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The use of secondary data in purchasing and supply management (P/SM) research☆

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ABSTRACT

The use of secondary data, data that has been gathered for another purpose but may be suitable for research, is growing in relevance and importance in purchasing and supply management research. This paper presents issues associated with using secondary data as a principal source of data or as supplemental to other data or methods. As editors increasingly call for multiple data sources in research publications, secondary data become even more relevant. Secondary data have many benefits, and some secondary data sets are well established and highly credible. The authors describe some of the ways that secondary data has been used in purchasing and supply management research, as well as some of the sources of data. Secondary data does have its limitations, ranging from bias in collection and reporting to difficulty in identifying and accessing appropriate sources of secondary data to dealing with its predominantly unstructured nature. Suggestions for improving the reliability and validity of secondary data are provided, as well advice for dealing with big data.

1. Introduction

Secondary data is defined as quantitative or qualitative data that has been collected by someone other than the researcher(s) for a different purpose than its intended use in research. There are many different types of secondary data available. Some of the more commonly used are existing literature, census data, governmental information, financial data, organizational reports and records (Lind et al., 2012). This data may be free to access, available by permission of the party collecting the data, or may require payment of a fee.

Researchers in P/SM often use secondary data to triangulate findings from principal data collection such as interviews, case studies, surveys and experiments (Tatsis et al., 2006; Sancha et al., 2015). One common use is as an objective source of performance outcomes associated with various P/SM practices among a research sample. Researchers have shown that the use of secondary data as the principal data source can reduce the bias that is sometimes introduced during case studies and the intrusiveness of data collection that is inherent in more experiential methods such as action research, experiments or interviews (Rabinovich and Cheon, 2011). Secondary data can also help overcome issues of survey fatigue or the use of survey companies such as QDAMiner or survey monkey that have questionable demographics and a lack of control over survey respondents (Schoenherr et al., 2015).

There are some important practices for using secondary data in order to address the appropriate research questions, which are discussed in this note. With the increased awareness of data availability, calls for the use of archival and secondary data as a principal source of data in P/SM research are increasing, as there are numerous benefits to its use (Calantone and Vickery, 2009).

2. Why use secondary data in P/SM research

Increasingly, it has been difficult to garner significant response rates using a survey method, and the litigious propensity of the current society has made access to case study participants challenging. Many populations have been over-sampled, and suffer from survey fatigue, which creates an overall unwillingness to respond to surveys. In order to gather survey data, researchers often rely on the expensive services of survey companies such as survey monkey and Qualtrics that have developed databases of survey takers qualified to answer surveys on a wide variety of topics.

Secondary data is effective in P/SM research to address a number of research topic areas such as sustainability, financial performance, literature analyses and more. Methodologically, secondary data can

☆ The purpose of this note is to discuss the use of secondary data in purchasing/supply management (P/SM) research. Secondary data is widely available and may be useful as a principal data source or as supplemental data for other research methodologies.

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Table 1
Benefits of using secondary data.

- Relatively large amounts of data available.
- Less money
- Less time
- May be viewed as more objective than primary data such as cases or survey data
- Fewer personnel needed to collect resources
- Combine with other types of data to investigate phenomenon more thoroughly
- Corporate data available – don't have to rely on perceptions of history
- Common, well-defined and established measures may be used

be analyzed through econometric analysis of archival data, content analyses, simulation, event studies, meta-analysis and GIS (geographic information systems) (Rabinovich and Cheon, 2011).

3. Benefits of using secondary data

There are many potential benefits to using secondary data, as shown in Table 1 below. For example, there are many sources of such data. Some are available free through libraries and other sources, and others may be purchased at a relatively low price versus what it would cost for a researcher to create the dataset. This may save a great deal of time and human effort, although some formatting and cleaning of secondary data sets is often required.

Secondary datasets often use well-established measures such as sales revenue, inventory turnover, and so on, that add credibility when combined with the results of another study. Further, using common, well-established measures can provide clarity. Some secondary data such as financial data are even audited, adding to the credibility of the data and the associated research project.

4. What type of data has been used in P/SM research?

For illustrative purposes, a search on google scholar with the keywords "secondary data" and "supply" was run for the years 2010 until 2015. The first 200 hits were checked for potential applicability based on the brief abstract, the key words and the journal where the article was published. Of these 200, there were 62 articles that warranted full paper reviews. Of these 62 articles, 21 used secondary data as principal data sources and 20 used secondary data to triangulate findings from other data collection methods. A list of articles using secondary data for principal reasons are included in Table 2 (Altay and Ramirez, 2010; Beske et al., 2014; Busse, 2010; Crum et al., 2011; Ellinger et al., 2012; Ellinger et al., 2011; Ellram et al., 2013; Ghadge et al., 2013; Ghadge et al., 2012; Hora et al., 2011; Horn et al., 2013; Johnson and Templar, 2011; Kovács et al., 2010; Lanier et al., 2010; Min and Kim, 2012; Modi and Mabert, 2010; Narasimhan and Schoenherr, 2012; Stentoft Arlbjørn and Pazirandeh, 2011; Tangpong, 2011; Tate et al., 2010; Yang et al., 2010).

Based on the articles listed in Table 2, Table 3 provides a partial list of some of the types of data that have been used in secondary research in supply chain management.

5. Why does secondary data make sense for P/SM research?

There are many reasons why secondary data is a good fit for P/SM research. If using a broad, well-established source of data, there are fewer chances to skew the data collection process based on researchers preconception and bias. This is essential to generating meaningful, generalizable and publishable results.

Further, secondary data sets are often already validated. This allows researchers to focus on validation of new constructs and measures that are critical to move research forward. Established databases have higher internal validity, and the clear descriptions surrounding these datasets presents greater opportunity for replication. Finally, in many cases consistent longitudinal data are available that provide the time series/temporal data needed for trend analysis. There are many ways in which to analyze the data including content analysis, running an event study, simulation, or meta-analysis (Rabinovich and Cheon, 2011).

6. General limitations of secondary data

When seeking secondary data to use in analysis, there can be significant time spent searching for appropriate datasets and interpreting the data, trying to understand issues such as: where are appropriate data published, are there common reporting measures used for this type of data and are there common time frames? Also, a significant problem is that the a single database or source secondary data may not be available to answer the research question, so researchers must be able to appropriately synthesize the different databases to address their needs.

In addition, all secondary data and empirical data in general, whether voluntarily provided or mandated and standardized, is a snapshot at a point in time (Snow and Thomas, 1994). Archival data focus on what has already occurred (Snow and Thomas, 1994). In addition, the way that the data were gathered and the information that is included is all subject to interpretation unless a very precise directive for reporting is provided. Even then, data can be distorted by company differences in accounting policies or other internal practices (Venkatraman and Vasudevan, 1986). The biases and data accessibility of those responsible for collecting and reporting the data are also considerations, even with data that appear to be very quantitative in nature, such as financial reports.

Further, data are not always available for all time periods, for all phenomena, and for all organizations of interest (Venkatraman and Vasudevan, 1986). Such bias is present even in data that we assume to be very standardized and subject to external auditing, such as financial reports of publicly held corporations (Snow and Thomas, 1994). Thus, green-washing might be a threat even if the CSR reports were audited.

Another complication is that is that 80% of the data available today are unstructured (Zikopoulos et al., 2012). Unstructured data includes data that is not managed by a standard database management system, information that does not have a predefined data model or is not organized in a predefined manner. While some would argue that such data is not designed as a data set because of the extensive transformation that needs to be performed to make it useable as research data, we include such data in our definition of unstructured data.

7. Specific limitations of voluntarily reported data

Specific to voluntarily reported data such as CSR data and non-financial data from company websites, there is no auditing of the data. While it is unlikely that companies would wildly distort such data due to the potential impact that this could have on reputation, self-reported data tend to be presented in a favorable light (Jose and Lee, 2007). In addition, because there is no requirement that companies disclose everything, reports will likely emphasize what is perceived as important, and areas where they excel, rather than disclose all relevant activities.

Along similar lines, there is a lack of common language and measurement (Fratocchi, et al., 2014) for many types of data such as sustainability initiatives and supplier performance. Terminology may differ somewhat by industry and by country. Thus, there may be differential interpretation of what companies are actually doing. In addition to these limitations, data cleansing can be an arduous task. Depending on the format of the data, there may be a tremendous amount of time required to transform the data into a useable form, then cleanse the data for errors and extraneous characters and standardize the format of the data just to prepare it for analysis.

Table 2
List of articles using secondary data as a principal data source 2010–2015.

Altay, N., & Ramirez, A. (2010). Impact of disasters on firms in different sectors: implications for supply chains. Journal of Supply Chain Management, 46(4), 59–80.

Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. International Journal of Production Economics, 152, 131–143.

Busse, C. (2010). A procedure for secondary data analysis: innovation by logistics service providers. Journal of Supply Chain Management, 46(4), 44–58.

Crum, M., Poist, R., Carter, C.R., & Liane Easton, P. (2011). Sustainable supply chain management: evolution and future directions. International Journal of Physical Distribution & Logistics Management, 41(1), 46–62.

Ellinger, A., Shin, H., Magnus Northington, W., Adams, F. G., Hofman, D., & O'Marah, K. (2012). The influence of supply chain management competency on customer satisfaction and shareholder value. Supply Chain Management: An International Journal, 17(3), 249–262.

Ellinger, A.E., Natarajarathinam, M., Adams, F.G., Gray, J.B., Hofman, D., & O'Marah, K. (2011). Supply chain management competency and firm financial success. Journal of Business Logistics, 32(3), 214–226.

Ellram, L.M., Tate, W.L., & Feitzinger, E.G. (2013). Factor-Market Rivalry and Competition for Supply Chain Resources. Journal of Supply Chain Management, 49(1), 29–46.

Ghadge, A., Dani, S., Chester, M., & Kalawsky, R. (2013). A systems approach for modelling supply chain risks. Supply Chain Management: An International Journal, 18(5), 523–538.

Ghadge, A., Dani, S., & Kalawsky, R. (2012). Supply chain risk management: present and future scope. The International Journal of Logistics Management, 23(3), 313–339.

Hora, M., Bapuji, H., & Roth, A.V. (2011). Safety hazard and time to recall: The role of recall strategy, product defect type, and supply chain player in the US toy industry. Journal of Operations Management, 29(7), 766–777.

Horn, P., Schiele, H., & Werner, W. (2013). The "ugly twins": Failed low-wage-country sourcing projects and their expensive replacements. Journal of Purchasing and Supply Management, 19(1), 27–38.

Johnson, M., & Templar, S. (2011). The relationships between supply chain and firm performance: The development and testing of a unified proxy. International Journal of Physical Distribution & Logistics Management, 41(2), 88–103.

Kovács, G., Matopoulos, A., & Hayes, O. (2010). A community-based approach to supply chain design. International Journal of Logistics: Research and Applications, 13 (5), 411–422.

Lanier, D., Wempe, W.F., & Zacharia, Z.G. (2010). Concentrated supply chain membership and financial performance: Chain-and firm-level perspectives. Journal of Operations Management, 28(1), 1–16.

Min, H., & Kim, I. (2012). Green supply chain research: past, present, and future. Logistics Research, 4(1–2), 39–47.

Modi, S.B., & Mabert, V.A. (2010). Exploring the relationship between efficient supply chain management and firm innovation: an archival search and analysis. Journal of Supply Chain Management, 46(4), 81–94.

Narasimhan, R., & Schoenherr, T. (2012). The effects of integrated supply management practices and environmental management practices on relative competitive quality advantage. International Journal of Production Research, 50(4), 1185–1201.

Stentoft Arlbjørn, J., & Pazirandeh, A. (2011). Sourcing in global health supply chains for developing countries: Literature review and a decision making framework. International Journal of Physical Distribution & Logistics Management, 41(4), 364–384.

Tangpong, C. (2011). Content analytic approach to measuring constructs in operations and supply chain management. Journal of Operations Management, 29(6), 627–638.

Tate, W.L., Ellram, L.M., & Kirchoff, J.F. (2010). Corporate social responsibility reports: a thematic analysis related to supply chain management. Journal of Supply Chain Management, 46(1), 19–44.

Yang, C.-L., Lin, S.-P., Chan, Y.-h., & Sheu, C. (2010). Mediated effect of environmental management on manufacturing competitiveness: an empirical study. International Journal of Production Economics, 123(1), 210–220.

8. What are some techniques to ensure reliability and validity?

Reliability assesses whether the data is consistently reported over time. With secondary data, it is thus essential to understand how the data have been collected. Were consistent measures used over time, and across different data sets purporting to measure the same thing? The researcher should be able to explain what was being measured, how, and in some cases by whom (self-reporting versus layperson reporting, versus professional researcher). This helps ensure that differences in the data are meaningful, not simply an aberration in reporting.

If the researcher cannot be reasonably certain that the data are reliable, any results found in analyzing the data may be spurious. If this is the case, the researcher should consider looking for other sources of secondary data. The researcher may be able to triangulate that similar data from various sources show similar results, thereby increasing the credibility that the data are reliable. Data from well-established sources, such as the US Census, Figshare, UK data sources and COMPUSTAT have a high level of credibility for internal consistency, so if the researcher can stick with established sources, that can increase reliability.

However these well-respected sources may not supply the type of data that the researcher requires. There are initiatives from leading institutions such as MIT to create and make available databases for use in P/SM research. Parties who provide data (especially publicly funded

Table 3
Sampling of types of secondary data used in SCM research.

Types of data	Examples sources
Financial data	Annual reports, financial databases such as Compustat, Dun & Bradstreet and Bloomberg
Supply Chain Management Rankings – Gartner top 25, for example	Data on disasters: EM-DAT database
Systematic Literature Review	Subject matter of interest; content analysis
Survey data gathered for other purposes but publically available.	Useful in longitudinal research. Example: Annual Mannheim Innovation Panel on innovation activity within the German economy
Product recall data	Consumer Product Safety data on toy recall, Automotive recall data
Large survey shared among researchers	Global Manufacturing Research Group (GMRG data)
Newspaper article searches	Factiva data base; specific newspaper archives/ websites such as Wall Street Journal
Various types of Company Data	Annual reports, CSR reports and websites;
Company sales and financial performance	Wharton Research Data Services
Press Releases	Focus on specific companies or sectors
Transcripts from meetings	Workshop transcripts on a specific topic
Customer satisfaction/reviews on products and services	Publically available on websites
Internal and external company sustainability data	Corporate social responsibility reports, codes of conduct, copies of presentations, websites

data) may require that the authors publish as open source (available to all for free), which is common in less prestigious journals or only after paying the journal a hefty fee. This may limit the use of such data sources by researchers.

Thus, a real challenge in using secondary data is validity. The question here is whether the secondary data available measures the constructs that the researcher is interested in, or provides a close enough approximation to be used in a meaningful way. For example, if a researcher is exploring how the number of suppliers a company uses varies by industry, firm size, or something similar, he or she may find secondary data on cost of goods sold. The researcher may make the leap to say that cost of goods sold is a surrogate for the number of suppliers. Of course, any student of purchasing literature would know that these are not causally related across companies, and that this would not be a valid measure for number of suppliers. In order to get secondary data that measures what the researcher wants to measure (or to adapt to a particular research question), the researcher may have to:

1. Combine multiple data sources that measure some aspect of what the researcher is looking for; or
2. Modify the construct of interest to better fit the available data if the results will still be meaningful.

9. Where does big data fit in?

Big data is a term used to describe the massive amounts of data that organizations are collecting that cannot be processed, analyzed and managed, using traditional tools and approaches (Zikopoulos et al., 2012). Big data is formally defined as data that has volume, velocity, variety, and veracity (IBM, 2016). To the organization collecting it, it is primary data. When we access it as researchers who did not collect the data or direct the collection of the data for our purposes, it becomes secondary data.

The vast majority of such data are unstructured, creating special challenges for both the organization collecting the data and the researcher who wants to use the data. The data needs to have intrinsic validity, in other words, it needs to measure what it says it is measuring: be accurate, complete and consistent, as well as timely (Hazen et al., 2014).

For a researcher to meaningfully use the data it must also have contextual validity, or meaning within a given setting. This includes dimensions such as relevance, credibility, quantity and believability (Hazen et al., 2014). The challenge with using big data as a resource is the complexity in understanding, manipulating, properly structuring and validating these data sets. These tasks may be so enormous that it consumes the researcher. By the time they get a useable data set, it may be old, or it may be so simplified that it is no longer very interesting. Or the researcher may want to write an article about how challenging it is to make such data sets useable. When taking on the challenge of using big data, the researcher must ask him/herself:

- Does the data have intrinsic and contextual validity?
- How long might it take to clean and structure this data into a useable form?
- Is the nature of this data different and somehow more interesting and valuable than other data sets available?
- Does the "bigger" aspect of this data set really add value, or does it just add computational complexity?

10. Future research opportunities using secondary data

With the growth of "big" data, the number of opportunities for using secondary data is increasing. The important consideration is ensuring that the data is used in a way that is meaningful and adds value in addressing real problems and issues, not simply in a way that is convenient. Using traditional secondary data sources such as the COMPUSTAT databases, census databases and others will continue to be important. More companies have massive quantities of data that they capture on their performance, such as customer order fill rates by item, by region, by customer, etc. Analysis of such data could provide fodder for analysis of particular supply chain practices, provided that the results can be generalized to a wider population, or analyzed in conjunction with data from other companies to provide greater insights.

11. Conclusions

While there is a wealth of potentially valuable and interesting secondary data that can be mined by researchers, including a growing store of mainly unstructured big data, the acquisition, cleansing, interpretation and publication of that data is not without extreme challenges. Reviewers may not be familiar with such data. This creates an extra responsibility for the authors to take care in the handling of the data, its interpretation and its presentation to the public. As in all data analysis, care must be taken to strive for validity and generalizability while clearly acknowledging both the limitations and contributions of secondary data analysis.

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