

Opportunities and Challenges for Official Statistics in a Digital Age

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Abstract

Official statistics play a crucial role in informing policy decisions, monitoring societal trends, and facilitating evidence-based decision-making. In the digital age, these statistics face both opportunities and challenges that need to be addressed to ensure their continued relevance and accuracy. Governments, corporations, and the general public are expected to receive information from national systems of official statistics concerning the economic, demographic, social, and environmental situation. It has been suggested that digitizing data collection for government statistics could have a significant social impact. Government administrative data is being used more, although slowly. There is little proof, but big data access via satellites, point-of-sale systems, and social media is being investigated and tested. New requirements for official statistics as well as challenges in conventional data collecting from families and businesses are what are driving these initiatives. The final evidence basis for policies meant to enhance lives might be created by the government using new data sources effectively, and anonymized data are also being made available to other academics. The essay describes how the big data evidence-to-policy process is supposed to function in that setting and evaluates the difficulties encountered in making it function as planned using the UK, Netherlands, and UN. We come to the conclusion that technology advancements require constant attention to the promotion of official statistics and interaction with all users and potential users. The objective is to produce trusted as well as reliable statistics.

Keywords: UN fundamental principles, Evidence-based policy, Big data, Administrative data, Research ethics

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1. Introduction

The evidentiary foundation for society is well-established and includes official statistics. They are described as "an indispensable element in the information system of a democratic society" in the fundamental principles for official statistics promoted by the United Nations (UN), and they are created to give governments, businesses, and the general public "data about the economic, demographic, social, and environmental situation" (UN Statistics Division, 2014, pp. 1-2). At first glance, official statistics appear to be a natural part of the digital age. Nearly every nation has a national statistics website listed on the UN website (https://unstats.un.org/home/nso_sites/), and outputs are increasingly digital by default.

Statisticians utilize social media to inform consumers of updates, formal consultations, and freshly published summaries. For these formal consultations, replies are gathered online. But rather than making a concentrated effort to increase interaction and reach out to new people, it appears that they are mostly employing new digital media to mimic established methods of consulting well-known stakeholders. With the exception of when using new technology to assist in interviewing survey respondents (for instance, Hand & Vichi, 2017), messages are frequently broadcast rather than attempting to engage in discourse.

This article contends that the digital age presents both enormous potential and challenges for official statistics. According to the core principles of the UN, official statistics must always have "practical utility," which is where the biggest issue lies. Codes of conduct aim to implement the practical utility test. We suggest that in order to make statistics as useful as feasible in the modern information landscape, where potential users can easily turn to other sources of evidence, official statisticians should also make greater use of well-known marketing concepts as they interact with digital society. Building trust in official statistics and creating statistics that are meant to be reliable due to their technical merits are both goals of this approach.

In terms of opportunities, we look at how official statisticians are starting to rely more on external big data sources to produce pertinent official statistics, building on their use of administrative data held by governments. A collection of big data is viewed as a complete set of a very large number of persons, transactions, or observations, despite the fact that the term "big data" is difficult to define accurately. Official statisticians are now examining the potential of sources like satellite imaging, mobile phone meta-data (data about phone usage), and other sources, in addition to administrative datasets, which frequently serve as the testing ground for procedures and processes for accessing and analyzing new sources. Then, using a case study that looks at current UK legislation to understand the objectives of new data gathering systems for creating official statistics, we show these potential and limitations. We examine the Office for National Statistics' (NSO) current plans for the 2018 census, which will pave the way for administrative data censuses moving forward, and then talk about how big data sources are starting to be gathered more broadly for UK statistics.

2. Using Official Statistics as Evidence

Although the guiding principles mentioned above would seem to indicate that everyone in society has equal access to official data, in fact, there are customs, procedures, and cultures that might give government users preference. The demand for information about the state, for use by state officials and supported by them dates back many centuries, predating the consolidation of the current official statistics system, which occurred in the second part of the 20th century. Official statistics still use administrative systems of government as data sources.

In order to ensure that the fundamental principles are applied uniformly, codes of practice, statutory foundations, and other measures must take into account the complexity of the use of official statistics and the sources of the data. For instance, the same facts should be made available for those outside of government to evaluate its performance in addition to directly influencing policy-making. Furthermore, while it is known that official statistics are used in a variety of contexts, such as business decision-making, the evaluation of policy alternatives, and within educational curricula, little is known about the specifics of how or by whom they are employed. Invariably, descriptions of the user base include a list of people that the producers are aware of, as well as some information about the target user demographics that the producers hope to reach. Business, research, and education communities, the media, and the general public use the National Accounts to provide a basis for analyzing the UK's economic performance, and causal mechanisms at work within the economy, according to the UK Statistical Authority's (UKSA) report on its assessment of the state of UK National Accounts (UKSA, 2015). 'Large elements of the National Accounts have legal standing in the European Union' is one statement that suggests more precision (UKSA, 2015). In order to distinguish between institutional and non-institutional users, as well as to account for heavy, light, or no usage, and whether institutional users have a general, specific, or research interest. Vichi, Valente Rosa, and Ruane (2015, p. 4) develop a schematic table of user type. However, no information is accessible on other users or any indication of the relative number of each user category, with the exception of European institutions with a legal interest in European-wide statistics. Users can and do rely on a wide range of sources to build their total evidence base, for instance when evaluating a nation's economic success, which is something that is specifically measured by government data. To evaluate the status of the economy, policymakers, business decision-makers, journalists, analysts, and the general public will rely on a variety of data, viewpoints, personal experiences, and other experiences. According to reports, a top member of the UK administration said, "Never mind the figures, the economy is "healing"." (Helm & Wood, 2012) may or may not have had information that was better or more current than that found in the official figures, but he was emphasizing the opinions of the business community.

In making decisions about monetary policy, the central bank also consults its own polls and contacts in addition to official data (Bank of England, 2019). In the digital age, there is unquestionably more information available than there was back when official statistics were printed on paper and reported through a limited number of media channels. According to Livingstone, Blum-Ross, Pavlick, and Lafsson (2018, p. 1), rather "displacing" traditional home

interactions, games, and communication methods, digital media "sit alongside" them. This also occurs during the formulation of governmental policies.

While measurement is important, "it does not in itself automatically translate into policy," according to Mayer (2013, p. 2), a member of the independent group advising the UK Government on natural capital. Inputs to policymaking go beyond official data, and regardless of the degree of digitization, there is no assurance that policymakers will have access to all pertinent statistics. The gold standard might be interpreted to suggest that building and using a strong evidence basis, being aware of and managing the political environment, and beginning with delivery are all necessary for good policy outcomes. There are obvious possibilities to use statistical evidence throughout the policy-making process.

The importance of shifting policy analysis "away from incredible certitude and towards the honest portrayal of partial knowledge" has been demonstrated by several examples given by Manski (2013, p. 3). Politicians, auditors, and the general public will all be required to express an opinion on the degree to which pertinent evidence has been used sensibly if policymaking is inspired by evidence rather than just reliant on it. Rutter (2012, p. 7) summarizes how the use of evidence and assessment might be more effectively integrated into the policymaking system while reporting on "positive developments" in evidence-based policymaking. However, she also notes that "there remains a gap between aspiration and practice." One such trend is the establishment of "what works" centers, which are centers for evidence-informed policy and practice, in the UK, other countries in the EU, the US, and Australia. Official statistics' future function is far from certain. We haven't gone into much detail here on possible cultural and other obstacles to a wider acceptance of public discourse and policy procedures that are based on or guided by systematic research. For instance, it may be argued that politicians, journalists, decision-makers, and the general public all need to become more adept at discovering, comprehending, and utilizing official statistics.

3. Taking a Marketing Approach in Official Statistics

If the objective of practical utility is to be achieved, it could be reasonable to begin the development of official data by identifying users and their requirements. In reality, figuring out user requirements is rarely done precisely. Instead, it appears that the official statistics approach is to first offer a body of data that broadly reflects the scope of the guiding principles for official statistics, and then to collaborate with users and user groups to address requirements using the statistics that are now available.

All official statistics could be viewed as products that must go through a rigorous marketing procedure in order to fulfill the whole objective of official statistics. This would include understanding the demand for data and how they might fit in, or even shape, a market, in addition to advertising and availability enhancements. The problem would therefore be how to get relevant rather than general data and better answer particular questions by first identifying what those questions are. Official statistics are public goods that are generally distributed for free, not market items, which is an obvious argument against marketing. Specific data requests may be answered by official statistics offices for free if they require little work, or otherwise for a fee. These requests often depend on users knowing how to invoke such a service.

Consider the four questions Collins (2010) initially presented to creators of any good or service in order to shift to a more open mindset. What are customers' demands, asks the first inquiry, reflecting the requirement for utility in official statistics? It requires active and ongoing user interaction, collaboration, and iteration between producers and users to respond to this question. Beyond connecting with key consumers, this approach does not generally appear to be carried out in the creation of official data. The inherent trade-offs between technical characteristics of quality, such as accuracy, timeliness, and depth of information, can then be made with at least some understanding of how they will affect the overall value of the statistics, which is a benefit of engaging with users. The Statistics User Forum (2019, GOS0024) provided testimony to a Parliamentary enquiry into UK official statistics, making the case for a renewed emphasis on the full use of official data as well as providing instances of encouraging advances and areas that still require more attention. The second two of Collins' marketing questions are about competition and understanding the market. National statistics offices do not have a monopoly on the publication of data and statistics. The need to understand the competition and to brand official statistics clearly and distinctively has become more important. Market research should help not only with understanding requirements but also how best to reach potential users.

The product's value proposition is the topic of the last marketing query. Along with taking into account the costs associated with data collection and processing, official statistics offer value to society that should be acknowledged.

It has been emphasized by the United Nations Economic Commission for Europe (UNECE, 2018) how important having official statistics is. It offers suggestions on how statistics agencies should promote, quantify, and share this value. While noting that the "few" attempts to determine the monetary value of official statistics so far "have demonstrated that Official Statistics bring net benefits," UNECE (2019) notes that seven countries are pilot-testing the proposals.

4. The Need for Big Data in Official Statistics

We identify three main pressures on the official statistics' current data sources that are driving the quest for new, big data sources. First, users' rising expectations. To considerably enhance the availability of "quality, accessible, timely, and reliable disaggregated data," it is necessary to develop an evidence foundation for policy and for wider usage (UN, 2015, p. 48). The ability of statistics to be substantially disaggregated, enabling sub-sectors of the population of people or resources at risk to be monitored, is the defining characteristic of many developing requirements. Second, fewer households and businesses are willing to participate in official polls. Third, government finances, including international development aid, are almost often the sole source of funding for official statistics organizations, and these budgets are under strain.

There are various ways to combat these influences, not the least of which is by arguing for the importance of official data, as was mentioned above. In this paper, we focus on the potential for cost savings and increased timeliness of official statistics through data collecting that embraces the digital society and makes extensive use of already-existing big data sources, such as official administrative data. In 2015, Goal 17.18 and Resolution 76 of the United Nations called for the development of new data sources for official statistics, particularly through "appropriate public-private cooperation to exploit the contribution to be made by a wide range of data, including earth observation and geospatial information." This is more of a change in the mix of data types than a revolution in data, including census and survey data, data from administrative systems, big data from unofficial, transnational, or observational systems, and data joined up in ways that protect the privacy of specific individuals and companies.

5. Developing the Use of Digital Data in UK Official Statistics

Even though the UK has an official statistics system that is well advanced, the need to find new data sources still exists. According to documents made public by ONS (2015), the official survey response rates for the UK have decreased in the past. For instance, in one of the largest household surveys conducted by the ONS, the response rate decreased year over year from 79% in 1993 to under 48% in 2014, the most recent data at the time. Obtaining a response from less than half of the respondents chosen is bound to undermine the survey team's and users' confidence, despite all the care taken to create representative samples and, where possible, identify the characteristics of non-respondents. Unsurprisingly, the National Statistician stated, "I fully expect that, in five years' time, what we will be doing will be radically different," while proposing a strategy for UK official statistics just before the complete evidence on response rates was published. Our services will be delivered digitally by default, and more data will be in real-time (UKSA, 2014).

For the first time, a strategy for the creation and release of results was outlined as official government policy in the census preparation White Paper for England and Wales in 2001. The idea that "the investment of time and resources in a national census is only justified if the results are made accessible to users quickly and in a clear and usable form" was at the center of the analysis. In order to accomplish this, "technological developments should be harnessed in order to improve the accuracy, timeliness, accessibility, and user-friendliness of published output" (ONS, n.d.). The census was processed by an outside service provider (ONS, 2013). Over 24 million census forms were scanned utilizing digitization, and replies were then electronically coded using automated and computer-assisted techniques. In the previous census, manual coding of occupation and industry was undertaken and restricted to a 10% sample of forms.

It affects more than only the gathering of government statistics and research; a stronger evidence base can be developed by using administrative data more frequently. Following a report stating that administrative data in research needed to be used more efficiently throughout the UK "for public and policy benefit," the Administrative Data Research Network (ADRN) was established in 2013. According to the network, "the UK is falling behind other developed nations and other European countries" (ADRN, n.d.).

There are approaches and cultural differences between the devolved administrations and the UK government. However, in the UK as a whole, the use of administrative data for statistics and research has often only advanced

slowly. By 2017, it was clear that greater law was required, and there was a chance for this issue to be covered by what would eventually become the Digital Economy Act (UK Parliament, 2017). The head of the UKSA observed in a letter to the appropriate Minister that the current legislative structure governing access to data for official statistics is convoluted and time-consuming. The recommendations in the Bill would improve access to administrative data for statistical and research purposes by utilizing data that is already maintained by the government and other organizations. This would result in considerable efficiency and savings for people, households, and businesses. Dilnot (2016, P.1).

The modernization of the census serves as the focal point for subsequent innovations and is the most visible official statistics project in the UK to make more use of big data. 'Unlocking data' through the legal change was noted as a success in a progress report on the strategic development of UK official statistics (UKSA, 2017), though 'much better use of data and clearer assurance for the public on how it is being used' was still awaiting the Digital Economy Act's entry into force the following year. Another significant breakthrough was the conversion of various business surveys to online data collection. In order to investigate new data sources and methodologies, ONS launched a data science campus in 2017 (<https://datasciencecampus.ons.gov.uk/>). More is promised, including monitoring the UK progress towards the UN sustainable development goals. While what is sometimes called a data revolution is clearly underway in the UK, development plans stretch forward into the next decade.

6. Challenges and Implications for Official Statistics

Since the UK, like many other nations with official statistics based mostly on censuses and surveys, is entering the digital society from a different position than nations with register-based systems. The essential tenets of official statistics promote global collaboration and the sharing of best practices. In addition to having a center for big data statistics, Statistics Netherlands (2014, pp. 153–160) has produced recommendations on quality assurance for administrative data and registers. According to Young, Hyman, and Rater's paper (2018, p. 337), "Web scraping, technology, and secondary data sources may be tools that are used increasingly" in compiling a registry of agricultural land holdings inside a city. In this case, some of the activities of interest had no direct online presence, confirming the need to combine data from a variety of sources, including administrative data and social media. Many official statisticians have important concerns about the technical quality, timeliness, and reliability of the data when they are presented with a potential source of administrative statistics. In his assessment of the difficulties associated with administrative and transaction data, Hand (2018, p. 555) urged statisticians to "approach the analysis of such data with the same cautious and critical eye as they approach the analysis of data from any other source." For instance, a database's record set "might not be representative of the population to which one wishes to draw an inference" or the level of information "might prove insufficient for all possible analyses" (Hand, 2018, pp. 557–558).

However, when seeking for high-quality, timely, and dependable big data sources, one can fall into the trap of only considering the sources rather than the uses when considering quality. 'Explore how adequate the administrative data are for answering the questions' is Hand's ninth task in his list of 15 big data challenges (Hand, 2018, p. 569). Bean (2016) proposes that ONS should redirect its culture "towards better meeting user needs" as one of the strategies to improve UK economic statistics. When interacting with people and responding to their demands, staff should be proactive rather than reactive. In this respect, the culture in Statistics Netherlands offers some lessons, since relationships, communication and agreements with users form the opening part of its quality assurance framework (Statistics Netherlands, 2014, pp. 31–40).

It might be argued that policymakers' requirements should not be the only ones taken into consideration when identifying the needs of users. Policymakers are expected to consider evidence before selecting an acceptable set of policy outputs, which could include legislation or more subtle methods of behavior modification. The majority of policy outputs are top-down. Top-down policies must be matched by bottom-up commitment to addressing the same concerns by businesses, civil society, and local government if true social change is to be achieved. One objective of the official statistics system should be to provide all stakeholders with access to the same body of evidence, which will hopefully result in a shared comprehension and description of the problems. However, this method results in a complex web of interconnected standards for official statistics.

There aren't any solid models for how official statistics, and evidence in general, factor into society decision-making for policy and other matters. An "evidence-informed policy and practice pathway" is laid out in Bowen & Zwi's (2005) approach for how evidence should be used. The three stages of the pathway include gathering the evidence, using the evidence, and putting the evidence into practice. The pathway also "involves decision-making components and a process which we have named "adopt, adapt, and act" (Bowen & Zwi, 2005, p. 0600)". Many "what works"

centers have embraced this method of operation, which encourages the use of pertinent evidence by working alongside policymakers and serving as a channel for connecting evidence suppliers and policy consumers. But it's not entirely apparent if this has resulted in a major increase in the use of evidence. Understanding the competitors, including through market research, is another aspect of a marketing strategy. Because users of all types can and frequently do utilize other sources of information as evidence, competition for the provision of statistics has increased. The providers of these additional sources might be commercial and place more emphasis on marketing their content. A monopolistic source of data may be forced to open up via new routes due to the disruptive nature of digital technology, or different value-added services may transform the data into new types of evidence. When consumers desire information, the digital society increasingly means "self-service." ONS recognizes "inquiring citizens" as one category of website visitors and aims to make its website accessible to this group of users in addition to standard data users and analysts. These users, along with "policy influencers," frequently repurpose ONS statistics in their own, online reports, creating yet another form of competition.

Greater awareness of how official statistics fit into and stand out in the marketplace for proof should result from their marketing. Finding the correct key to open new data sources is not the only step toward using them more effectively. Even with a stronger legal foundation, it takes the ONS months, if not years, to negotiate access and convert new data into statistics that are published. Other providers may enter the market sooner and their real-time data may not be guaranteed to meet the quality standards of official statistics, therefore the real-time statistics the UK National Statistician has in mind may still be published after their reference period. Information may be the life-blood of a market economy, but the market in information itself raises questions about the skills and competencies in handling information, and how these skills can be honed.

Trust, or "confidence in the people and organizations that produce statistics and data," is another factor to take into account when analyzing the market for evidence (Office for Statistics Regulation, 2018, p. 14). Sometimes people consider trust to be the 'unique selling point' of official statistics. Recent data suggests that the public continues to have faith in official UK statistics and that this confidence is being maintained (Morgan & Cant, 2019). This evidence, however, was gathered prior to any significant usage of personal information from commercial organizations in the creation of official statistics. The only big data initiative by ONS yet that has garnered public interest was its investigation into the potential applications of web-scraped prices and point-of-sale-scanner-price information.

Instead, then gaining access to sources that contain personal information, this application is for experimental assessments of consumer inflation. We are still a long way from regular statistics derived from commercially available sets of personal data, and ONS has only lately begun to issue experimental statistics based on information about where mobile phones are used. Developments outside the realm of official statistics, such as the growing usage of data from smartphones to power new applications that can compromise privacy, may have an impact on how this plays out in terms of trust. Researchers can increase confidence by adhering to a code of ethics that is intended to show that they are reliable. The intergovernmental Organisation for Economic Co-operation and Development (OECD) has released a version of research ethics appropriate for the digital society in which it is recommended that "Data should be shared as openly as is feasible within the relevant legal and ethical constraints" (OECD, 2016, p. 6). But what exactly are these restrictions, who make them, and do the individuals whose data is being used, know about and accept them? The ethical gathering, sharing, and use of novel kinds of data for research are covered by the OECD recommendations.

They support the establishment and disclosure by data owners/controllers of procedures for the secure and accountable sharing of personal data, including measures for the privacy protection of data subjects and for public input and responsibility. Although doing so would appear to be crucial for winning public support for research and statistics in the digital age, it is unclear whether it will be done.

7. Conclusion

Official statistics are expected to play a significant role in the digital society, and cutting-edge technologies are being used to compile and disseminate them more often. Digital technology may be assisting in the creation of a better evidence basis or the better use of the evidence base, although this is not yet obvious. There are chances and difficulties. The difficulties already, but they might become more severe as a result of digital technology used with new sources of commercial and personal data. In addition to supplying statistics, national statistics offices ought also to respond to queries from the public because they are in a competitive market for users' attention. They will be able

to demonstrate the importance of official data to society if they are successful. With prospective data sources and technologies far beyond most of those currently covered by national statistical offices, big data are likely to offer creative solutions.

It's obvious that we need new data sources like this one, but the information it contains is not yet suitable for routine use in the creation of official statistics. Before being used to inform an evidence-based environmental policy, research findings regarding the viability and utility of new data sources must be sent along the type of channel envisioned by Bowen & Zwi (2005). Official statistics should seek to maintain its fundamental principles as an essential component of the information system of a democratic society in light of the appetite for evidence and new demands. Delivering new items and creating digital technologies is only a small portion of what will be required. We argue that the degree to which the creators of official statistics interact with users including those in the media, policy, and politics, as well as the general public will ultimately determine the success of these advancements. If official statistics are to fulfill their potential, three major issues must be resolved: creating reliable, valuable, and assured-quality official data that are of benefit to society.

All three areas might be facilitated by adopting a more marketing-oriented strategy in addition to the more conventional emphasis on data quality and technique. Statistics and data are always in demand. The ultimate "evidence base" for policies meant to enhance lives might be produced by effectively using new data sources. Although new data sources and statistics may be required, they are insufficient to change the way we live, eradicate poverty, protect the environment, and ensure that no one is left behind in our economic and social development. To do all of this, it is necessary, among other things, to significantly increase the use of official statistics in decision-making across all spheres of society, including industry and public policy. With its top-down approach to behavior change, official statistics are not just for policy; they also serve to keep governments accountable by assisting citizens and corporations in taking action.

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