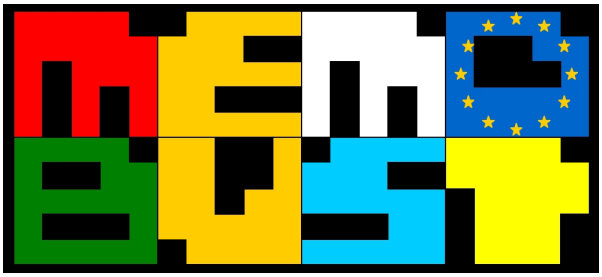


This module is part of the

Memobust Handbook

on Methodology of Modern Business Statistics

26 March 2014

Theme: Response Process

Contents

General section

1. Summary

The statistic survey perspectives can be viewed as a design perspective and quality perspective (Groves et al., 2004). The design perspective leads from concepts through "constructs" and measurements to questions to become a process and one of its stages is the response process. The quality perspective makes numerous references to "error". The sampling error, nonresponse error are just two examples. Measurement errors refer to the gap between what is called the ideal value and the obtained response, i.e., at the response process stage. Survey methodologists attribute deviations from perfect measurements to cognitive problems in the response process. Hence, these problems lie at the heart of the response process model. Originally, the model was developed to reflect aspects of households and individual surveys. Further development of cognitive research extended the model to fit the response process in business surveys. A merger of the two produced a Hybrid Response Process Model for Business Surveys, a complex and general model encompassing the entire response process in business surveys. Since it still did not fully and clearly address numerous aspects the model has recently been developed into the Multidimensional Integral Business Survey Response Process Model.

The response process models can serve as a framework for the evaluation of business surveys (Giesen, 2007). The linkage between model steps and observations of real respondent behaviour when dealing with survey requests, provides the structure which can help to analyse this complex activity. This is a way to spot problems and try to fix them for the future. Furthermore, considering the data collection instrument and the response burden connected with answering items it contains, response process steps make it possible to establish at which stage the burden is especially heavy and what can be done to ease it. This can improve the questionnaire and even influence its design. The division of the response process into separate stages was the foundation of cognitive methods for pretesting survey questions. Cognitive interviewing, understood as an extension of the standard interviewing process of eliciting answers to questions, studies processes distinguished in the response process model (Willis, 2004). The foundation of the response process for establishment surveys, which is more complex and contains more steps, adequately allows to split survey evaluation into the response process steps. When the data collection process and the response burden are assessed using different methods (Giesen, 2007) and the findings are linked with the response process stages it is possible to establish the nature of the problems, whether cognitive or logistic, and consequently, adopt the results to improve the data quality or ease the response burden.

2. General description

2.1 Response models for business surveys

The starting point is the respondent's task in the interview. The cognitive analysis of the task provides the basis for a description of operations the respondent must go through to arrive at an answer to a survey question. The widely adopted model for answering questions in interviews was introduced by Tourangeau (1984) and consisted of four basic consecutive steps:

1. Comprehension – first, understanding the meaning of the question.
2. Retrieval – recalling the relevant information.

3. Judgment – formulating an answer based on recalled information.
4. Communication – formatting the answer to fit the demands.

The psychological aspect of the question-answer process and its social dimension are accounted for in the general response model mentioned above. However, potential sources of the measurement error exist even before these four cognitive steps. Eisenhower et al. (1991) introduce another step at the top of the list, namely "Encoding". Addition of another step was motivated by the fact that before the four steps of the model take place memory must be formed from experiences of the respondent. The earlier model was mostly suited to individual and household surveys, because it relied on social interaction of interviewing and memory engagement. By comparing the differences between responses in household survey and establishment surveys, Edwards and Cantor (1991) developed the response model for establishment surveys. The major difference between those models results from the fact that establishments often use information systems or records, not memory, to obtain knowledge to a question. Hence, the *record formation* step in a business survey is an equivalent of the cognitive *encoding* step in a household survey is. Similarly, *retrieval* from memory is analogous to the *record look-up* process in establishments. The decision which source is to be used – records or memory – calls for yet another step: the *source decision*. The cognitive activities of comprehension, judgment and communication apply directly to the establishment response model. Finally, the model consists of six steps:

1. Encoding/Record formation.
2. Comprehension.
3. Source decision.
4. Retrieval/Record look-up.
5. Judgment.
6. Communication.

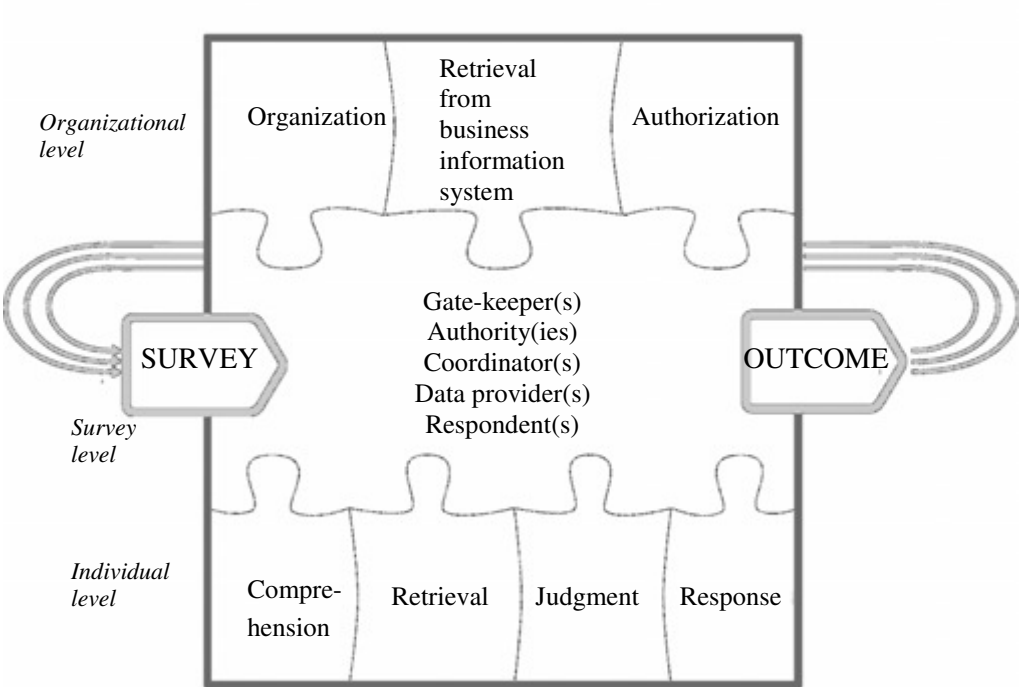
Exploratory research on reporting to statistical surveys and its findings produced the Hybrid Response Process Model for Establishment Surveys (Sudman et al., 2000; Willimack and Nichols, 2001). This model extends and revises the previous models by explicitly distinguishing organisational and cognitive steps of the response process in establishment surveys. Singling out the consecutive phases in the survey request tasks performed by an establishment links the cognitive and organisational factors of the process. The combination of cognitive and organisational levels results from a qualitative study of large establishments conducted by Sudman et al. (2000). The model was slightly modified and complemented by Willimack and Nichols (2001). The organisational context creates a framework for cognitive factors. The complete model includes the following steps:

1. Encoding in memory/record formation.
2. Selection and identification of the respondent or respondents.
3. Assessment of priorities.
4. Comprehension of the data request.
5. Retrieval of relevant information from memory and/or existing company records.

6. Judgment of the adequacy of the response.
7. Communication of the response.
8. Release of the data.

While cognitive factors remain valid, the additional steps are motivated by the complex nature of the response process in establishments, perceived as living organisms with goals other than releasing information for statistical purposes. In other words, the organisational steps in the hybrid model can be treated as integral processes, which characterise a business as an organism, while the individual steps connect the four step model with personal abilities associated with comprehension, retrieval, judgment and communication; the result is the Multidimensional Integral Business Survey Response Process Model (MISBR) proposed by Bavdaž (2010). This model integrates previous findings with new research results. The model addresses the two composite layers of the response process in establishments – the organisational layer and individual layer. Between the two layers the model distinguishes the survey layer, which provides a link between them. The illustration beneath provides the author's visual representation of the model.

Business organization



reprinted by permission of the author (Bavdaž, 2010)

The *Organisational layer* includes a complex list of factors, which influence the consecutive steps of the response process. Respondent selection and assessment of priorities are an integral part of the organisational layer have their own significance as far as organisational priorities and individual priorities are concerned. Individual priorities and organisational priorities may not always be unified. Typical organisational factors influencing the response process are: tradition, customary practices, established procedures and the location of information. Individual and organisational mixture of factors include competing tasks and formation and delivery of requested data. Business policy to

surveys and the individual attitude to tasks concerning these surveys are both influential factors, which connect the organisational and individual level. At the organisational level the model also distinguishes retrieval from business records and authorisation of the business response. Retrieval is based on the business information system. How the system is organised depends on two kinds of factors: internal and external. External factors include: legal obligations, standards and benchmarking practices. These factors are imposed more or less from outside of an organisation. Internal factors, on the other hand, depend on management needs. The record formation process is conditioned by the kind of business activity and its environment. It is also related to the problem of data availability. As a result, response forms a kind of continuum: from exact values through various levels of estimation to nonresponse in extreme cases.

The *Individual layer* moves the response process from the organisational level to the individual level, since participants of the process are individuals, who act according to their own cognitive processes. The stages of the individual response process, i.e., comprehension, retrieval, judgment and communication, are linked to the organisational level. The multidimensional integral business response process distinguishes three types of knowledge needed in the response process: the knowledge of the business reality, the knowledge of record formation, the knowledge of business records. Comprehension of the business reality involves matching survey variables with business activity and determining its relevance for survey questions. Retrieval is closely connected with business records and therefore the knowledge of business records is a key element, provided the required data are stored in business systems. In case they cannot be obtained, the business reality can be a helpful factor. Judgment, in turn, refers to the compilation of possessed information and the record formation process to properly link the data with business concepts. During the communication step, the business knowledge from records must be edited and categorised to suit the format required by the measuring instrument.

The *survey layer* accounts for the response process during surveys and refers to the general implementation of the survey response as well as repeated response to the same surveys. The layer can be used to conceptualise the influence of various elements of a survey on the response process. Distinguishing this level enables the observation how survey design components influence the response process. For example one of the observed dimensions at this level is the impact of repeated administrations of the survey to the same respondent on the organisation of the response. The other example of the dimension can be the impact of respondent's contact with the survey staff on response. At the survey layer the focus is on repeated administrations of the survey response. Additionally, the layer allows observation of a contagious effect transmitting the experience from one business survey to other business surveys (Bavdaž, 2010).

In addition to distinguishing organisational and individual levels of the business survey response process, the model also assigns different roles to people taking part in the process. All those people participate in the process at the organisational level, but at the individual level they have their own internal cognitive processes. Their roles and their influence on the response process exceeds the four-steps of the cognitive model (comprehension, retrieval, judgment and response) since their participation may only be episodic, at various points of the process, and may not affect the later understanding of questions or the organisation of the response. The model distinguishes the following roles: the gate-keeper (a person or a unit that brings information into an organisation or sends information from an organisation to the surrounding environment), the supervisor or people with

authority, the data provider and the respondent. The completion of the response process may even require the participation of persons from outside of an organisation or contacts with a survey agency. The *survey* level draws attention to the fact that repeating the same activities leads to routine performance of tasks, which may be done only partially or superficially. On the other hand, the repetitive character of reporting procedures may even eliminate the need for a supervisor by progressively supervision in consecutive rounds of recurrent surveys.

2.2 Application of the response process model

The widely adopted response process model developed by Tourangeau (1984) created a framework for cognitive methods of questionnaire pretesting in household and social surveys. The aim of these methods is to improve questions and to reduce measurement errors. The study of the response process model steps supports the development of rules for questionnaire design, but the main goal of cognitive methods is to evaluate survey questions and change them whenever necessary (Willis, 2004). The development of response process models for establishment surveys turns the attention to the complexity of the response and the burden associated with it. A better understanding of the process of establishment's statistical reporting may reduce the response burden (Sudman et al., 2000). Establishment activities at each step of the process and interactivity between them may increase or reduce the burden, and consequently result in item non-response and influence data quality (Hak et al., 2003). The evaluation of questionnaires used in the field for data collection and the detection and understanding of the problems connected with them can be based on the extended hybrid response process model for business surveys (Giesen, 2007). Research on the response process model provides results for data users and data collectors (Willimack and Nichols, 2010). Conclusions for data users include, among others, the awareness of possible cases of non-availability of the required data in the context of complex and burdensome nature of business surveys. Data collectors can use it as a basis to improve data collection instruments and to facilitate data collection process.

Moving down the extended hybrid model (Sudman et al., 2000; Willimack and Nichols, 2001) the consecutive steps can be briefly characterised as follows:

Encoding in memory/record formation step links two aspects of the process: cognitive and organisational. Two approaches are possible depending on the type of required information: categorical data or figures. In the first case, data can be *usually* retrieved from memory; in the latter case it is *usually* necessary to consult transactional systems. In this case memory is needed, too, to recall the knowledge of company systems. The greater an establishment is, the more complex the acquisition of information may be. What is important, however, is that such data actually exist in the systems, though it is not a sufficient condition. Studies show that businesses keep their data according to:

- management needs,
- regulatory compliance,
- established standards.

The influence of data collectors on record formation would be very desirable and could facilitate the *retrieval* step (Willimack and Nichols, 2010). Another application from empirical observations of this

step in establishments can be the relaxation of requirements concerning burdensome items of the survey or items for which information may not exist (Giesen, 2007).

Selection and identification of the respondent or respondents

Researches draw attention to the fact that the selection of a proper respondent can reduce the measurement error (Edwards and Cantor, 1991; Willimack and Nichols, 2010). The step is singled out on account of its further consequences for cognitive steps. The respondent can be more of a coordinator, whose task may focus on compiling collected pieces of information. Since it is very likely that data from many users are required to answer survey questions, questionnaires should enable respondents to forward different parts of the questionnaire to different users (Giesen, 2007). In the case of electronic collection instruments, features which facilitate the distribution of questionnaires among users of an organisation can also decrease the response burden by involving multiple users in the response process.

Assessment of priorities

Tasks in establishments have their priorities. Statistical obligations are ranked low on the list of priorities. They are defined as "Other government data requests" (Willimack and Nichols, 2010). Government reporting duties generate costs to establishments. Factors which respondents need to pay attention to – and are therefore worth to underline in the design of elements in the survey related to response – include:

- mandatory status of the survey,
- clear due date, explicitly given, according to the standard date format of the country,
- advance notice of new surveys.

The mandatory status of the request is a feature implicitly distinguished by respondents (Willimack, 1999) and therefore worth stressing. Feedback from a statistical agency underlining the importance of the supplied data is recommended as an incentive to respondents (Giesen, 2007).

Comprehension of the data request

Comprehension is a typical cognitive step. Understanding varies among respondents, which emphasises the importance of respondent selection. The key factor is the knowledge of business reality. Respondents fit the meaning of a given concept to standards used in business practice such as accounting standards. There are several additional factors, which complicate the response process in the case of electronic reporting as opposed to paper questionnaires (Morrison, 2005). Electronic instruments require a friendly user interface and the user-centred design, which can improve the understanding of the instrument and contribute to a positive image of electronic reporting.

Retrieval of relevant information from memory and/or existing company record

As mentioned above, the *record formation* stage is connected with the physical availability of the requested data. This is only a first step. Another problem involves data retrieval from company records, which may be difficult either owing to the complexity and the subject scope of questions or because of the organisational complexity of an establishment. At a more specific level, two questions should be asked: first, to what extent do survey concepts match business practice? Any deviations in this respect can influence comprehension. Secondly, who has the ability to access company data?

Another problem is connected with compiling individual pieces of information into one response item. As can be seen, the overlap between the steps of *respondent selection* and *retrieval* requires cooperation between company employees. This should be considered when designing collection instruments: namely, they should facilitate the distribution of a part or parts of the questionnaire to ease the burden of response. Given respondents' familiarity with spread sheets, questionnaires can become more user-friendly when they are organised like spread sheet tools (Willimack, 2010). Record formation factors also influence data availability. Several levels of data availability in business systems are reflected at various levels of the response outcome (Bavdaž, 2010). In some cases, answering questionnaire items may require estimation. The response outcome can vary from approximate values to item non-response. The recommendation for data collection instruments is to explicitly inform when estimation is acceptable or to add an field where estimated values can be entered (Giesen, 2007).

Judgment of the adequacy of the response

The collected information are assessed to determine if they meet the requirement criteria. At this stage data can be submitted to various operations such as summation, categorisation. Figures may represent an estimated value if exact data could not be acquired. Studies stress the role of questionnaire instructions as tools to judge the correctness of prepared data and their continuity, which means that procedures established previously are also valid in future periods, which also means that errors made earlier are carried over to the future. In the case of business surveys the prevalent data collection mode is the self-administered questionnaire. Electronic data collection instruments contain edit checks. Edit messages help to form a judgment about the validity of the response (Morrison, 2005). Built-in edit rules can encourage the respondent to review the data for accuracy or provide an explanation when the rule is not satisfied. The module "Questionnaire Design – Editing During Data Collection" discusses issues connected with editing within the questionnaire.

Communication of the response

Communicating the response means matching prepared data to fit the options of the measuring instrument. Electronic questionnaires ushered in "editing" at the data collection stage. Data consistency may require some correctional operations. Respondents are generally positive about electronic reporting (Willimack, 2010), which may be due to the common use of spread sheets, no matter what skills users have. The burden of communicating the response may also be seen by respondents as unwarranted as opposed to the burden connected with retrieval (Hak et al., 2003). The user-centred design can address many issues in order to facilitate the communication of the response.

Release of the data

Studies indicate that this step may require authority. What literature refers to as "social desirability" can also be observed in establishment surveys. The company's desire to comply with external obligations and the concern to project a good public image may entail an internal policy, whereby any information leaving the company must first be approved by the management. Another factor is the confidentiality of business activity, which raises the question of trust towards a statistical agency.

3. Design issues

4. Available software tools

5. Decision tree of methods

6. Glossary

For definitions of terms used in this module, please refer to the separate "Glossary" provided as part of the handbook.

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Interconnections with other modules

8. Related themes described in other modules

1. Questionnaire Design – Editing During Data Collection
2. Data Collection – Main Module
3. Response – Response Burden

9. Methods explicitly referred to in this module

1.

10. Mathematical techniques explicitly referred to in this module

1.

11. GSBPM phases explicitly referred to in this module

1.

12. Tools explicitly referred to in this module

1.

13. Process steps explicitly referred to in this module

1.

Administrative section

14. Module code

Response-T-Response Process

15. Version history

Version	Date	Description of changes	Author	Institute
0.1	16-01-2012	first version	Paweł Lańduch	GUS
0.2	11-09-2012	second version	Paweł Lańduch	GUS
0.3	14-06-2013	third version	Paweł Lańduch	GUS
0.4	17-09-2013	fourth version	Paweł Lańduch	GUS
0.4.1	04-10-2013	preliminary release		
0.5	18-02-2014	minor revisions according to EB review	Paweł Lańduch	GUS
1.0	26-03-2014	final version within the Memobust project		

16. Template version and print date

Template version used	1.0 p 4 d.d. 22-11-2012
Print date	21-3-2014 17:51