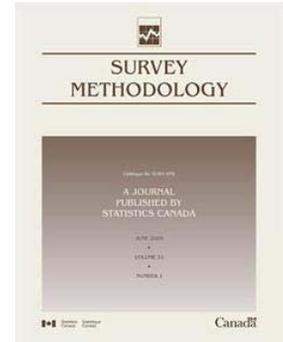


Article

The multidimensional integral business survey response model

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Abstract

Knowledge of the causes of measurement errors in business surveys is limited, even though such errors may compromise the accuracy of the micro data and economic indicators derived from them. This article, based on an empirical study with a focus from the business perspective, presents new research findings on the response process in business surveys. It proposes the Multidimensional Integral Business Survey Response (MIBSR) model as a tool for investigating the response process and explaining its outcomes, and as the foundation of any strategy dedicated to reducing and preventing measurement errors.

Key Words: Accuracy; Data collection; Economic statistics; Business survey; Measurement error.

1. Introduction

Measurement errors represent the gap between an ideal measurement and the obtained survey response (Groves, Fowler, Couper, Lepkowski, Singer and Tourangeau 2004). To efficiently prevent or reduce the occurrence of measurement errors, it is necessary to know how the process of responding to survey questions evolves and what influences its course. Because work to reduce errors in business surveys has traditionally focused on sampling, frame, and nonresponse errors and, to a lesser extent, on measurement errors (Willimack, Lyberg, Martin, Japac and Whitridge 2004), knowledge of measurement errors and the underlying causal mechanisms is still largely limited in business surveys. This article attempts to fill that gap.

Most studies that examine the causes of measurement errors in business surveys are a product of pretesting research. As a result, most such studies are hypothetical (*e.g.*, Morrison, Stettler and Anderson 2002) or tentative (*e.g.*, Phipps, Butani and Chun 1995) as opposed to being based on actual data collection (*e.g.*, Hak, Willimack and Anderson 2003). The abundance of pretesting results, which are usually bound to a particular survey, contrasts with the scarcity of quality assessment research (*e.g.*, Giesen and Hak 2005) and with the shortage of generalization and linkages to the response process. Many studies focus on a particular aspect of the response process. For instance, Ponikowski and Meily (1989) examined the availability of data that business surveys require; Ramirez (1996) investigated respondent selection in business surveys; Jenkins and Dillman (1997) considered the design of business questionnaires; O'Brien (2000) and Willimack (2007) explored the respondent's role in the establishment survey response; Greenia, Lane and Willimack (2001) concentrated on business perceptions of confidentiality and on the closely connected issue of data sharing among statistical organizations; and Willimack (2003) exposed comprehension issues. Recently, more

attention has been dedicated to the development and testing of electronic business questionnaires (*e.g.*, Snijkers, Onat and Visschers 2007) and their editing (*e.g.*, Nichols, Murphy, Anderson, Willimack and Sigman 2005), while more frequent complaints about the costs that statistical reporting imposes on the business community have triggered research on the response burden (*e.g.*, Hedlin, Dale, Haraldsen and Jones 2005).

The first study to systematically address the entire response process in establishment surveys was a general model of the survey response process for factual information, which Edwards and Cantor (1991) presented. Biemer and Fecso (1995) combined the cognitive model of Edwards and Cantor's (1991) survey response with a statistical model that tried to quantify measurement errors by their sources. Another attempt to grasp the entire response process in business surveys was made in 1998-1999, when the U.S. Census Bureau conducted unstructured qualitative interviews on statistical reporting. The study served as a basis for two business survey response models: the hybrid response model for establishment surveys by Sudman, Willimack, Nichols and Mesenbourg (2000) and the complete model by Willimack and Nichols (2001). Most recently, Lorenc (2006) suggested examining the entire response process on the basis of the idea of socially distributed cognition and using an establishment as a unit of observation.

These models identify many essential aspects of the response process in business surveys and offer some concepts for them, but they treat many issues only partially. This was an incentive for a comprehensive study of the response process of a selected business survey making possible further development of the business survey response model. This article presents the Multidimensional Integral Business Survey Response (MIBSR) model and discusses its contributions.

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2. Empirical study

The aim of the empirical study was to build a conceptual framework of the response process – a response model – by examining from start to finish the actual response process to a typical business survey in a real business environment. The qualitative research interview was the primary method of investigation. The method was implemented using various techniques (mainly retrospective probing and ethnographic interviewing but also thinking aloud), two modes (in person and by telephone), and different interviewees (people from the participating business, questionnaire administration experts from the statistical organization, and subject-matter experts). In some cases on-site observation and analyses of micro data complemented those techniques. Considering all the variables, a range of approaches had to be developed (for more details, see Bavdaž 2009). On-site visits were arranged around two consecutive deadlines for the questionnaire's completion in 2005. An attempt was made to contact all key people involved in the response process.

The selected survey – the Quarterly Survey on Trade – was a business survey conducted by the Statistical Office of the Republic of Slovenia on a sample of approximately 1,600 legal units performing trade activities. It had classic characteristics of business surveys: a recurring mandatory governmental mail survey. Its instrument was an eight-page paper questionnaire and instruction and classification booklets. The questionnaire consisted of an introductory text and four sections, one referring to the business as a whole and the other three each referring to one kind of trade activity (commission trade, wholesale, and retail). All sections asked for sales and employment data. In addition, there were questions on sales breakdowns, stock, activity codes, and size and number of stores. Nonresponding units received up to three reminders and, ultimately, a telephone call. The final response rates were generally high, greater than 90%. Major deviations and inconsistencies discovered during editing procedures also required telephone calls to businesses.

The final sample in this study consisted of 28 businesses required to complete the Quarterly Survey on Trade. Previous studies resulting in models of the response process applicable to business surveys were based on small samples as well: 24 establishments (Edwards and Cantor 1991), 30 large multiunit companies (Sudman *et al.* 2000; Willimack and Nichols 2001), and 7 schools (Lorenc 2006). This is consistent with exploratory interview studies, which tend to have small sample sizes of “around 15 ± 10 ” (see Kvale 1996, page 102). The selection of businesses aimed to cover the heterogeneity of response processes. Because business size can be defined as the single most important business

characteristic that is assumed to influence or be related to the characteristics of the response process (*e.g.*, O'Brien 2000), businesses were selected from all size classes.

Several measures boosted the validity of the research design. The businesses were selected from different size classes, including some of the largest ones in trade but also some from nontrade primary business activity. A few businesses refused to cooperate, mainly because of the work overload. Nevertheless, caution is necessary when applying findings to nontrade and overworked businesses. The study included people with different roles in the response process. Substantial effort was made to obtain participation and organize visits during the time the respondents were completing the questionnaire or right afterward so as to minimize the loss of information from their memory. The short time lags that occurred in some cases did not seem to be so damaging for remembering a frequently repeated and well-documented process, given the advance announcement of the impending on-site visit. Interview questions directed respondents to report how they last filled out the questionnaire (*e.g.*, when the books closed that month, how much time they spent, who signed the form and how fast), and respondents generally supported their reports by data from paper and electronic documentation they used to fill out the questionnaire. All this helped distinguish their last engagement from the usual one.

The interview as the primary research method was in some cases combined with observation. The interviews were tape-recorded and transcribed. More repeating patterns emerged as the fieldwork progressed, though diminishing returns of each consecutive on-site visit were noted toward the end of the fieldwork. The findings from the on-site visits were compared with the observations of the survey staff and subject-matter experts, quantitative data (where available), and previously published research. Alternative explanations were considered. Last but not least, the selection of a typical business survey made the generalization to other business surveys more plausible. As Yin (2003) suggests, all steps in the research were carefully documented to establish a chain of evidence and ensure high reliability of findings.

3. The MIBSR model

3.1 Presentation of the model

One of the main study results is the Multidimensional Integral Business Survey Response (MIBSR) model, which integrates previous research findings and new findings from my empirical study. The MIBSR model explicitly distinguishes between processes occurring at the individual level and others taking place at the organizational level, which is the business level in this case (see Figure 1). The cognitive

processes of comprehension, retrieval, judgment, and response occurring at the individual level are taken from Tourangeau's (1984) response model. They reflect the mental processes of people involved in the survey response that relate to the actual answering of particular survey questions as compared to the processes that refer to the organization, information support, and authorization of such answering, which occur at the business level. Contrary to the typical situation of surveys of individuals, parts of the process, such as requesting data from another participant or retrieving data from business records, are visible through participants' physical actions. By using the survey level, the MIBSR model also allows for the possibility of conceptualizing the response process over several implementations of a survey or over several surveys (indicated by the arrows in Figure 1).

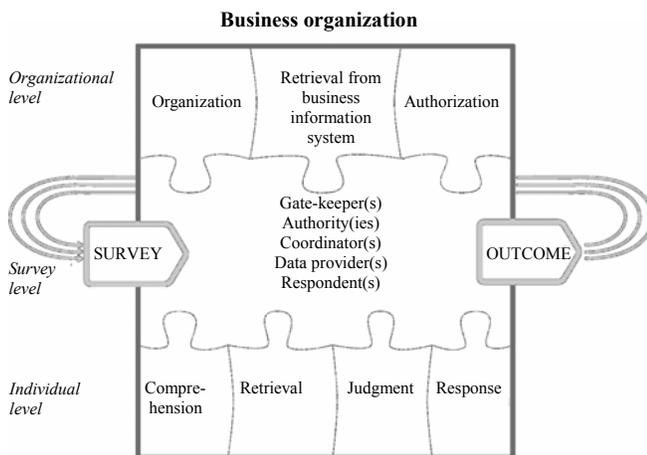


Figure 1 MIBSR model

The survey response task may involve several business participants who can enter and exit the response process at various points in time; but for the sake of clarity and simplicity, they are all depicted together. Business participants take part in organizational processes while going through their own cognitive processes; thus, they are a unifying link between processes at the individual and organizational levels. They may adopt one or more of the roles with a different influence on the response process, namely a gate-keeper (*e.g.*, a receptionist, boundary-spanning unit), an authority, a response coordinator, a data provider, or a respondent. Although Figure 1 presents participants from a single business organization, successful completion of the task may require either the participation of people who provide outsourced activities or communication with survey staff.

The response process is triggered when the survey instrument crosses the business's boundaries. The MIBSR

model addresses the business response to a survey request presupposing a positive decision about participation in the survey. The examination of this decision, potentially leading to nonresponse, goes beyond the scope of this article even though it represents a natural introduction into the response process and may influence its course. The model suggests the most typical sequence of processes, although in practice some may be left out, repeated, or occurring in a different sequence. The following sections focus only on elaborated and newly added insights into the response process.

3.2 Organizational level

3.2.1 Organization of the survey response

Participation in a survey generally entails some preparatory activities due to work distribution and specialization in organizations. It requires an answer about who will perform the survey response task and when it will be done; both answers provide clues about how the task will be carried out. The study provided evidence that the two steps could be intrinsically linked. In fact, the selection of people for the survey response may itself indicate the priority assigned to the task in the organization. For instance, in some accounting firms and larger businesses, chiefs performed the task themselves, although they could have delegated the task, which may indicate a certain importance of the task, while the fact that many respondents received the task as novices may indicate its low priority. In contrast, priorities at the individual level were not always consistent with priorities at the organizational level. For instance, even if tax reporting gained higher priority than statistical reporting at the organizational level, this was irrelevant for a survey respondent not involved in tax reporting. I therefore examined the selection of business participants and the scheduling of the survey response task together within the organization of the survey response. The result is an expanded list of factors potentially influencing the organization of the survey response task (see Figure 2).

Tradition, customary practices, established procedures, and information location mainly influence the selection of business participants, which is an organizational matter, while other factors operate at both the organizational and the individual levels. Tradition dictates reliance on previous participants in recurring surveys when the same people repeatedly participate in the response process of the same (longitudinal) survey. Some study respondents claimed they had been "filling it out for years." Some had been filling it out since they started the job or since a colleague retired, went on a longer sick leave, left the job, and so on.

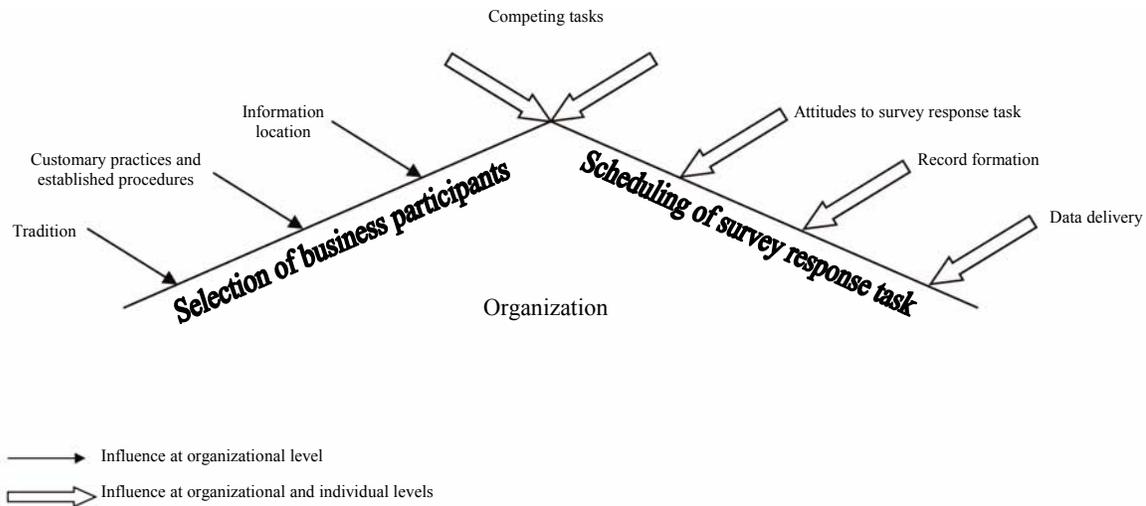


Figure 2 Factors influencing the organization of survey response

Many processes in organizations draw on customary practices and established procedures, which leads to the selection of the usual participants. This means that even when a new survey request reaches the business, the business will likely proceed in the same way as with previous survey requests because of the relatively stable distribution of work. In fact, some of the respondents in this study explained that the survey questionnaire would often be directed to the same department or person, who usually replied to such requests even if no formal policy on surveys existed. As one respondent clarified, “They prefer to bring them to me – this is the only policy.” Some respondents knew which types of surveys they received, saying, for instance, “I’m doing all statistics except wages,” or “I’m doing all statistics, also for the Bank of Slovenia, except Intrastat.” Even in larger businesses, the same person often filled out several different survey questionnaires; one person completed all survey questionnaires that required financial data, be it for the Bank of Slovenia, the Statistical Office, or the Agency for Public Legal Records; others provided a list of specific surveys that they would complete, such as surveys on investments, fixed assets, value added, and so on.

Information location is an essential factor that influences the selection of business participants from the perspective of measurement errors. It refers to sufficient knowledge to provide an accurate survey response, including adequate access to records, if necessary. In this study, many respondents expressed that they had been chosen because of their access to data, for instance, “I have the data and I know how to retrieve them.”

Competing tasks relates to the assignment of people and order to the tasks. It usually influences the choice of business participants at the organizational level when

alternative possible participants are compared, as well as the scheduling of the survey response task at the individual level when the priorities of a participant’s several tasks are considered. Study respondents in several, mainly smaller businesses agreed that they give low priority to the survey response task when they schedule their work: “VAT (value-added tax), debt recovery, bookkeeping . . . all has priority over statistics.” Another respondent said that she “wouldn’t think of doing the survey on the day all the book entries are done” but instead checks “the balance sheet, . . . liabilities, how the payments stand, how much debt there is, the financial situation.” Another explained the work process as “internal reporting first, current affairs next, statistical reporting afterwards.” In a few larger businesses, however, respondents said that they completed survey questionnaires as soon as data became available or final.

Similarly, attitudes to the survey response task can be examined at the organizational level through formal policies on surveys and the informal reactions of authorities as well as individual perceptions. Businesses in this study did not have any formal policies on surveys, though the discourse of authorities in some companies indicated their negative attitudes: “it’s only statistics; prepare something.” Organizational attitudes may affect the organization of the survey response, through potential consequences for the business, particularly opportunity costs, penalties, and damage to the public image. Most participants expressed a negative attitude toward surveys, describing them as “a necessary evil” and “redundant” or “additional” work. Individual attitudes toward surveys may contribute to the early, timely, or late scheduling of the task; they may also influence an individual’s inclusion or exclusion in the survey response task.

Record formation and data delivery are primary in the scheduling of the response tasks. The timing of record formation determines when the records with required data about the business were created and took on the acceptable or desirable form, especially when the data become final. Respondents in larger businesses and businesses with foreign ownership typically referred to internal deadlines for “closing the books” or the VAT submission deadline. Data delivery is relevant in those cases where the participant must rely on other people to deliver required data. This particularly applied to accounting firms in this study. However, the timing of record formation and data delivery may vary by the kind of data requested, so that the latest record formation and the latest data delivery, eventually, determine the actual scheduling. For instance, some respondents explained that more time was necessary to get the correct value of stock because of lags in recording incoming invoices as compared to sales figures.

After the organization of the survey response task, the task can be realized, though it is sometimes necessary to further refine the selection of business participants or the scheduling to provide for all requested items, absence from work, and other circumstances.

3.2.2 Retrieval of information from the business information system

The capacity of the business information system (BIS) is the key factor that influences the response process and its outcome in business surveys. The BIS does not consist of the technological element only; it also includes people (Avison and Elliot 2006). The human capacity of the BIS relevant for the business survey response is mainly reflected in cognitive processes at the individual level (see section 3.3), while its technological capacity is determined through business records at the organizational level. The study showed that formation of business records depends on internal and external factors, though the line between the two groups is blurred (see Figure 3).

External factors – legal obligations, standards, and benchmark practices – are imposed on companies from the environment and dictate the content of business records through cogency or the threat of sanctions. Legislation, regulations, and other forms of power with the law set out legal obligations. With respect to that, study respondents mainly mentioned mandatory compliance with accounting standards and the requirements of tax authorities. The latter could refer to the business as a whole (e.g., VAT reports) or to particular items (e.g., excise duties on tobacco products). Other mandatory requirements may relate to contributions, securities, insurance, environmental issues, and so on. Participants usually noted the compulsory character of governmental business surveys, although the lack of

sanctions for nonresponse or a late response made some participants question this; furthermore, changing record formation for statistical purposes only was unthinkable to most study participants. Standards are a softer form of external factors: they are not mandatory, but are expected to be followed in most cases. Two examples from the study include the use of a classification based on the European Article Number barcode standard and recommendations from accounting authorities. The study suggested that standards were not used in the case of specific reasons; for instance, the information systems of the smallest retailers did not support barcode use. Benchmark practices are the least influential group of external factors. They refer to good examples of practice that have gained some recognition and authority by reputation (and not by law or institutional power). For instance, some study respondents mentioned obsolete software versus current standards, while others stressed powerful capabilities of their software and its positive influence on data provision.

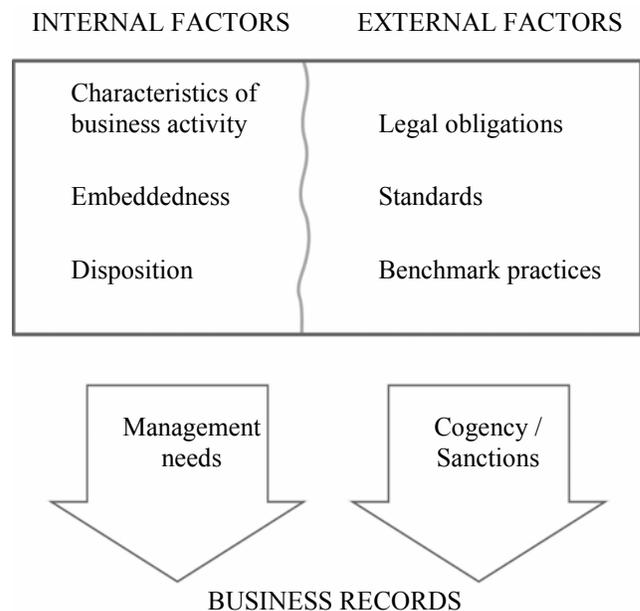


Figure 3 Factors of record formation

External factors drive data homogeneity and comparability in business records across companies, at least within similar economic activities. They provide the framework in which companies develop their own solutions for business records according to internal factors unless adhering to compulsory requirements more than fully satisfies data needs for running the business as was the case in small, local companies. Internal factors of record formation include characteristics of business activity, such as the size, type, and diversity of the business activity;

embeddedness in the business environment; and the disposition to forming records.

The size of the business activity plays a crucial role in record formation because it leads to a differential overview of an activity. In the study, most larger companies had an abundance of data. Business records provide information that cannot be gained from participation or observation only. That said, the size of the business activity is relative, especially if the size is observed only within legal boundaries or national borders. Therefore, it is better to speak about the embeddedness in networks of various kinds. In the study, for instance, a couple of smaller businesses had a foreign owner that demanded comprehensive reports to overcome the distance and manage the business remotely, and another small business had to use the sophisticated software of a business partner because it was its major supplier. The study also showed how different types of activities influenced the kind of available records; for example, wholesale businesses that typically put recipients on their invoices had more information on their buyers than businesses in retail that typically issued receipts without indicating the name. High diversity of business activities also is a major challenge for record formation in most businesses; in general, smaller businesses had renounced the use of detailed records and were forced to make estimates instead. Last, disposition refers to the prevailing attitudes of people in the business to various aspects of record formation, such as the inclination toward data, information technology, and change. Some businesses relied heavily on evidence-based decision making and thought highly of data; others showed enthusiasm for the possibilities of information technology, but a few others saw no usefulness in data.

Factors of record formation influence the availability of data in business records and their compliance with survey definitions. Data availability appears at the intersection of technological and human capacity in the business; knowledge is required to extract data from the BIS conditional on their existence. Several levels of answer availability in the BIS apply to survey questions (see Figure 4); their naming was inspired by the determination of cognitive states in Beatty and Herrmann (2002) and is in principle consistent with that proposed by Lorenc (2007):

- (a) A datum is accessible – the required answer may be readily available. In this study, a typical example is total sales revenue, which is readily available to a person in accounting, or the number of employees, which is readily available to a person in the personnel department.
- (b) A datum is generable – the required answer is not readily available to any person; the available data represent a basis for generating the required answer

through manipulation. In the study, for instance, sales revenue in a particular trade activity was not always readily available, but it was possible to derive the exact figure by consulting two separate records (*e.g.*, the general ledger and commercial records).

- (c) A datum is estimable – the required answer is not readily available to any person; the available data represent an approximation of the required answer or a basis for estimating the required answer through manipulation. In the study, a sales breakdown by commodity groups (*e.g.*, food, beverages, clothes, footwear) was often estimated by recategorizing available groups; however, those categories were sometimes too aggregated or too diverse to allow for an exact match (*e.g.*, Christmas products, Easter gifts, discontinued products).
- (d) A datum is inconceivable – no available data lead to the required answer or its approximation; some bases for generating or estimating the required answer exist but require an unimaginable effort to produce it. For instance, a company would have to classify more than ten thousand invoices monthly to arrive at an exact breakdown of sales by kind of buyers.
- (e) A datum is nonexistent – there are no bases for estimating the required answer. In the study, a cash-and-carry store could not distinguish between different kinds of buyers because they issued the same kind of nameless invoices to all customers, companies and individuals.

Because data availability varies across people in a business, it may be useful to determine answer availability at the individual level. In this case, a distinction has to be made between an answer that someone can obtain directly and an answer that they can access only through another person.

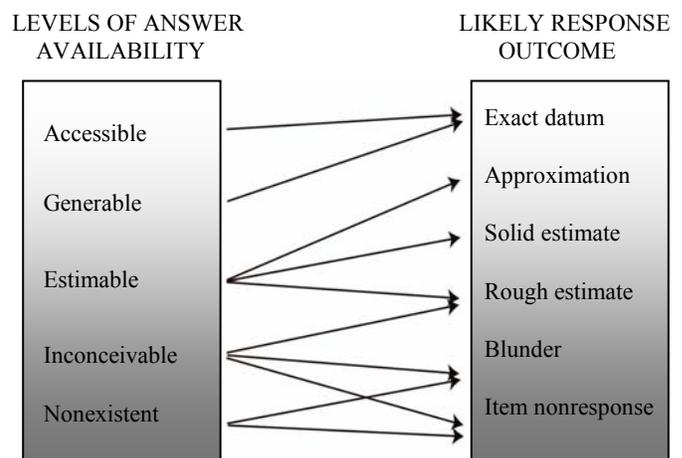


Figure 4 Levels of answer availability and likely response outcome

The final response outcome is conditional on the level of answer availability and may range from an exact datum to item nonresponse (see Figure 4). A measurement error occurs whenever the response outcome deviates from the exact datum. When a datum is accessible or generable, the response outcome is likely to be an exact datum, although the possibilities of committing a measurement error increase if data have to be accessed through other people or manipulated. When a datum is estimable, the response outcome may be an approximation with a negligible measurement error or an estimate with a minor or substantial measurement error. An inconceivable datum may, at best, lead to a rough estimate. When respondents have no adequate bases to provide a response, they may make wild guesses resulting in blunders or skip the question, which leads to item nonresponse.

3.2.3 Authorization of the business response

Authorization is the final opportunity for corrective actions before the business response is forwarded to the survey organization and documentation archived. Most businesses in this study found this organizational step inconsequential and even skipped it. In more than half of businesses, respondents signed the questionnaire themselves because “they have the mandate to sign such things” and “the director is very rarely present” or “does not deal with such things.” Still, even in those cases, some respondents mentioned that the director had been informed about that procedure. In several businesses, the superior signed the questionnaire for the sake of formality and no verification procedures were in place because “the director trusts us” or “doesn’t have the necessary data,” or because “we work this way.”

A superior was typically present in the largest companies, through formal authorization or informal notification. Internal verification was rare, which could be the consequence of preceding consultations with the superior. Accounting firms usually delivered the completed questionnaire to the business for signature, though businesses sometimes also signed the blank questionnaire in advance.

3.3 Individual level

Given the level of answer availability in the BIS, it rests on the performance of cognitive processes and accompanying physical actions (especially interaction with computers) at the individual level to determine the final response outcome. The MIBSR model proposes that three inherently linked types of knowledge are relevant for these processes: knowledge of business reality, knowledge of record formation, and knowledge of business records (see Figure 5). Although it may be difficult to disentangle the three types of knowledge in practice, the study seems to suggest that every type is particularly influential for one kind of cognitive process.

The division of cognitive processes into comprehension, retrieval, judgment, and response derives from Tourangeau’s (1984) response model. In business surveys, these processes may not be defined as easily as in surveys of individuals because the initial organization of the response may involve only a brief and superficial consideration of the survey task with barely any impact on the later response process or a thoughtful reflection on the questions. The study mainly focused on respondents’ cognitive processes because it is their task to answer survey questions. Nevertheless, observations of other business participants are provided where available.

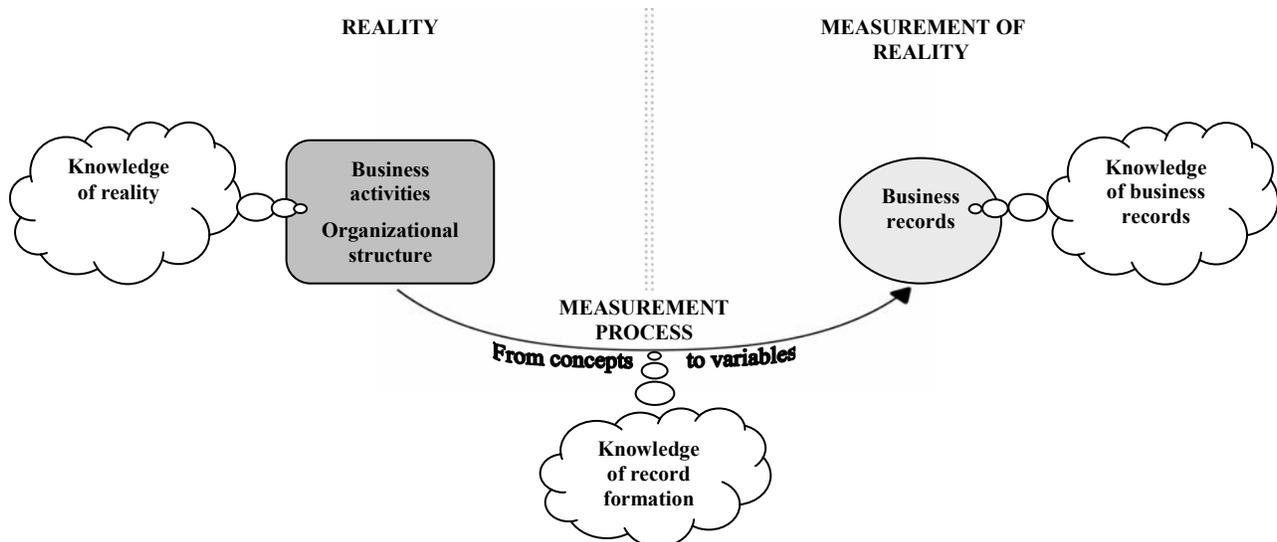


Figure 5 Knowledge relevant to the business survey response

3.3.1 Comprehension

In comprehension processes, respondents interpret the survey request for data, which usually is in the form of labels instead of questions. The MIBSR model suggests that, for comprehension processes, knowledge of business reality is particularly important. Business reality refers to the activities the business performs to subsist and to the division of work across locations and individuals. Knowledge of business reality thus presupposes acquaintance with every aspect of the business: who does what, what activities the business is involved in and how they are carried out, how decisions are made, why the business situation is as it is, how it evolved through time, and so on. Because larger businesses tend to be complex with technical and social divisions of labor, establishment of branches, organizational hierarchy, and decision-making structure (Tomaskovic-Devey, Leiter and Thompson 1994), it can be expected that fragmentation of the knowledge of the business's reality increases with business size.

This knowledge is essential in establishing whether survey questions are applicable to the business and providing correct answers afterward. In fact, no business in the study filled out all survey items. Respondents had to fill out only sections that applied to the kinds of trade they performed. Survey questions also required them to select applicable commodity groups, kinds of employment, kinds of buyers in wholesale, kinds of payment in retail, and so on. The required knowledge of business reality was occasionally specific: one respondent, for instance, needed information about the relationship between the company as the franchisor and their franchisees to avoid double counting or skipping some items across the businesses.

A major obstacle to using knowledge of business reality for correctly understanding survey questions was the incomprehension of economic and accounting concepts or their confounding with other concepts. For instance, one respondent had problems distinguishing between the concept of trade, which includes repackaging of goods, and the concept of production, which entails some transformation of goods beyond repackaging; a few respondents pondered over trade rendered on a commission basis because their activity was trade but accounting treated it as a service; many respondents associated retail with a store rather than with individuals as final consumers, regardless of the kind of buyer; one respondent defined wholesale as "everything that is not paid with cash" instead of linking it to nonfinal consumption; some respondents did not understand that "nontrade and nonmanufacturing organizations" were service providers; others did not understand the difference between merchandise and material, because the latter is an input to production (not trade) in accounting terminology

and takes on another meaning in colloquial language, such as construction or building material.

Study respondents often used their own definitions to interpret survey questions. The same is true for those business participants who provided data on request without actually seeing the questionnaire and/or instruction booklet. This, for instance, happened in a few larger businesses where data providers completely relied on their own definitions of the sales space when providing data on store distribution by size of the sales space because additional explanations were given only in the instruction booklet.

3.3.2 Retrieval

In retrieval processes, the data and information required for the survey response are located and brought forth. In business surveys, the data usually reside in business records, not in memories, but knowledge is crucial for their extraction and interpretation. The retrieval thus mainly rests on knowledge of the business records, which refers to the contents and location of business records in the business and the possibilities of data access, including familiarity with applications and the people in charge of them.

Study respondents mainly exhibited good knowledge of the business records they worked with. In a couple of businesses where superiors participated in the response process, the superiors were not abreast of all details of the records and had an assistant perform the retrieval—but they had excellent insight into the business reality and knew how it converted into records. Even perfect knowledge of the business records, however, did not always suffice for exact answers. When the business records did not register all necessary data, knowledge of the business reality became critical for making correct inferences and good estimates. This sometimes happened in larger businesses and accounting firms where respondents knew the records very well, including the chart of accounts and its codes, but knew the assortment of merchandise only vaguely. As a result, they had to use estimates when classifying sales by commodity groups, as their acquaintance with the business activity was incomparable to a comprehensive, firsthand insight of sales personnel. In smaller businesses, lack of necessary data in records sometimes meant complete reliance on memory instead of records; a respondent, for instance, arrived at employment in wholesale by retrieving the number of people in relevant workplaces, namely chauffeurs, people who worked in the warehouse, salespeople, and office clerks.

3.3.3 Judgment

Judgment refers to the compilation of all retrieved data and information to formulate an answer. In this study, it frequently entailed some data manipulation or handling,

such as summation, balance with a residual, recategorization, and application of proportions. Judgment is mainly supported by knowledge of record formation. This knowledge provides information on how the business reality translates into business records and ensures that captured data are not considered isolated figures, codes, or words but take on a certain meaning representing the processes and objects measured. It therefore represents a link between knowledge of the business reality and knowledge of the business records (see Figure 5). Its importance was, for instance, noted during the observation of a respondent who was filling out the questionnaire and had to struggle with an inconsistency in the retrieved sales data. To identify the mistake, she systematically analyzed nonsales activities in the observed period and the correctness of their encoding in the records to finally discover a transaction that should not have been included in the sales figures.

However, lack of knowledge could not explain some judgments with an unfavorable response outcome, so the study looked more closely into principles that guided judgment. Among the most pervasive principles encountered in the survey response process under study was the principle of continuity, which advocates the use of the same response strategy in recurring surveys – even if this leads to errors. Continuity was sometimes considered within a year but also across years. It seemed to be strengthened by the lack of negative feedback from the statistical organization and its presumed satisfaction with the data. The study identified several respondents who used detailed procedures of calculation that were quite obsolete. A respondent even erroneously left out the section of commission trade but would not change the procedure during the year to avoid disrupting the reported data.

Two other principles were identified in relation to the principle of continuity: the principle of consistency and the principle of disregarding the exceptional. The principle of consistency implies use of the same or similar response strategies in the same survey questionnaire. For instance, a respondent who attributed various items of merchandise to only one commodity group in wholesale did the same in retail; a respondent who estimated wholesale turnover from VAT figures used the same approach to retail turnover, and so on. The principle of disregarding the exceptional implies ignoring new, one-off, or temporary activities. For instance, a study respondent inadvertently reported a temporary activity not reported in the questionnaire; another confessed the exclusion of new activities from reporting because their success was uncertain. The question, however, is how to set boundaries on the novelty and on the temporariness and when precisely such activities become representative of the business.

The principle of disregarding the exceptional is also related to the principle of disregarding the marginal, which advises ignoring those activities that are perceived as marginal to the business. For instance, some study respondents disregarded some items in sales breakdowns if they represented less than one percent of activity. The impact of the principle depends on the use of the collected data. It should be inconsequential if the aim is to estimate national totals or change. However, sales of a specific commodity group may be marginal to a large business but not marginal for the market of that commodity group.

The business perspective principle advocates the priority of the business perspective as compared to a statistical request. In the study, data on existing organizational units were judged acceptable despite their divergence from the required units; data on various packages (*e.g.*, a newspaper supplemented with a book) that were relevant from the business perspective were not disentangled for statistical purposes.

3.3.4 Response

The response component refers to the processes of mapping a judgment onto a response category and editing the response (Tourangeau, Rips and Rasinski 2000). In business surveys, mapping usually translates into matching available data from the BIS with response categories offered, which provides room for a specific form of measurement error: misclassification. For instance, when respondents had problems fitting available sales data into the provided classification scheme, they often chose the closest category, the main category, or the category “other.”

The study also identified the presence of editing processes that show different aspects of business sensitivity. Some study respondents checked whether their selection of the decisive activity code was consistent with their registered activity, which may show a fear of nonconformity with administrative requirements. Not reporting people who helped in family businesses may reveal tax evasion. Although many respondents agreed that the data they reported in the questionnaire were considered confidential, there was scarce evidence of hindrance for disclosing the data to the statistical organization (*e.g.*, not reporting detailed data on newly introduced activities).

3.4 Survey level

The MIBSR model introduces the possibility of conceptualizing the response process over several implementations of a survey or over several surveys. It thus conceptually enables the observation of how the elements of survey design, which is under the control of survey organization, influence the response process.

The study focused on the impact of recurrence on the response process. In repeated administrations of the survey to the same business, the organization of the survey response became less relevant or irrelevant if it was a perfect replica of the preceding administration. The cognitive processes at the individual level were characterized by routine when the same business participants performed them. Many respondents admitted that they had not read the whole questionnaire, let alone the instructions in a repeat questionnaire. This also occurred in businesses that agreed to be observed while completing the questionnaire: after respondents gave the questionnaire a swift scan for any changes, they plunged into the retrieval processes based on the previously completed questionnaire or on other documentation and supporting notes. The comprehension step was thus performed superficially and pertained more to understanding completion of the previous questionnaire than it did to understanding survey requests. The retrieval procedures followed the previously established course and exhibited learning-curve effects. The respondent's judgment clung to the initial approach and was unlikely to change. The recurrence frequently loosened up a respondent's supervision and reduced the importance of the authorization or even omitted it.

Given the appointment to the survey task of the same people or usual units in the business, many of them sooner or later had contact with survey staff, despite the common self-administrative mode of data collection in business surveys. Such contact could occur early in the response process and influence the respondent's comprehension and judgment. This was rarely the case in the study; only a few respondents asked for explanations the first time they participated in the survey and another respondent asked for help when the business's activity changed. Contacts in which respondents requested postponement of the deadline did not seem to influence the subsequent response process, though the same could not be claimed for respondents who resisted participation. All other contacts happened during a follow-up when the response process, or parts thereof, had to be performed again, which could result in an adjusted survey response. Although respondents mainly acknowledged the politeness of the survey staff, their calls signaled that something was wrong: a missed deadline, an item missing in the questionnaire, an inconsistency in the reported data. The rareness of such contacts made a significant impression on respondents because these contacts were often the only type of feedback from the statistical organization.

In contrast, respondents did not always appreciate a lack of feedback. They expected feedback from the statistical organization after they first participated in the survey, but this generally did not happen. The lack of reaction made

them confident in their approach, thus reinforcing the principle of continuity in their judgment. However, many respondents reported at least one piece of data that was not completely accurate (or not as accurate as they would expect the data should be) and they perceived the lack of complaints as satisfaction with bad data. Some respondents were convinced that the statistical organization knew about their business activity, which is why they rarely provided textual descriptions of seasonal oscillations. Given these observations, it is not surprising that several respondents expressed doubts about the accuracy of statistical data or questioned the accuracy of data that others provided. The right feedback may not only be important for that particular survey but also for participation in other surveys because it contributes to general perceptions on surveys and statistics.

4. Discussion of model's contributions

The dominance of written communication between the survey organization and businesses has moved business participants away from the center of statistical production and reduced the possibilities of insights into the process of responding to survey requests and the causes of measurement errors. By studying the response mechanisms and influencing factors, response models help bring these insights out and design approaches that turn this knowledge into an advantage. This section discusses the contributions of the MIBSR model with respect to previous response models applicable to business surveys.

4.1 Model construction

Two approaches were encountered in construction of previous models: adding some organizational steps to the core cognitive processes from Tourangeau's cognitive model of survey response (Biemer and Fecso 1995; Edwards and Cantor 1991; Sudman *et al.* 2000; Willimack and Nichols 2001) or using the organization as the unit of observation (Lorenc 2006). The MIBSR model explicitly links the processes to the level at which they occur: cognitive processes to the individual level and organizational processes to the organizational (in our case, the business) level. It also foresees the observation of the response process over several implementations of the same survey or over several surveys with different designs, which is particularly interesting for governmental surveys. By analyzing complex response processes at the appropriate level of observation, the MIBSR model sets up a framework that can also be used for quantitative modeling and experimental design.

4.2 Insights at the organizational level

Previous models treated initial organizational arrangements in the context of respondent selection (Biemer and Fecso 1995; Edwards and Cantor 1991) or in separate steps of respondent selection and the assessment of priorities, the latter ranking statistical reporting to the government lower than most other business reporting activities (Sudman *et al.* 2000; Willimack and Nichols 2001). They also identified several factors that influence respondent selection, especially the functional role, authority level, and position with regard to the information system (Edwards and Cantor 1991), knowledge of the information system, terms and definitions (Biemer and Fecso 1995), competing job responsibilities and access to the data (Sudman *et al.* 2000). The MIBSR model integrates all preparatory activities in the organization of survey response and suggests an expanded list of influencing factors. The organization of survey response now acknowledges that delegation of the task may also include selection of other business participants beyond respondents and that priority of competing tasks is just one of the factors influencing the task's scheduling.

All previous models have paid considerable attention to record formation. The MIBSR model suggests a different systematization and extension of factors of record formation, initially grouped into management, regulation, and standards by Willimack and Nichols (2001). Because it is generally unlikely that the requirements of statistical reporting are an actual factor of record formation, the MIBSR model may assist the survey organization in its endeavors to exert influence on record formation and eventually obtain requested data. Taking into account technological and human capacity of the BIS, the MIBSR model defines several levels of answer availability based on the extent to which the answer conforms to required survey definitions and proposes the likely response outcome. In authorization of the business response, the MIBSR model reiterates the possibility of internal verification that Sudman *et al.* (2000) and Willimack and Nichols (2001) propose for the release step. Authorization is more likely sought out when the survey response involves legally separate units and more formalized and centralized organizations.

4.3 Insights at the individual level

At the individual level, which deals with comprehension, retrieval, judgment, and response (Tourangeau 1984), the MIBSR model further elaborates on the knowledge relevant to cognitive processes. Willimack and Nichols (2001) emphasized personal knowledge for answers directly from memory and knowledge of the records. The MIBSR model suggests that a thorough understanding of the data in business records and their appropriate use in the survey response require knowledge of the whole chain of data

generation, from knowledge of business reality to knowledge of record formation and knowledge of business records.

As far as comprehension processes are concerned, Edwards and Cantor (1991) have acknowledged the problematic use of jargon, and Sudman *et al.* (2000) have pointed to the problematic deviation of required economic concepts from accounting standards. The MIBSR model goes even further to explain that the errors may result from a broader issue of incomprehension of economic and accounting concepts or their confounding with other concepts.

The MIBSR model identifies several principles that help understand the underlying judgment processes in business surveys, which are consistent with examples manifesting the principles of continuity and consistency by Sudman, *et al.* (2000) and Willimack, Nichols and Sudman (2002), respectively. These principles may also reflect satisficing (Simon 1957) or inertia. The use of inappropriate principles, especially the principle of continuity, is particularly strengthened by the lack of survey feedback.

In the cognitive processes of responding, the MIBSR model exposes the problem of matching in business surveys, thus adding to the rounding error that Sudman *et al.* (2000) discuss. It also integrates different aspects of business sensitivity that Edwards and Cantor (1991) have discussed as part of the communication step, and Sudman *et al.* (2000) have discussed as part of the release step. The model treats them at the individual level where the editing occurs if the data are indeed sensitive.

4.4 Insights at the survey level

Previous models have concentrated on a single occurrence of the response process in a particular business survey, while the MIBSR model extends to several occurrences and several surveys. Among the many dimensions at the survey level, the study systematically analyzed the impact of recurrence and contact with the survey staff on the response process, which represents a further elaboration of specific instances already mentioned in previous models in the context of retrieval, such as rehearsal of the look-up (Edwards and Cantor 1991) or documentation of previous completions supporting retrieval (Sudman *et al.* 2000). In addition, the MIBSR model allows for the presence of a contagious effect transmitting the experience in one business survey to other business surveys.

5. Conclusion

Survey organizations usually have to set aside a considerable amount of resources for processing survey data because the processes of responding to survey questions in the businesses are not performed satisfactorily. The MIBSR model provides further evidence on how the processes are

carried out and what influences them. It offers insights into the business perspective, which are valuable for efficiently seeking solutions to improve the processes and, consequently, reduce or eliminate measurement errors. The model may also serve as a framework for the documentation and systematization of existing and future knowledge on the causes of measurement errors in business surveys. It may be used as a preceding step of empirical studies on measurement errors and for a consistent explanation of empirical findings. Future research should continue with the application of the qualitative research methods to the study of particular dimensions of the response process, other business participants besides respondents and other kinds of business surveys. It should also embark on quantitative modeling of the response process and verifying the effectiveness of suggested improvements with experiments. Last, it should look into the interactions with other kinds of nonsampling errors.

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References

- Avison, D., and Elliot, S. (2006). Scoping the discipline of information systems. *Information Systems: The State of the Field*, (Eds., J.L. King and K. Lyytinen). Hoboken: John Wiley & Sons, Inc., 3-18.
- Bavdaž, M. (2009). Conducting research on the response process in business surveys. *Statistical Journal of the IAOS*, 26, 1-14.
- Beatty, P., and Herrmann, D. (2002). To answer or not to answer: Decisions processes related to survey item nonresponse. *Survey Nonresponse*, (Eds., R.M. Groves, D.A. Dillman, J.L. Eltinge and R.J.A. Little). New York: John Wiley & Sons, Inc., 71-85.
- Biemer, P.P., and Fecso, R.S. (1995). Evaluating and controlling measurement error in business surveys. *Business Survey Methods*, (Eds., B.G. Cox *et al.*). New York: Wiley-Interscience, 257-281.
- Edwards, W.S., and Cantor, D. (1991). Toward a response model in establishment surveys. *Measurement Errors in Surveys*, (Eds., P.P. Biemer, R.M. Groves, L.E. Lyberg, N.A. Mathiowetz and S. Sudman). New York: Wiley-Interscience, 211-233.
- Giesen, D., and Hak, T. (2005). The response process model in business surveys: Lessons learned by using a multi-method approach. *FCSM Conference Papers*, Federal Committee on Statistical Methodology.
- Greenia, N., Lane, J. and Willimack, D. (2001). Perceptions of confidentiality protection at statistical agencies: Some evidence from data on businesses and households. *Statistical Journal of the United Nations ECE*, 18, 309-314.
- Groves, R.M., Fowler, F.J., JR., Couper, M.P., Lepkowski, J.M., Singer, E. and Tourangeau, R. (2004). *Survey Methodology*. Hoboken: Wiley-Interscience.
- Hak, T., Willimack, D.K. and Anderson, A.E. (2003). Response process and burden in establishment surveys. *Proceedings of the Section on Government Statistics*, American Statistical Association, 1724-1730.
- Hedlin, D., Dale, T., Haraldsen, G. and Jones, J. (2005). *Developing Methods for Assessing Perceived Response Burden*. Eurostat.
- Jenkins, C.R., and Dillman, D.A. (1997). Towards a theory of self-administered questionnaire design. *Survey Measurement and Process Quality*, (Eds., L.E. Lyberg *et al.*). New York: Wiley-Interscience, 165-196.
- Kvale, S. (1996). *InterViews: An Introduction to Qualitative Research Interviewing*. Thousand Oaks: Sage Publications.
- Lorenc, B. (2006). Two topics in survey methodology: Modelling the response process in establishment surveys; inference from nonprobability samples using the double samples setup. Doctoral dissertation, Department of Statistics, Stockholm University.
- Lorenc, B. (2007). Using the theory of socially distributed cognition to study the establishment survey response process. *Proceedings of the Third International Conference on Establishment Surveys, Montreal, Canada*, American Statistical Association, 881-891.
- Morrison, R.L., Stettler, K. and Anderson, A.E. (2002). Using vignettes in cognitive research on establishment surveys. *International Conference on Questionnaire Development, Evaluation and Testing Methods, Charleston*, American Statistical Association.
- Nichols, E.M., Murphy, E.D., Anderson, A.E., Willimack, D.K. and Sigman, R.S. (2005). Designing interactive edits for U.S. Electronic Economic Surveys and Censuses: Issues and guidelines. *Research Report Series (Survey Methodology 2005-03)*, U.S. Census Bureau.
- O'Brien, E.M. (2000). Respondent role as a factor in establishment survey response. *Proceedings of the Second International Conference on Establishment Surveys*, American Statistical Association, 1462-1467.
- Phipps, P.A., Butani, S.J. and Chun, Y.I. (1995). Research on establishment-survey questionnaire design. *Journal of Business & Economic Statistics*, 13, 337-346.
- Ponikowski, C.H., and Meily, S.A. (1989). Controlling response error in an establishment survey. *Proceedings of the Surveys Research Methods Section*, American Statistical Association, 258-263.
- Ramirez, C. (1996). Respondent selection in mail surveys of establishments: Personalization and organizational roles. *Proceedings of the Survey Research Methods Section*, American Statistical Association, 974-979.
- Simon, H. (1957). *Models of man: Social and rational*. New York: John Wiley & Sons, Inc.
- Snijkers, G., Onat, E. and Visschers, R. (2007). The annual structural business survey: Developing and testing an electronic form. *Proceedings of the Third International Conference on Establishment Surveys, Montreal, Canada*, American Statistical Association, 317-326.

- Sudman, S., Willimack, D.K., Nichols, E. and Mesenbourg, T.L. (2000). Exploratory research at the U.S. Census Bureau on the survey response process in large companies. *Proceedings of the Second International Conference on Establishment Surveys*, American Statistical Association, 327-337.
- Tomaskovic-Devey, D., Leiter, J. and Thompson, S. (1994). Organizational survey nonresponse. *Administrative Science Quarterly*, 39, 439-457.
- Tourangeau, R. (1984). Cognitive science and survey methods. *Cognitive Aspects of Survey Methodology: Building a Bridge between Disciplines*, (Eds., T.B. Jabine, M.L. Straf, J.M. Tanur and R. Tourangeau). Washington, D.C.: National Academy Press, 73-100.
- Tourangeau, R., Rips, L.J. and Rasinski, K.A. (2000). *The Psychology of Survey Response*. Cambridge, England: Cambridge University Press.
- Willimack, D.K. (2003). Business respondents' perspectives on alternative employment arrangements and implications for employment statistics. *Proceedings of the Section on Government Statistics*, American Statistical Association, 4559-4570.
- Willimack, D.K. (2007). Considering the establishment survey response process in the context of the administrative sciences. *Proceedings of the Third International Conference on Establishment Surveys, Montreal, Canada*, American Statistical Association, 892-903.
- Willimack, D.K., Lyberg, L.E., Martin, J., Japac, L. and Whitridge, P. (2004). Evolution and adaptation of questionnaire development, evaluation, and testing methods for establishment surveys. *Methods for Testing and Evaluating Survey Questionnaires*, (Eds., S. Presser *et al.*). Hoboken: Wiley-Interscience, 385-407.
- Willimack, D.K., and Nichols, E. (2001). Building an alternative response process model for business surveys. *Proceedings of the Survey Research Methods Section*, American Statistical Association.
- Willimack, D.K., Nichols, E. and Sudman, S. (2002). Understanding unit and item nonresponse in business surveys. *Survey Nonresponse*, (Eds., R.M. Groves, D.A. Dillman, J.L. Eltinge and R.J.A. Little). New York: John Wiley & Sons, Inc., 213-227.
- Yin, R.K. (2003). *Case Study Research: Design and Methods*. Thousand Oaks: Sage Publications.