May 15, 2019

MEMORANDUM FOR:    Allison Plyer
                          Chair
                          Census Scientific Advisory Committee


From:                 Steven D. Dillingham
                          Director
                          U.S. Census Bureau

Subject:           U.S. Census Bureau Responses to Census Scientific Advisory
                          Committee Recommendations tabled from the Fall 2018
                          Meeting on December 6-7, 2018


The U.S. Census Bureau thanks the Census Scientific Advisory Committee for its recommendations.  We are responding to the committee recommendations submitted as a result of their Virtual Meeting held on February 28, 2019, to discuss and vote over Recommendations and Comments to the Census Bureau tabled from the 2018 Fall Census Scientific Advisory Committee (CSAC) Meeting.

Your expertise is necessary to ensure that the Census Bureau continues to provide relevant and timely statistics used by federal, state, and local governments, as well as business and industry, in an increasingly technologically oriented society.

Attachment

**Recommendations and Comments to the Census Bureau
Tabled from the Census Scientific Advisory Committee
Fall 2018 Meeting on December 6-7, 2018**

**Date:**          February 28, 2019

**Submitted By**:  Allison Plyer, Chair, on behalf of the CSAC

**For:**           Steven D. Dillingham, U.S. Census Director

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## I.     Opportunity Atlas

CSAC would like to have a webinar on the Opportunity Atlas from the Census Bureau perspective, particularly the implications for future similar projects or other Census programs. (CES)

*CENSUS RESPONSE:*
*The U.S. Census Bureau accepts this recommendation.  We are prepared to conduct a webinar or give a presentation on the Opportunity Atlas at a future CSAC.  The presentation would include a discussion of the implications for future similar projects and other Census Bureau programs.*

## II.    Administrative Records Data Working Group Final Report
The CSAC would like to thank Tom Mule and the many Subject Matter Experts who contributed to the research presented to the Administrative Records (AR) Data Working Group.

1.  CSAC recommends that the Census Bureau continue testing and/or modeling Administrative Records utility in handling Non-Response Follow-Up (NRFU) units for the upcoming Decennial Census data collection and for future efforts.  Testing and analysis take time but are less costly than repeated NRFU.  Many times, the AR Working Group heard that testing (e.g., adding parameters / thresholds, testing more than a single study area) could not be extended simply because time is too short. Incomplete testing might provide incomplete information.  Revised workflow and added statistical staff would permit comprehensive testing.  Given that ARs improve reliability and quality, the CSAC recommends adjusting workflow to maximize return on investment in the upcoming census and into the future.

Testing and validation obviously incur cost, labor and time; however, such outlays are important and should be prioritized.

***CENSUS BUREAU RESPONSE:***
*The Census Bureau accepts the Committee's recommendation with respect to future Nonresponse Followup (NRFU) data collection efforts. The Census Bureau agrees with the Committee that the use of administrative records for reducing the workload of the NRFU operation is critical to ensuring continued improvements in efficiency of the operation and for containing costs for the 2020 Census and future censuses. The use of administrative records for NRFU will certainly be a major component of all mid-decade testing leading up to the 2030 Census, but research and testing for the 2020 Census has been completed and the design for the 2020 NRFU operation is final. We will continue to work with subject-matter experts and stakeholders to develop and pursue new and innovative methods for incorporating the use of administrative data into all aspects of the operations and processes for future censuses.*

2. CSAC recommends continued vigilance about all potential sources of reduced quality in population counts and household characterizations with special attention to the inclusion of the citizenship question and potential impacts on accuracy of self-reports. The white paper by Brown et al. (2018) Understanding the Quality of Alternative Citizenship Data Sources for the 2020 Census. CES 18-38 provides an excellent example of the type of work that should be pursued. The Census Bureau must determine how to incorporate Census data and administrative records to create estimates of citizenship by census block. CSAC would like information on the timeline, relevant decision makers, and other information that will keep us apprised of how these decisions will be made.

***CENSUS BUREAU RESPONSE:***
*We appreciate the interest and concern of the Committee and generally agree with the recommendation. We continue to (1) investigate the implications of asking citizenship in the 2020 Census, (2) prepare the communications campaign as appropriate, and (3) develop production procedures to account for missing characteristics in the 2020 Census, including citizenship. At an upcoming meeting of the Committee, we will be happy to share the timeline for completion of these activities and to discuss the decision process.*

3. CSAC recommends convening a new CSAC Working Group to explore the possibility of expanded roles for Administrative Records use in ACS and other upcoming data collections and surveys. ARs are utilized at different stages for Decennial Census than for ACS surveys, and the impact of when they are utilized

may be important. New or innovative uses for ARs may become apparent in considering the results of modeling and simulation.

***CENSUS BUREAU RESPONSE:***

*The Census Bureau thanks the CSAC for the recommendation to convene a CSAC Working Group to explore the possibility of expanding roles for administrative data on the American Community Survey.  The ACS program is committed to engaging stakeholders, including advisory committees, in our research on the potential use of administrative data for the ACS.*

**III. Measuring Technology Use by U.S. Businesses**

CSAC would like to thank Catherine Buffington for her presentation. The topic generated constructive committee discussion and input. As this topic was correctly identified as experimental, the comments below are suggestions for consideration as opposed to specific committee recommendations. CSAC looks forward to the continued research and development of this topic. CSAC provides the following considerations and comments:

1. Consider the inclusion of farm businesses into the survey process either directly or through collaboration with agencies such as the USDA National Agricultural Statistics Service (NASS).

   *CENSUS RESPONSE:*
   *Census Bureau data collections from farm businesses are not in scope. The Census Bureau agrees that collaboration with other agencies, such as NASS, would be useful in providing insight into the adoption and diffusion of advanced technologies such as robotics and artificial intelligence (AI).*

2. Consider asking specific and detailed questions related to categories and sub-categories of technology adoption. This is to avoid ambiguity and/or potentially inaccurate responses. For example, firms may inaccurately respond 'Yes' to general questions about utilization of technology if the category is broad (e.g., "AI", "internet of things").

   *CENSUS RESPONSE:*
   *For the 2018 Annual Survey of Manufactures (ASM) robotics collection, very detailed definitions based on ISO standards for industrial robotics were used to narrow the scope of reporting for precisely the reasoning the committee provides – without scope reduction, many respondents may have responded in the affirmative (e.g., for robotic vacuums) when the technology was not part of the production process.*

   *The 2017 Annual Survey of Businesses (ABS) included a large number of technologies (i.e., machine learning, machine vision) with less stringently defined boundaries. We hope that these questions will both serve as a benchmark for emerging technologies and also provide insight into which industries would be useful to survey about more detailed technologies and their use.*

3. Consider expansion of questions on technologies and technology-related issues: examples include the internet of things, data storage and security (particularly of personally-identifiable information), cloud-based services and other technologies

that enable businesses to exist, and the costs associated with enterprise systems and changing those systems.

*CENSUS RESPONSE:*
*These are very good suggestions for future questions, and we thank the committee for providing them.*

4. CSAC is interested in the distinction between technology adoption that increases the demand for labor, at various skill levels, and technology adoption that substitutes for labor.

    *CENSUS RESPONSE:*
    *The 2018 ABS that will survey over 300,000 non-farm businesses across all other sectors of the U.S. economy includes a module created to measure some of these phenomena. Specifically, the 2018 ABS asks whether the company uses (or produces) five advanced technologies (robotics, AI, cloud computing, specialized equipment, and specialized software) and how that has affected the number of employees by type of employee (i.e., production worker non-production worker) and also by skill level.*

    *More generally, we also have plans to combine all of our survey data asking about the adoption and use of advance technologies with administrative data to examine the differences in employment and worker composition over time of companies that use (or produce) these technologies.*

5. Consider standardization of questions across different surveys (ABS, Annual Survey of Manufacturers, Annual Cap-Ex Survey, etc.). This will allow comparison of results and provide a temporal component for analysis.

    *CENSUS RESPONSE:*
    *When possible, the Census Bureau standardizes questions across survey instruments. The set of technology questions included on the ASM, the ABS, and the 2018 Annual Capital Expenditures Survey (ACES) reflect a coordinated effort to standardize measurement concepts reflected in definitions provided to the respondent as well as within the survey question.*

6. Consider the efforts of other countries in measuring technology use and opportunities for standardization of measures. For example, are there U.S. or internationally recognized technology terms/categories as potential sources of question content?

    *CENSUS RESPONSE:*

*This is a very useful suggestion, and we will need to conduct research into this possibility.  For instance, Canada has conducted some comprehensive surveys on technology adoption and use, and some of their content could be used to further standardize question content.*

7.  Explore the role that the U.S. and the U.S. Census Bureau can play as leaders in establishing international standards.  For example, the U.S. could initiate and lead a working group on such standardization.

    *CENSUS RESPONSE:*
    *This is a very useful suggestion, and we will need to conduct research into this possibility.*

8.  Continue to research and consider methods for differentiating productivity improvements related to technology adoption vs. those related to employee skill development.  Are there questions related to the experience and numbers of the labor force that can be asked in addition to the technology adoption questions?  Explore whether the available labor force has the necessary technological skills.

    *CENSUS RESPONSE:*
    *These are very good suggestions for future questions, and we thank the committee for providing them.  The proposed 2018 ABS technology module contains some steps in this direction.  For instance, it asks about the adequacy of human capital of workers in a firm as a potential impediment for technology adoption.*

9.  In addition to questions on specific technologies, which change over time, continue to research other potential technology adoption indicators that might form stable time series.  One example mentioned was monitoring tax credits issued for Research and Development (R&D).  Are they flat, increasing, decreasing?  Do they correlate with the trends identified in the various business surveys?  Another example might be a technological "basket of goods" that can evolve over time as technologies evolve.

    *CENSUS RESPONSE:*
    *These are interesting suggestions for furthering technology measurement research.  They also benefit from not inducing additional respondent burden.  We thank the committee for providing them.*

10. Consider sample size and sample frequency in asking technology questions: not every question needs to be asked of every respondent in every year.  The design could alternate years, and/or subsample in some years, particularly given the very large size of the Annual Business Survey.

*CENSUS RESPONSE:*
*We agree that as part of determining if content is appropriate to a survey program, the correct periodicity of a collection item should be understood. The current plan for the ASM and ACES robotics content (assuming the items can move from an experimental to a permanent collection) is to collect it annually as a capital expenditures item as, generally, balance sheet items on these instruments are collected annually.*

*The current plan (pending OMB approval) for the ABS is to ask technology questions with a three-year retrospection while rotating the content to appear only every three years to achieve some measure of coverage.*

11. Consider complementary data collections targeting the universe of technology sellers in addition to the universe of technology buyers.

    *CENSUS RESPONSE:*
    *This is a very useful suggestion, and we will need to conduct research into this possibility. Currently, we do not collect detailed product information from retail companies except during our economic census every five years. There is some attempt to obtain this information in the context of the proposed 2018 ABS module, where questions are asked to both the producers (of goods and services that embed the technology) and users of the technology.*

12. CSAC would be interested in the process by which new technologies are identified, prioritized, and added to the survey instruments.

    *CENSUS RESPONSE:*
    *The Census Bureau welcomes the opportunity to elaborate on our process. Identifying emerging technologies and their relative importance is challenging. Ideally, the surveys would need to capture those technologies that are at their early stages of diffusion and deemed to have substantial impact on firm and labor outcomes. Potential ways to achieve this are as follows:*
    - *Review the existing and emerging literature by leading experts researching the use of technology on businesses and workers, and identify those technologies that are being emphasized as most impactful for firm and labor outcomes.*
    - *Cooperate with academic experts on their priors and visions regarding what type of technologies might be the next revolutionary ones. For example, a recent article by Acemoglu and Restrepo (2019) provides some assessment of what the future of AI technologies might look like, and what kind of new AI technologies should be the focus of further development.*

- *Participate in conferences and seminars related to emerging technologies.*
- *Use limited company interviews and reach out to potential users to have a sense of their views on what might be the next set of technologies that are likely to be the most impactful for their operations.*
- *Use administrative data on products, patents, trademarks, and imports-exports to identify classes of goods/services/industries/patented technologies that are new and on the rise. For instance, a surge in nanotechnology-related patenting might indicate faster diffusion across firms and may warrant data collection. Similarly, an addition of a new product category or an increase in the imports/exports of certain goods embedding a technology might be an indication of faster diffusion, which would prompt attention for data collection efforts.*

## IV.   Using Administrative Records

CSAC is pleased to see progress in both the (Nonemployer Statistics) NES-D and (American Community Survey) ACS efforts to incorporate Administrative Records (AR) into active surveys. The ACS housing data example illustrates a sensible approach to finding ways to blend AR with surveys — focus on characteristics that may not be apparent to the respondent during a survey, that don't change frequently, and that, when they change, the amount of the change is already traced by some other data collection entity. CSAC provides these specific comments on using Administrative Records in NES-D and ACS:

1. CSAC wants to be sure that Census staff working on the use of AR benefit from the other efforts at Census to incorporate Big Data into Census products. Examples include research into using private sources of information about retail sales, housing, and construction.

   *CENSUS RESPONSE:*
   *The Census Bureau accepts this recommendation. Census Bureau staff working on the use of administrative records often have experience using third-party big data. They also stay abreast of big data usage elsewhere in the Census Bureau and by external researchers. Information on big data usage is commonly acquired through presentations, research memoranda, working papers, journal articles, and informal communication. Further, Census Bureau staff are actively engaged in research to identify big data sources that could be acquired and used in support of various Census Bureau projects.*

2. CSAC recommends that the Census Bureau prioritize reporting at the most detailed geographic levels possible in the NES-D project, leading to a broader base of use cases and stakeholders, including community and economic development

organizations, regional planning agencies, and groups working on improving the gender and racial diversity in the small business community.

*CENSUS RESPONSE:*
*The Census Bureau accepts this recommendation. Because NES-D is not a survey, but rather consists of the entire universe of non-employers, it offers the possibility of providing statistics of business owners' demographics at detailed levels of geography, even for small demographic groups. Business surveys often have to suppress this type of information due to disclosure avoidance or high relative standard errors.*

*The potential to provide estimates at detailed geographic levels would not only lead to a broader base of use, but would also be particularly important in light of recent research that shows that connectivity of the right type among business owners at the local level is a critical factor in fostering business startups and success. Having information on the demographics of local business owners would help facilitate the right type of connectivity at the local level and help foster gender and racial diversity in the small business community.*

*The primary challenge for providing statistics at detailed geographic level is meeting current standards for disclosure avoidance. At this point, we are uncertain about the geographic detail that NES-D will be able to provide and the potential tradeoff between detail and the accuracy of estimates. We plan to continue providing timely and transparent information on the development of disclosure avoidance rules and their impact on the availability of NES-D estimates.*

3. The presentation on Using Administrative Records solicited feedback on the trade-off between time-series consistency and improvements to methodology. CSAC notes that for much of the user community, the priority is the best methodology possible, even when this may create a break in series. CSAC recommends that both the methodological improvement and the resulting break in series be well explained and documented to the users, and that methodological improvements be introduced as soon as possible.

**CENSUS BUREAU RESPONSE:**
*The Census Bureau is committed to engaging with stakeholders and data users to explain impacts of new methodologies. The Census Bureau will continue to conduct outreach with these groups through conference, workshop, and other interactions to communicate about our administrative records research. The Census Bureau will also continue to publish reports documenting research, evaluations, and methodology on census.gov.*

4.  CSAC notes that the Bureau spends considerable effort analyzing the feasibility of using AR from federal and private sources. Local and state government sources could also be useful, but have widely varying reporting formats that complicate their use. CSAC recommends that Census lead a pilot Government Open Data Standards (GODS) initiative focused on promoting the use of uniform formatting standards for the reporting of one or two specific local and state government data sources. Criteria for target data source(s) for the pilot could be 1) the value to the Census Bureau efforts, 2) the complexity of the dataset, 3) the variety of format currently in use, and 4) the potential burden of adoption on the local or state government.

    ***CENSUS BUREAU RESPONSE:***
    *The Census Bureau is continually working to identify additional sources of administrative data that may be used in conjunction with, or in place of, direct inquiries through surveys and censuses. The Census Bureau is evaluating federal, state, and local government sources as well as private sources for this research.*

5.  CSAC refers to a 2017 NAS panel, convened by former Census director Robert Groves, on "Improving Federal Statistics for Policy and Social Science Research Using Multiple Data Sources and State-of-the-Art Estimation Methods," which may be of use in further work on this topic.

    ***CENSUS BUREAU RESPONSE:***
    *The Census Bureau thanks the CSAC for providing this reference.*

6.  The Bureau reported that the implementation of AR for housing questions in the ACS might impact the results of other survey questions via the imputation process. In order to better gauge the impact of the use of AR records on the ACS, the CSAC requests a briefing on the imputation methods currently be used.

    ***CENSUS BUREAU RESPONSE:***
    *The Census Bureau would welcome the opportunity to give a presentation to CSAC on the ACS imputation methods.*

7.  CSAC requests a briefing on the way the AR uncertainty (e.g., accuracy, timeliness, reliability, completeness) is incorporated into ACS margins of error and how the AR uncertainty progresses (monotonically, linearly, etc.) across the granularity of enumeration units.

    ***CENSUS BUREAU RESPONSE:***
    *The Census Bureau would be pleased to present on the impacts of administrative records on the ACS as the research evolves.*

8. As noted in the above section Using Administrative Records Data Working Group Final Report, CSAC recommends convening a new CSAC Working Group to explore the possibility of expanded roles for Administrative Records use in ACS and other data collections and surveys. A Working Group could also address CSAC's request for examining the impact of AR on imputation methods and ACS margins of error. CSAC members welcome the opportunity to review working papers for all AR efforts to provide additional feedback and help shape the CSAC agenda at future meetings.

   ***CENSUS BUREAU RESPONSE:***
   *The Census Bureau thanks the CSAC for the recommendation to convene a CSAC Working Group to explore the possibility of expanded roles for administrative data on the ACS and other data collections and surveys. The Census Bureau is committed to engaging stakeholders, including advisory committees, in the research on the potential use of administrative data.*

**V.     2017 Economic Census Update**

1. Regarding attempts to increase overall response, the CSAC recommends that Census consider setting up a working group or otherwise reaching out to CSAC members who can help evaluate what communications channels are most productive, how best to identify the proper contacts within a firm, and how to reduce incoming telephone contacts.

   ***CENSUS RESPONSE:***
   *The Census Bureau will form a working group related to collection strategies and outreach ahead of the 2022 Economic Census and can reach out to CSAC members for information and feedback.*

2. CSAC recommends that Census examine how to reach individuals who are generating income but may not see themselves as being "in business" or not in any of the industries for which Census has previously produced reports.

   ***CENSUS RESPONSE:***
   *Economic census respondents are pulled from the Census Bureau's Business Register. Businesses with paid employees are included in the Economic Census. Businesses with no employees are not part of the economic census, but instead would be included in the Nonemployer Statistics program. Further research can be conducted to determine where these types of businesses would most likely be represented.*

3. CSAC recommends that Census look into partnering with co-working companies, online business hosting platforms (e.g., Etsy) and other intermediaries who facilitate the operation of businesses without a traditional physical presence.

*CENSUS RESPONSE:*
*The Census Bureau will look into developing relationships with associations, intermediaries, and businesses in the co-working and online business hosting platform industries ahead of the 2022 Economic Census.  Again, economic census respondents are pulled from the Census Bureau's Business Register.  Businesses with paid employees are included in the Economic Census.  Businesses with no employees are not part of the Economic Census, but instead would be included in the Nonemployer Statistics program.  Further research can be conducted to determine where these types of businesses would most likely be represented.*

4. CSAC is concerned about the December 2021 end date for publishing results of the 2017 Economic Census. CSAC recommends that Census accelerate that time, if possible, or reduce output for the 2017 Census in favor of devoting more resources to preparation for the 2022 Census.

   *CENSUS RESPONSE:*
   *Because of flat line funding over several fiscal years, the 2017 Economic Census release dates were impacted with the final releases scheduled for December 2021. We continue to look for efficiencies in order to release data ahead of the December 2021 schedule.  Planning for the 2022 Economic Census is already underway, and we do not plan for the 2017 Economic Census release schedule to impede planning for the 2022 Economic Census.*