

The Dutch Annual Business Inquiry: Developing and Testing an Electronic Form

Ger Snijkers, Evrim Onat, Jo Tonglet, Rachel Vis (Statistics Netherlands) & Robert 't Hart (Metaform, Amsterdam)

1. Introduction

A major issue in Dutch governmental policy as to data reporting in general is reduction of response burden. As a consequence, Statistics Netherlands strives for reduction of data reporting for individual businesses, as well as making data reporting as efficient and easy as possible. One way to do that is providing electronic questionnaires via the internet (Haraldsen, 2004; Hedlin et al., 2005; Dowling, 2005).

In 2004, a project was started to redesign the paper questionnaire for the Dutch Annual Business Inquiry. First of all, the questionnaire was stripped to items necessary with regard to output demands. Secondly, the form was redesigned with regard to the structure (sections of items), instructions and wording. And thirdly, the visual design of the form was restyled. This redesign project created the opportunity to develop an electronic version of this complex questionnaire.

The electronic form was developed and tested in a number of steps. Functional issues of the form were investigated in a small usability test, using a draft version that was very similar to the original paper form (Snijkers, Tonglet & Onat, 2005). This test also resulted in the identification of navigational issues, edit rules and visual design issues that make an e-form different from a paper form. The result of this test was a prototype of the e-form. In a second step the prototype was tested again, in order to find out how the new form works in practice (Onat & Vis-Visschers, 2005). In this paper both usability tests will be described. The last step will be a field pilot in which the usability and data collection process as a whole will be tested.

2. The Dutch Annual Business Inquiry

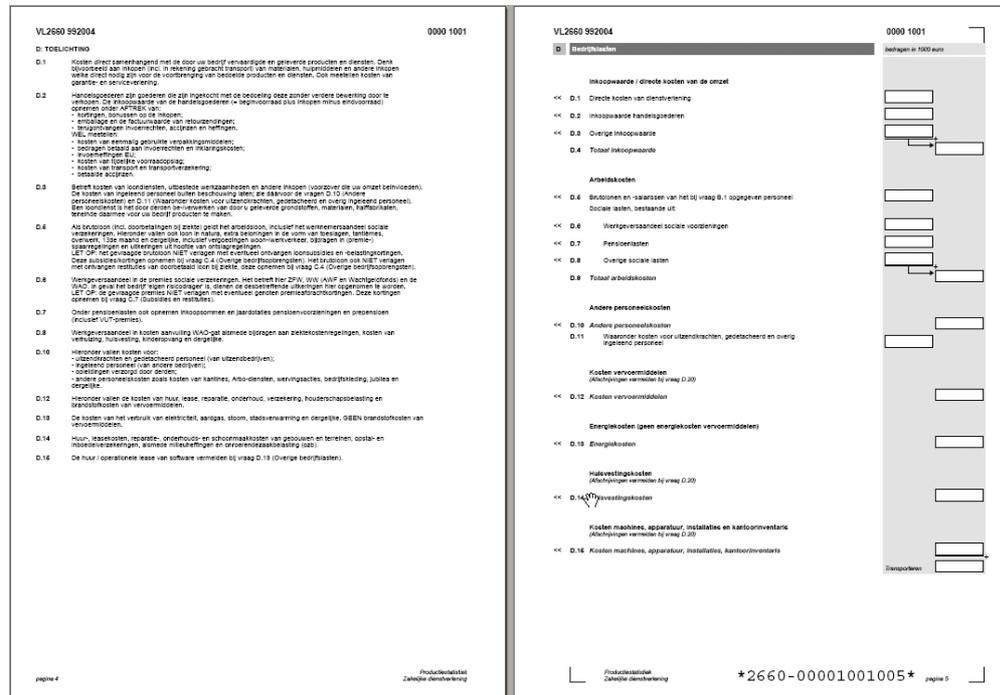
In the Dutch Annual Business Inquiry, businesses are requested to provide information on benefits and losses, i.e. their business accounts. In 2005 a sample of about 70.000 businesses was drawn for the 2004 Inquiry. These businesses received a paper form including an advance letter, saying that – among other things – this inquiry is mandatory. About 45% of the sample is self-selecting, meaning that they receive the questionnaire every year. This concerns the larger establishments with 50 and more employees.

The longest questionnaire for large establishments consists of up to 40 pages. A questionnaire may be seen as a booklet of A4 pages with the items on the right page and the instructions and explanations on the left page (see figure 1). The items are grouped into sections, which may be over more than 4 pages long. Sections concern issues like employees, benefits, costs, and business results. The questionnaire is characterised by many and voluminous instructions and explanations, because of differences in definitions as used by businesses.

The questionnaire is complicated and hard to complete. This has to do with the fact that a lot of detailed information is requested. Furthermore, the information has to be collected from various departments, and most of the definitions and the order of

the items on the questionnaire do not match those of the administrations. These aspects make the completion process of the form very cumbersome and time-consuming, resulting in measurement errors. Also the lay-out of the paper questionnaire caused measurement errors. These results stem from a detailed evaluation study of the paper questionnaire (Giesen, 2004, 2005).

Figure 1. The original questionnaire of the Annual Dutch Business Inquiry.



With these results in mind the structure and the lay-out of the questionnaire was redesigned. This came down to:

- breaking the questionnaire down into smaller sections of no more than one page, resulting in a better overview for each section, and less calculation errors;
- a strict order of [item label] - [short instruction] - [answer space], thus connecting – in reading order – items and answer spaces;
- locating additional instructions and explanations at the bottom of a page, like footnotes;
- restricting instructions and explanations to the most essential information, resulting in short and readable notes.

In figure 2 two pages of the newly designed paper form are presented. To get this result a professional designer¹ was consulted.

¹ Robert 't Hart (Metaform, Amsterdam).

Figure 2. The redesigned questionnaire of the Annual Dutch Business Inquiry.

C Bedrijfsopbrengsten

Let op!
Bekijken ex. BTW
SOMM € 23.874 als 24

Netto-omzet (C1)
Factuurwaarde aan derden, inclusief transitohandel en omzet binnen de onderneming.

Handelsvermindering (C2)
Som gefactureerde procenten van het omschrijven van verkopen en kopers.

Omzet detailhandel (C3)
Factuurwaarde handelsgoederen geleverd aan consumenten.

Industriële omzet (C4)
Factuurwaarde zelfvervaardigde goederen en/of geleverde industriële diensten.

Verhuur onroerend goed (C5)
Factuurwaarde huurprijzen onroerend goed.

Overige omzet (C6)
Omzet uit alle overige afzonderlijke activiteiten die een sectorij specifiek vertegenwoordigen van de bedrijfsomzet.

Totaal netto-omzet (C7)
 $C1 + C2 + C3 + C4 + C5 + C6$

Waarvan toeleveraar (C8)
Procentage van het bij vraag C7 opgegeven bedrag dat in rekening is gebracht aan derden in het buitenland.

Overige bedrijfsopbrengsten

Geactiveerde productie (C9)
Waarde van zelfvervaardigde duurzame productiemiddelen die zijn ingezet in eigen bedrijf.

Beheersopbrengsten (C10)
Vergoedingen voor infrastructuurdiensten.

Subsidies en restituties (C11)
Zowel nationaal als van de EU, inclusief investeringssubsidies en afschrijfkortingen op loonbelasting.

Overige, niet eerder genoemde opbrengsten (C12)
Overige, niet eerder genoemde opbrengsten.

Totaal bedrijfsopbrengsten (C14)
 $C9 + C10 + C11 + C12$

Toelichting

Netto-omzet
Wel meeliefden:
- afzonderlijke eigen vervoer en distributiekosten;
- interne verkopen.
In mindering brengen:
- kortingen, bonussen op verkopen;
- afschrijfkortingen, aan derden betaalde restituties (zie F10);
- rekening geleefde restituties;
Niet meeliefden:
- ontvangen exportrestituties, exportverminderingen (zie C11);
- ontvangsten voor de beschikking gestelde arbeidskrachten (zie C12);
- ontvangen schade-afkeringen (zie C12).

Omzet groothandel
Handelsprocenten zijn procenten voor eigen rekening en risico ingekocht met het doel deze zaken verder te verhandelen door te verkopen aan handelaars en/of bedrijfsmatige gebouwen.

Overige bedrijfsopbrengsten
Wel meeliefden:
- opbrengsten uit kermissen, royaute's, andere...; niet-kermissen;
- ontvangen schade-afkeringen;
- niet-ontvallen belasting (zoals arbeidsloon, arbeidskosten, salaris van de zaak).
Niet meeliefden:
- vergoedingen voor afgevoerd personeel (zie E10);
- andere, afkorting van de vermindering van overzetten (zie E10);
- zekeringen (zie E10).

Inkoopwaarde en directe kosten van de omzet

Inkoopwaarde handelsgoederen

Beginvorraad (D1)
Voorraad handelsgoederen aan begin boekjaar, inclusief leveringskosten.

Inkopen (D2)
Factuurwaarde, vermindert met kortingen.

Eindvoorraad (D3)
Voorraad handelsgoederen aan eind boekjaar, inclusief leveringskosten.

Inkoopwaarde handelsgoederen (D4)
 $D2 - D3 + D1$

Inkoopwaarde grond- en hulpstoffen

Beginvorraad (D5)
Grond- en hulpstoffen aan begin boekjaar, incl. leveringskosten. Het betreft slechts het volume van industriële activiteiten.

Inkopen (D6)
Factuurwaarde, vermindert met kortingen.

Eindvoorraad (D7)
Voorraad grond- en hulpstoffen aan eind boekjaar, incl. leveringskosten.

Inkoopwaarde grond- en hulpstoffen (D8)
 $D6 - D7 + D5$

Overige

Uitbetaald werk (D9)
Alle uitbetaalde werkzaamheden die direct samenhangen met de omzet, inclusief kosten van ingekond personeel.

Kortingen en bonussen (D10)
Op jaarbasis verkregen kortingen en bonussen die nog niet verrekend zijn bij de vraag C1 en D6.

Totaal inkoopwaarde (D11)
 $D8 + D9 + D10$

Waarvan import (D12)
Procentage van het bij vraag D11 opgegeven bedrag dat in rekening is gebracht door derden in het buitenland.

Toelichting

Inkopen
Wel meeliefden:
- kosten van verwerkte verpakkingmiddelen;
- uitvoerkosten en inkooptarieven;
- kosten van tijdelijke voorraadprijzen;
- inhoudingskosten (zie F10);
- kosten van eigen transport en transportverzekering.
In mindering brengen:
- kortingen, bonussen op de inkopen;
- restituties van de factuurwaarde van retour-zendingen;
- terugbetalingen betaalde schulden, andere dan kortingen;
- restituties aan derden (zie F10).

Uitbetaald werk
Betroft alle uitbetaalde werkzaamheden voor zover gericht op realisatie van omzet. Dit kan betrekken op kosten voor uitbetaald personeel, inclusief of juridische adviezen. Wel meeliefden kosten voor bijvoorbeeld spijzen door derden.

3. Testing the electronic form

The results of the evaluation of the paper form helped in thinking about the visual design of the electronic questionnaire. Because of this study, we already had a clear view on the response process with regard to this questionnaire (Giesen, 2004, 2005; see also Willimack et al., 2004). However, some research issues still had to be answered. We had to find out how the electronic form would work-out in practice, and what features had to be included in the e-form in order to make it easy to use. Another important issue was whether the paper and the electronic forms had to be designed in the same way. To research these issues a usability and test study was carried out.

At the time we started thinking about the electronic form, the results of the evaluation study of the paper form were not yet available. So, the old form (figure 1) was used as a basis. This form was programmed in Blaise. The use of Blaise set the layout conditions. This form is presented in figure 3. The original sections are the tabs in the e-form, located at the top of the screen. The tabs were labelled A, B, C, etc., corresponding to the sections of the paper form. Furthermore, the form is characterised by pages that need scrolling. To help the respondent complete the form, edit rules like calculations and checks were added to the e-form. To obtain explanations to items the key combination <Ctrl><F1> had to be pressed; this was indicated by ‘*’ at the left hand side of an item.

Figure 3. The e-form of the Annual Dutch Business Inquiry, first version.

Bedrijfslasten	bedragen in 1000 euro
Inkoopwaarde / directe kosten van de omzet	
D.1 * Directe kosten van dienstverlening	
D.2 * Begintvoorraad handelsgoederen	
D.3 * Inkoop handelsgoederen	
D.4	0
D.5 * Eindvoorraad handelsgoederen (inclusief herwaarderdingen)	
D.6 Inkoopwaarde handelsgoederen	0
Overige inkoopwaarde met betrekking tot:	
D.7 * Uitbestede werk, werk door derden en loondiensten	
D.8 Inkoopwaarde niet elders genoemd	
D.9 Overige inkoopwaarde	0
D.10 Totaal inkoopwaarde	0
Arbeidskosten	
D.11 * Brutolonen en -salarissen van het bij vraag B.1 opgegeven personeel	
Sociale lasten, bestaande uit:	
D.12 * Werkgeversaandeel sociale voorzieningen	
D.13 * Pensioenlasten	
D.14 * Overige sociale lasten	
D.15 Totaal arbeidskosten	0
Andere personeelskosten	
D.16 Uitzendkrachten en gedetacheerd personeel	
D.17 Overig ingeleend personeel	
D.18 Opleidingen verzorgd door derden	
D.19 * Overige personeelskosten	
D.20 Totaal andere personeelskosten	0

This form was tested in three waves, as is indicated in table 1. In the first wave an on-line version of this form was tested by 15 colleagues of Statistics Netherlands. These colleagues were familiar with the paper questionnaire, and comprised testers from the CBS cognitive lab, business interviewers, questionnaire developers, and helpdesk employees. The designer who redesigned the paper form was involved in this test wave.

In the second wave, this form was tested in the field by 6 CBS business interviewers and involved 37 businesses. These businesses were selected in such a way that a variety of branches of industry were included in the study: Software development, road transportation, accountant bureaus, and building cleaning. These businesses were middle to large businesses as to number of employees, i.e. 50 and more. In this way, the completion process would be complex and vary among businesses, in the sense that smaller and larger business administrations were involved and perhaps even more than one administration had to be consulted.

The questionnaire was loaded from a CD-rom onto the laptop of the interviewers and completed by the interviewers at the offices of the businesses. The interviewers were instructed in the use of the electronic questionnaire, since they had to know how to operate the e-form in the field.

In the third wave, in-depth interviews were carried out with 6 business respondents at their office. Like in the second wave, a variety of branches of industry was included: software development, road transportation, and building cleaning. Again, the sizes of the businesses varied, from 20 up to 100 employees.

These interviews were carried out by testers from the CBS cognitive lab in cooperation with business interviewers. The business interviewers are experts on this form, and can identify errors in the completion process. The interviews were video taped. In this wave the respondents had to download the questionnaire from a CBS server via the internet (at a https-address), log-in to the questionnaire with a

username and a password, complete it off-line, and send the data back via a secure internet connection to a CBS server. The respondents were not familiar with the questionnaire.

Table 1. An overview of the test waves

	Wave 1	Wave 2	Wave 3
Period of testing	August 2004	October 2004	November/December 2004
Questionnaire	Blaise	Blaise	Blaise
On/off-line	On-line via internet	Off-line, installed from CD-rom on laptop of business interviewer	Off-line, downloaded via internet
Number of completions/interviews	15 CBS employees	37 businesses	6 businesses
Tested by:	CBS cognitive lab testers, business interviewers, helpdesk employees, questionnaire developers, designer	6 CBS business interviewers	2 cognitive lab testers, and 2 CBS business interviewers
Results	Major difficulties with on-line version	Experiences from interviewers	Most results from inexperienced respondents

4. Results of the first test study

In this section the results of the three test waves will be described. The results will be presented in the order of the response process, i.e. i) retrieving the questionnaire, ii) starting up the questionnaire, iii) introduction to the questionnaire, iv) filling-in the questionnaire, v) transmitting the data and vi) deleting the questionnaire.

4.1. Retrieving and installing the questionnaire

In the test, three ways of distributing the questionnaire have been used. The on-line version, in wave 1, was characterised by long sending and receiving sessions. Even for fast data connections, the time needed to receive a new page lasted much more than 5 seconds. This was due to the length of the questionnaire and the included edit rules. Distributing the questionnaire via CD-rom, as was used in wave 2, on a large scale is relatively expensive.

In testing wave 3 (with the downloadable version), it was observed that the problems regarding retrieving and installing the questionnaire were mainly getting the https-address right. In this wave respondents had to type in a long and unusual https-address from a letter. This gave rise to typing errors. Also the fact that a secured address was used (https) brought about errors in the address: people did not see the 's'. After several tries, respondents needed help from the interviewers to continue.

Once the respondent had logged-in on the CBS-server the questionnaire could be downloaded and installed. The installation procedures did not cause major

problems. One respondent could not download the questionnaire because of a firewall; the questionnaire was installed from a CD-rom.

4.2. Starting-up the questionnaire

Once the questionnaire had been installed on the computer, it could be opened. In wave 3, however, respondents first had to log in to the questionnaire by use of a username, a password and an additional security code. This procedure did not cause any trouble, except for the use of the security code, which was supposed to prevent unauthorised logging in to the questionnaire with a hacked username and password, especially for on-line questionnaires. This code was generated by the computer, presented on the screen, and had to be copied. The meaning of this code was not clear and resulted in many questions: “why is it there?” “Since it is on the screen, it makes no sense, or does it?” Respondents were reluctant to continue, until the meaning was explained.

4.3. Introduction to the questionnaire

After the respondent had logged in to the questionnaire, a first page with information regarding the questionnaire was presented. This page contained information on the sections of the questionnaires and their order, as well as information on how to navigate, get to instructions, and transmit the data.

This was done in wave 3. In the previous waves, the opening page was the first page with data boxes. In these waves, the ‘respondents’ did not know what to do, although they were familiar with the paper questionnaire.

4.4. Filling in the questionnaire

Completing a questionnaire like the Annual Business Inquiry is a very complex and long process, which puts a heavy burden on the respondent (Giesen, 2004, 2005). During the test interviews, respondents sat in front of their computer, surrounded by piles of administration papers, notepads and a calculator. The filling-in process involved their turning from the questionnaire to the administration papers, finding a pen to make notes, returning to the questionnaire on the screen, opening the explanation window to the item using their mouse, going in search of additional administration papers, typing in numbers in the calculator, etc, and finally entering the data in the questionnaire. Respondents were also disturbed by the phone ringing, and by colleagues coming in asking for information. Also, in practice, respondents may need several sessions to complete the questionnaire, and they need to contact colleagues from other departments to get the requested information. It is hardly surprising that, during such a process, respondents became easily confused and got lost when completing the questionnaire.

With regard to a survey like this one, we have to take into consideration that for businesses there are no benefits in participating. To them the completion of the questionnaire only brings about costs. As Willimack et al. put it (2002, p. 225): “Survey participation is considered a non-productive activity, resulting in a cost to the business that does not generate profit.” This means that business respondents will not be motivated to complete the questionnaire.

Because of the complex completion process and the lack of motivation, the usability and the user friendliness of the e-form are of great importance (Hedlin, Dale, Haraldsen & Jones, 2005). Our assumption is that when respondents have difficulties with the usability, they become irritated and will not complete the questionnaire (resulting in (item-)nonresponse) or will choose a satisficing response strategy, i.e. try to complete the questionnaire as quickly as possible e.g. by estimating answers (very likely resulting in measurement errors; Krosnick, 1991). Jansen and Steehouder (see d’Haens and Steehouder, 2000) call this the

kick-and-rush behaviour², meaning that respondents go straight for the tasks; they read as little as possible, read scanning looking for keywords, and seek an efficient response strategy. This behaviour will even be stronger when they are not motivated to participate.

The focus of the test was on the usability and the user friendliness of the questionnaire. Aspects concerned with usability are the visual lay-out and navigation. Some ideas to improve usability were mentioned by the respondents during the interviews. These ideas concerned printing, searching, calculating, carrying-over, explanations, and progress indication. These issues will be discussed in this subsection.

4.4.1. Visual lay-out and navigating

The characteristics of the e-questionnaire, as presented in figure 3, are described in section 3. In the test interviews in wave 3, we found that the tabs were not identified as tabs, and as such did not help respondents to navigate through the questionnaire: they did not realize that they could skip from one section to the next by clicking the tabs.

Because respondents did not identify the tabs as the separate sections of the questionnaire, they had no overview of the questionnaire and got lost. After completing the items in the first tab, and pressing <enter> to the last item, they skipped automatically to the next tab. All of a sudden a screen with empty answer spaces was presented. This confused the respondents, who then wondered where the answers had gone. They had not noticed that a new section was presented. The interviewer had to instruct the respondent on the use of the tabs. One respondent remarked that a structure like the Windows Explorer would be more logical, with all sections listed in an index at the left side of the screen.

Furthermore, some tabs were comprised of long pages, corresponding to long sections on the paper questionnaire. This made scrolling necessary, resulting in a bad overview of the section.

An e-form should be clear and user friendly, like every questionnaire (Dillman, 2000; Fowler, 1995). The lay-out should be functional in the sense that it should help the respondent in finding his way through the questionnaire. Furthermore, respondents want to know what sections of the questionnaire are completed and what still has to be done. The visual lay-out of the tested e-form did not meet these needs. During the test, this resulted in a lot of questions by the respondents, on how to continue and where to go next. Because of unexpected skips, some respondents got lost in the questionnaire.

4.4.2. Printing

Respondents requested the possibility to print the questionnaire. In the tested version, no printing option was available. We found that respondents wanted to make a paper copy for several reasons. First of all, while completing the questionnaire, they want to know where they are and what data they have already entered. Secondly, when other departments have to be consulted, separate sections of the questionnaire can be passed on in hard copy. After the questionnaire has been completed, respondents want to check the data on paper and obtain authorisation to send the data to Statistics Netherlands. And finally, they want a paper copy for their archives.

² In case of electronic questionnaire we can speak of click-and-rush behaviour.

4.4.3. Help window for calculations

In addition to a print function, respondents requested for a ‘fill-in window’. This is a window that can be opened with an item, offering the possibility to fill in the items from the administration papers that match the item and the corresponding numbers. In this window, all numbers will be automatically counted up, and the result will be put in the corresponding response space.

After completing the questionnaire, respondents did not know anymore with what items on the questionnaire specific items from the administration papers were listed. This aid would be helpful, when at the end corrections had to be made to the entered numbers, and respondents had to go over the questionnaire again. Also, the windows had to be printed with very item used. Respondents felt that such an aid would be helpful to keep track of the completion process.

4.4.4. Entry search

While completing the questionnaire, some respondents ticked off the items in their administration papers that were already entered in the questionnaire. At the end of the questionnaire, they noticed that not all items had been checked off. However, they did not know where to put these items. Up to this point, the questionnaire was leading in the response process, meaning that they searched for the items in their administration papers that matched the definitions on the questionnaire (or at least, what they thought would match). From this stage on, however, the administration papers became leading. Now, they had to find the entries in the questionnaire that matched the items in the administration papers. At this point, respondents would find it useful when they could search for labels, instead of having to browse through the questionnaire and hoping to find the correct item. Here, respondents indicated that an entry-search facility would be helpful.

4.4.5. Automatic calculations

In the tested questionnaire, items were automatically added or subtracted. This is a major feature of computer-assisted data collection (Couper et al., 1998; De Leeuw, Hox & Snijkers, 1995). Respondents were positive about this feature; as a matter of fact they expect the computer to do the calculations (Murphy, 2005). In some cases, however, the results of the calculations were unexpected or it was unclear where the numbers came from. This was the case when the calculated numbers were not logical, or when the results were put at the end of the page and respondents had to scroll to find them.

4.4.6. Carrying-over (imputations)

In the paper form, many relations between items exist, for example, the summation at the end of a page has to be carried over to the next, or the summation of a section is used in another one. On paper, respondents have to be instructed in these matters (as is the case with addition and subtraction). In the e-form, these rules had been computerised. We believed that this would make the form easier to complete, since on paper many respondents had shown difficulties with these rules (Giesen, 2004, 2005). It was discovered, however, that respondents became confused when, for example, the computerised imputation rules were not logical to them, or when it was not clear where the imputed number came from. Furthermore, they could not edit the imputed numbers, since these answer spaces were locked.

4.4.7. Instructions and explanations

In the tested questionnaire, explanation windows could be opened by pressing <Ctrl><F1>. Explanations were indicated by ‘*’ with items, but respondents did not notice this mark. Therefore, they were not aware that help was available. Even when they did notice the asterisk, they did not know what it meant. Only after they

were told that an explanation window could be opened and how it could be done, did they use it.³

4.4.8. Progress indicator

Since respondents cannot easily browse through an electronic questionnaire, as is the case with paper forms, respondents indicated that a progress indicator is desirable. This indicator gives feedback to the respondent as to what parts have been completed and what still has to be done.

4.5. Transmitting the data

To send back the data, respondents had to log in to the internet. Before doing so, the respondent had to confirm that all relevant items had been completed. After this had been done, a pop-up window appeared asking whether the data should be transmitted now.

In this process a number of problems appeared. First of all, after the filling-in of the questionnaire had been confirmed, respondents had to press <enter> to continue; the interviewer had to inform them of this. Secondly, in a number of cases, respondents didn't manage to log in to the CBS server because of technical problems. Also, respondents were confronted with messages from the computer saying that 'manipula.exe' was trying to connect to a remote server. This computer program was part of the e-form, but since respondents were unaware of this hidden part, they did know what to do.

After the data had been transmitted, a confirmation was received, thanking the respondents for the data. Respondents were positive about this message. However, after this message window was closed, the window saying that the data are ready to be sent appeared again on the computer screen. This was very confusing. Some respondents thought that the data had to be sent again, although they had received a confirmation.

4.6. Deleting the questionnaire

After the response process was completed, respondents might have wanted to delete the questionnaire from their computer. In this study, respondents did not indicate that they would like to do this.

5. Recommendations and discussion after the first tests

Based on the results of our research the following recommendations are proposed with regard to the electronic questionnaire of the Dutch Annual Business Inquiry.

i) Retrieving and installing the questionnaire

- As to this long and complex questionnaire, we recommend a downloadable questionnaire to be installed on the computer, and completed off-line. This recommendation is based on our experience in this study and the evaluation of the paper form (Giesen, 2004, 2005). A rule of thumb (as used by the Dutch Tax Office) is that questionnaires of over 25 items should be off-line versions. This questionnaire may be completed in several sessions, and by several people from several departments. A downloadable form makes it possible to stop and

³ This does not necessarily mean that the explanations are useful to respondents. From the evaluation of the paper form (Giesen, 2004, 2005), we know that they only read explanations when they need help. When they read the explanations, they may not be very useful, since they do not provide the required help. Also, help may be missing where it is wanted.

start again at any given moment. Also, all information concerning the questionnaire and entered data is available, making it possible to browse through the questionnaire while keeping an overview. Furthermore, the time to be on-line is relatively short, in comparison to an on-line version.

A drawback of the off-line version is that businesses with firewalls may not be able to retrieve the questionnaire. We expect, however, that in practice this may not be a big problem. This is based on the experiences with the Dutch Tax Office. Since the beginning of 2005, businesses are compelled to use electronic tax forms that have to be downloaded via the internet.

- Downloading and installing should be clear and simple. This could be done by providing an internet site with a simple http-address (like e.g. www.mycbs.nl). When this site is a personal site, this site should be secured by a username and a password, for example. The download and install procedures should preferably be in accordance with known conventions as used by MS-Windows.

ii) Starting-up the questionnaire

- The questionnaire may start with a log-in procedure. Since the respondent may feel that the questionnaire contains confidential data, a log-in procedure may be needed. A respondent will then be asked whether he would like to protect the questionnaire with a username and a password so that unauthorised personnel cannot open it. This procedure may be optional.

iii) Introduction to the questionnaire

- The test study shows that respondents need a clear introduction to the questionnaire. After having logged-in, the questionnaire should open with this page, listing information on the structure of the questionnaire, how to proceed, navigate, obtain explanations, fill in and transmit the data. This page should, preferably, not exceed one screen.

iv) Filling in the questionnaire

- The visual design should be functional in the sense that it should help the respondent find his way through the questionnaire, and provide information on what has been completed already and what remains to be done. Furthermore, as the evaluation of the paper form shows (Giesen, 2004, 2005), the questionnaire should be composed in a consistent way; every lay-out element that is not consistent may confuse respondents.

The composition of the questionnaire should be instantly clear and simple. This should also be true for navigation. The tabs and the long pages (making scrolling necessary) did not provide an overview of the questionnaire. A set-up that people are used to is a design with the sections listed at the left side of the screen, as is shown in figure 4. Punselie (2004) recommends that such a structure should not be too deep. According to him, a structure with more than 4 levels results in people losing overview. Also, each level should consist of no more than 7 sections.

In the literature on Web questionnaires, a lot of attention is given to the visual design and navigating (see e.g. Best & Krueger, 2004; Punselie, 2003; Schonlau et al., 2002; Vroom, 2002; Van der Geest, 2001; Dillman, 2000; Dillman et al., 2005). This indicates that these issues are important regarding usability.

- Scrolling should be avoided as much as possible. Each section should be made to fit on a computer screen, i.e. paging instead of scrolling.

- The questionnaire should be composed out of small, clear sections. Here, the redesign of the paper form (as discussed in section 2) helped in designing the electronic form.
- The questionnaire should have a printing function. This may be a function which asks what section of the questionnaire should be printed, e.g. this section (empty), this section (including answers), the whole form (including answers), or an empty form.
- A fill-in window and an entry-search facility would help in obtaining a better match between administration papers and the questionnaire items, in stead of matching on face value and what comes first. This facility would help in making completion easier as well as reducing measurement errors (i.e. listing administration items at the wrong entry).
- Edit rules with regard to calculations and carrying-over (imputations) should be implemented in the form. Respondents expect the computer to be more than a passive receiver of data: “They expect the computer to perform calculations for them and to help them keep their data consistent by running edit checks for valid data.”, as Murphy points out (2005, p. 10). However, these rules should be clear and logical to the respondents.

Although not tested in this study, we state that the same is true for consistency and range checks. Dowling (2005) reports that respondents like edit checks because they want to get it right. Also, they feel that it is efficient in the sense that it “stops me getting a phone call later on”, when the Statistical Institute calls back for data cleaning.

However, experience with computer-assisted data collection (Haraldsen, 2004; Couper et al., 1998; De Leeuw, Hox & Snijkers, 1995) shows that edit checks should be implemented with care and tested carefully. Too many interruptions and error messages may frustrate the response process, and irritate respondents. When occurring, clear error messages should indicate the error to the respondent. Murhphy (2005) found in usability studies of electronic questionnaires that error messages are “showstoppers”. Even if respondents were free to go on, “they would not continue to the next question unless they could resolve the edit message.”

- Instructions and explanations should be presented in a clear way. It should be clear to respondents immediately that explanations to items are present, and that they can be viewed simply by clicking a button. This button, as well as short instructions, should be presented in such a way that they will attract attention. Since respondents are not likely to read long texts, especially not on the screen, and since they read scanning, the explanations themselves should be clear and short, as are the instructions to the new paper form (see section 2). This is also true because in web data collection no interviewers are present to provide assistance.
- While completing an electronic questionnaire, respondents need feedback on their progress. A clear progress indicator should be implemented.

v) Transmitting the data

- Before transmitting the data, a confirmation of the completeness and accuracy of the data should be requested. This may not only be interpreted as a check to whether the questionnaire is completed, but also whether the data are correct.

- Technical problems with regard to the transmission process should be avoided: this process should be tested carefully.
 - The transmission of the data should be confirmed with a “thank you” message, indicating that the data have been received. After this message has appeared on the respondent’s screen, the send-button should not be presented anymore.
- vi) Deleting the questionnaire.
- Although this study did not provide any data on the need to delete the questionnaire afterwards, we feel that this option should be implemented in the system. In most software programs this is a default option.

With these recommendations in mind and following guidelines as presented in the literature on internet surveys (see e.g. Dillman et al., 2005; Best & Krueger, 2004; Haraldsen, 2004; Punselie, 2003; Schonlau et al., 2002; Vroom, 2002; Van der Geest, 2001; Dillman, 2000), this questionnaire was redesigned. The result is presented in figure 4.

6. Testing the new version of the downloadable electronic form

Following the above mentioned recommendations, a new electronic form for the Annual Business Inquiry had to be developed. This was not immediately possible, because the recommended visual design was rather difficult to program. The informatics department of SN developed a new computer program, based on Blaise that could build such an advanced visual design. The working title of this program was TEPS (tool for the electronic business inquiry), later it was named Basil. For this test round four different questionnaires were programmed in Basil. Figure x gives an example of one screen of the questionnaire.

Figure 4. Example of a screen of the questionnaire

The visual design of the form is similar to the electronic forms of the Dutch tax authorities, and as such respondents are familiar with the visual design. In the

frame on the left the different sections of the questionnaire are presented in an index. This index can be used to browse through the questionnaire. At the bottom of the screen there is a menu bar, with buttons for sending, saving, quitting and printing the questionnaire; a button for the calculator, and the help window for calculations and a help-button. Above the menu bar the navigation buttons are located. Additionally there is a yellow affirmation button, with which each screen must be completed. Finally there is the content frame in which the questions are presented.

The questionnaires were tested with ten businesses. The test interviews were conducted as follows: an SN consultant and an interviewer from the Questionnaire Laboratory carried out the interviews. The aim of the interview (i.e. testing the questionnaire) was explained to the respondent. Next the respondent received a letter with the internet address of the questionnaire in it. The consultant and the interviewer then observed how the respondent filled in the questionnaire. Afterwards they evaluated the task and the respondent could give his opinion and recommendations. The results of the test are presented next.

6.1. Results of the test

6.1.1. Downloading and installing the questionnaire

To download the questionnaire the respondent had to copy a lengthy internet address from the letter into the internet browser. This caused several problems, though the mistake of forgetting the “S” (indicating the secured connection) in “httpS”, was not made due to the warning in the letter. Still it was a lengthy address with a long string of numbers, e.g. “https://.../53508001.exe”. Several respondents checked and rechecked whether they had copied the right number. It made them uncertain.

Installing the questionnaire caused no real problems. Though for one respondent it was not possible to download an ‘.exe-file’ on his computer. He had to ask a system manager to download and install the questionnaire on his desktop for him.

6.1.2. Navigation

As was said, there were two ways to navigate through the questionnaire, the index in de left frame and the navigation buttons. The respondents used both ways, though the buttons were used to browse chronologically and the index was used to skip quickly to a specific screen. The ways to navigate through the questionnaire was clear and needed no explanation. The only thing that might be mentioned was that respondents initially did not understand the function of the affirmation button, and used it to browse through the screens and erroneously affirmed incomplete screens. Still, they found out quickly how to use the buttons correctly.

6.1.3. Progress indication and the affirmation button

In the electronic forms of the Dutch tax authorities there is an affirmation button to validate the answers are given on a specific screen. By affirming the answers the screen is completed and “closed”. In the questionnaire of the Annual business Inquiry all screen have to be “closed” before the questionnaire can be returned to the office. Yet, it cannot be determined in advance which questions have to be answered and which will be left open. It is possible that a business does not have certain costs even though they are in the questionnaire. Such questions can be left unanswered. By affirming that a screen has been filled in completely the respondent indicates that he/she consciously and correctly has left certain questions unanswered.

When a screen has been “closed” a green check mark appears before the section in the index. These check marks also functions as a progress indicator, then. A

respondent can see which sections he/she has completed and which sections still have to be filled in.

6.1.4. Explanatory notes

For many questions there are additional explanations available. In these explanatory notes for example precise definitions are given, or instructions on how to calculate a certain item. Again the way to access the explanations is similar to the electronic forms of the tax authorities: a button with a question mark before the

question: . During the test we saw that the respondents did not know how to access the explanations. They did not “see” the button. Later the colouring of the

button was changed and this had a positive effect: . Now, the respondents noticed the buttons and accessed the explanations more often.

6.1.5. Help window for calculations

The help window for calculations is a completely new feature in the electronic form. It was developed as a result of the remarks of the respondents in the previous test. In this questionnaire it is possible that for one item in the questionnaire several items from the respondent's administration have to be added up. To keep a record of which items from the administration have been used in the questionnaire it is possible to save the calculation in a special help window.

During the test no respondent used this function spontaneously. It was not immediately clear how it would work. Only after hints from the interviewers respondents noticed the button and tried to use it. Remarkably, once the respondents were aware that the function existed they were enthusiastic about it; they just had to be pointed towards it.

6.1.6. Returning the questionnaire

The questionnaire can be returned to SN in two ways, via the internet or via an e-mail. When a respondent clicks on the send button in the menu bar, several checks are carried out. Firstly it is checked whether all screens have been “closed” with the affirmation button. Next, it is checked whether a couple of essential items have been answered (i.e. some profit and some cost items have to be filled). Then the respondent is presented with the choice whether he/she wants to send the questionnaire via the internet or in an e-mail.

There were no changes with the previous version of the questionnaire on this point. So the observed problems there returned here.

6.2. Discussion

After this second test we can say that the user friendliness of the electronic questionnaire for the Annual Business Inquiry has been greatly improved. We noticed that the respondents enjoyed working with the questionnaire, even though the task had not changed compared to the paper questionnaire. Yet the “fun factor” of the task was higher.

The experiences in this test show that the respondents can handle the questionnaire and like to work with it. They still loathe the complicated task of filling in the questionnaire, though.

7. Conclusions

Completing the Dutch Annual Business Inquiry questionnaire is a very laborious and complex process (Giesen, 2004, 2005). Business respondents are poorly motivated to complete such questionnaires: they see no benefits, only costs (Willimack, 2002). This results in kick-and-rush (or click-and-rush) behaviour (d'Haens & Steehouder, 2000) and satisficing (Krosnick, 1991): respondents rush through the questionnaire, misread it, and provide the answers that are easiest for them (satisficing). When the questionnaire is badly designed, this behaviour will even be stronger, resulting in bad data. Ultimately, respondents will stop responding.

The following example illustrates this kick-and-rush behaviour. In the instructions to the questionnaire, respondents read that a help window for calculations was available. Yet, they did not use it spontaneously. Only after being hinted by the interviewer, they would remark: "Oh yes, you're right, I have read about that help window."

In order to tailor the questionnaire to the click-and-rush behaviour (and preventing non-response and measurement errors from occurring), the first version of the electronic questionnaire needed a lot of improvement. As a result of the test, a new version of the electronic questionnaire was developed in which most recommendations have been integrated.

In general, these recommendations involve making the electronic questionnaire clear and logical in every way. This means that the questionnaire should be simple, intuitive and consistent with regard to the visual design and its features. Also the structure of the questionnaire should be logical to the respondent, and should help to maintain overview. Breaking down the questionnaire into small parts and small tasks may assist in its step-by-step completion. Also a number of features should be built-in to assist the respondent in completing the questionnaire, like calculations, imputations, edit checks, a printing facility, a fill-in window, an entry-search facility, and a progress indicator. These built-in features should however be transparent: hidden rules and features may confuse the respondent and make them feel uncertain, even when they are familiar with the paper form. Instructions and explanations should be immediately clear.

To paraphrase Van der Geest (2001): Web questionnaire design is communication design. At all times the questionnaire should be intuitive and provide instant answers to questions like (see also Dillman et al., 2005):

- What I am supposed to do (next)? How should I continue?
- What will happen when I press this button?
- How is the questionnaire built up?
- Where am I? What did I do so far?
- Where can I put these data?
- Where can I get help?

These test show that completing a questionnaire on the computer and reading from the PC screen is very different from completing a paper questionnaire. These differences include the facts that a web questionnaire is not just a passive measuring instrument, and respondents expect it to help them. Also reading from the PC screen is different than from paper, as is navigating and obtaining an overview. With a computer people are less patient than when reading from paper. This is also concluded by Haraldsen (2004) and Dillman (2000). In order to make the questionnaire work well, the visual design (including character fonts) and its features have to be adapted to the chosen medium. As a consequence, the electronic questionnaire should be designed differently than the paper form.

However, we feel that to respondents both paper and electronic form should have the same look-and-feel.

Businesses ask for web questionnaires. In 30 interviews with businesses on web data collection, Dowling (2005) found that the internet is considered an efficient and respondent friendly way of data reporting. But, to be an efficient alternative for data reporting, electronic questionnaires should be easy to use, i.e. respondent friendly (Dowling, 2005, Hedlin et al., 2005; Snijkers, 2002), and, the visual design and its features should support the response process. Dowling concludes that when the web doesn't work, respondents will return to paper. Here, the web includes the whole process, from logging in to the internet, downloading the questionnaire, completing the questionnaire, to transmitting the data. Once respondents have returned to paper, it is our firm belief that it will be very hard to convince them to use the web again. That is the reason why we put a lot of effort in the development of this e-form. The next step is putting the questionnaire to the test in the field.

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