered from the online first test that was carried out in parallel to the 2017 structural survey.

25. The response rates of the structural survey 2017 and the online first test were almost identical.

26. The return rate via the eCensus channel was 72.5 per cent for the online first test while it was 31.0 per cent for the whole structural survey 2017.

Table 3
eCensus return rates by age class

Age class	eCensus return rate for the online first test	eCensus return rate for the 2017 structural survey
15–44	90.2%	40.9%
45–59	84.7%	30.4%
60–74	70.8%	19.8%
75+	45.4%	11.2%
Overall	**72.5%**	**31.0%**

27. It was confirmed that age is the most important variable determining whether or not a person will reply via the eCensus. Other variables like sex, nationality, civil status and canton of residence were also considered, but did not give any interesting results.

28. If the results of the online first test are extrapolated to the structure of the real 2017 structural survey sample, a return rate via eCensus of 80.5 per cent in obtained.

29. Orders for paper questionnaires differ considerably between the online first sample and the 2017 structural survey sample.

Table 4
Order rate for paper questionnaires by age class

Age class	Order rate during the online first test	Order rate during the 2017 structural survey
15–44	2.6%	1.0%
45–59	7.6%	1.5%
60–74	20.2%	2.2%
75+	38.4%	3.6%
Overall	**17.2%**	**1.6%**

30. It can be observed in table 4 that for the age classes 60–74 and 75+, the order rate of paper questionnaires in the Census Hotline are very high compared to the other two age classes and compared to the results for the 2017 structural survey. This is of course in line with the fact that older people are often more comfortable with a paper questionnaire and less Internet oriented.

31. If the results of the online first test are extrapolated to the structure of the real 2017 structural survey sample, an order rate for the online first approach of 10.5 per cent is obtained. This is quite a lot. Since the Hotline is very expensive for the FSO, such a high order rate must be avoided.

32. Concerning data quality, it can also be observed that the number of manual treatments by temporary workers at FSO is considerably reduced in the online first test. The same holds for the telephone call-backs by the external market research institute. Data quality of an eCensus questionnaire is usually higher than that of a paper questionnaire since many rules

are built into the online questionnaire. Many inconsistencies simply do not occur in the online questionnaire data. The results are summarized in the following table.

Table 5
Data quality measures

	Rate of manual treatments	Rate of telephone call-backs
2017 structural survey	79.1%	14.8%
Online first test	57.6%	10.0%
Extrapolation test to survey	63.9%	7.3%

33.   The rate of manual treatments is high since many quality checks are performed anyway on the questionnaires.

34.   It can be concluded that the test was very successful and useful to set up the strategy for the 2018 structural survey.

VI.   The 2018 structural survey

35.   The online first test that was conducted in parallel to the 2017 structural survey was a good basis for designing the strategy for the 2018 structural survey. It helped FSO to determine which part of the sample would only get a letter with access information for the online questionnaire and which part would receive a paper questionnaire.

36.   To avoid too many calls to the Census Hotline for orders of the paper questionnaires (see Table IV), it was necessary to avoid too many people in the age classes 60–74 and 75+ getting a letter and no paper questionnaire. Since during the weighting and calibration of the data of the structural survey, the age of 64 is the limit of an age class, the age class 60–74 used in the online first test was split into two parts: 60–64 and 65–74. Thus, the following procedure was defined for the initial distribution of the survey material in January 2019.

Table 6
Initial distribution material

Age	Distribution
15–44	Letter
45–59	Letter
60–74	
60–64	Letter
65–74	Paper questionnaire
75+	Paper questionnaire

37.   All people in the sample aged 15–64 received a letter with access information for the eCensus questionnaire. All people aged 65 or more received a paper questionnaire. The latter still had the possibility to use the online questionnaire since access information to the eCensus was printed on the paper questionnaire.

38.   The letter that was sent to the people aged 15 to 64 contained a Quick Response (QR) code that could be used with a smartphone or tablet to conveniently open the login page of the online questionnaire without having to type the Uniform Resource Locator (URL) of the online questionnaire.

39.   The procedures for first and second reminders were left unchanged. For the first reminder in February, all interviewees who had not yet responded received a reminder letter with access information for the eCensus questionnaire. For the second reminder in March, all interviewees who had not yet responded received a paper questionnaire.

40.   One very important measure with this new procedure was to staff the Census Hotline at the external marketing research institute in such a way that a larger number of hotline contacts for paper questionnaire orders could be handled.

41.   The most important measure was to offer a modern and user-friendly online questionnaire to all people in the sample who wanted to fill out their questionnaire online. Thus, the previous solution, which was based on an internal FSO development and which had served well during the 2010 to 2017 surveys but was difficult to use on mobile devices, was abandoned. During the whole year of 2018, a new solution was developed with the marketing research institute that also was in charge of the Census Hotline and the telephone call-backs. This meant that a very detailed specification of the requirements for this new solution had to be established by the FSO team. Very comprehensive test cases for the navigation rules, filters and validation rules had to be designed and carried out. Moreover, cognitive and usability tests had to be performed to make sure that, on one hand, the new solution was understood in the same way as the existing paper questionnaire, and on the other hand that it was user-friendly and easy to use on all devices. At the end of 2018, a new solution was available that had been programmed using a responsive web design (RWD) such that the online questionnaire adapts automatically to the size of the screen of the device used (personal computer, laptop, tablet, smartphone). This new online questionnaire was also tested extensively in all four available languages, on all types of devices, with different browsers and browser versions.

42.   One recommendation that can be made to other national statistical offices that also wish to develop online questionnaire solutions, is to reserve enough time for extensive documentation of specifications and for comprehensive testing. Programming a census questionnaire is a complex task that can easily be underestimated.

VII.   Preliminary Results

43.   All results in this chapter are preliminary at the time of submission of this paper (5 June 2019) since the 2018 structural survey ends on June 14, 2019 and the statistical treatments of the 2018 survey data will only be finished in November 2019.

44.   Overall, it can be said that that the new online first procedure defined in table VI worked well and was well accepted by the people in the sample. Thus, the letter with access information for the eCensus was sent to 247,213 people aged 15–64 and 66,982 paper questionnaires were sent to people aged 65 or older. The new online questionnaire worked well and no major problems were encountered.

45.   The preliminary results for the return rates for the two parts of the sample defined by the survey material sent (letter or paper questionnaire) by channel are given in the following table.

Table 7
Return rates for the two parts of the sample (age groups 15–64 and 65+) by return channel

Sample / Channel	eCensus	Paper	Total
Part 15–64 (online first)	87.5%	12.5%	100%
Part 65+ (paper)	18.3%	81.7%	100%
Total	**71.7%**	**28.3%**	**100%**

46.   It can be seen in table VII that the overall return rate by the eCensus channel is 71.7 per cent, a little more than initially estimated (71.0 per cent) for the proposed procedure described in table VI. This is a very good result and exceeds the initial goal of at least 65 per cent.

47.   The total number of hotline contacts was around 35,000 as of 28 May 2019. This is much less than the (conservative) estimate of approximately 44,000. The number of paper questionnaires ordered was 14,426. Of these, 12,575 were from people in the online first part

of the sample (aged 15–64). These numbers are close to the estimates made before the start of the survey.

48.   The number of telephone inquiries carried out by the external market research institute as of 28 May 2019 was 23,210, with a little more to go until 7 June 2019. This number also corresponds to the initial estimate and an inquiry rate of 8.6 per cent.

49.   The rate of questionnaires which required manual treatments by temporary workers at FSO was 64.5 per cent, which is less than the estimated value of 68.9 per cent. One possible explanation is that the data quality was even better than expected. In fact, the great majority of the paper questionnaires were filled out by people aged 65 or more. Since, in Switzerland, the retirement age is 65 for men and 64 for women, the paper questionnaires were mostly questionnaires of retired people without information about current occupation, place of work, commuting information and information about other household members. Thus, in a certain sense, the paper questionnaires were "easy" to treat and did not hold a lot of potential for errors.

50.   It can be said that the overall costs of the structural survey were reduced thanks to the new online first procedure. Even though the number of hotline contacts due to paper questionnaire orders has increased, the number of telephone inquiries due to missing or inconsistent information has been reduced. The number of manual treatments of the questionnaires has also been reduced. The exact calculation still remains to be done since the survey is not completely over yet at the time of submission of this paper.

51.   Furthermore, of all online questionnaires received, approximately 18 per cent were filled out on smartphones and approximately 6 per cent were filled out on tablets.

VIII.   Outlook and further improvements

52.   It is hoped that the return rate via the eCensus channel can be further increased in the near future. FSO intends to do this by more prominently stating in the survey material that the questionnaire can be filled out easily on mobile devices, hence appealing even more to younger age groups.

53.   A long list of improvements has been documented that FSO wishes to implement in the new eCensus solution. These changes have been prioritized and will be implemented and extensively tested until November 2019.

54.   FSO is planning the preparation of the eCensus questionnaire in the Rhaeto-Romanic language as well as the integration of an extract of the Swiss Business and Enterprise Register during the entry of information about the employer. Other improvements are related to the stability, layout and user-friendliness of the eCensus.

55.   It will also be investigated whether, and how, a more precise prediction can be made to identify which part of the sample is more likely to respond via the eCensus channel and which part will rather use the paper questionnaire. Are there other (available) variables that are important besides age?

56.   Another possible improvement could be the automated recording of paper questionnaire orders in the Census Hotline. Such an automated procedure could reduce hotline costs even further.

IX.   Conclusion

57.   It has been shown that the implementation of an online first procedure for the Swiss Structural Survey was carried out for the first time for the 2018 structural survey and was very successful.

58.   This initiative is part of the overall strategy of FSO to increase the use of mixed-mode procedures in its social surveys and to particularly use online questionnaires for the sake of data quality improvement, to reduce costs, and to face the demands of the digital age.