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Cross Cutting Topics:

Collecting SPPIs with Electronic Questionnaires in Canada

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Statistics Canada

1 Introduction

This paper provides an overview of the development and implementation of Electronic Questionnaires for Services Producer Price Indexes (SPPI) in Canada. It highlights some of the specific functionality requirements for repricing services and provides some insight on challenges and expected results.

Statistics Canada is making good progress developing Electronic Questionnaires (EQ) for many of its surveys. There has been growing use of EQ for turnover surveys. Collection of annual turnover data for reference years 2011 and 2012 included EQ for 7 surveys. Of the surveys with an EQ option in 2012, 79% of responding units reported electronically, compared to 16% over the telephone and 5% on paper. At the writing of this paper, Statistics Canada is using EQ for collection of all surveys that are part of the Integrated Business Statistics Program (IBSP), including 36 turnover surveys for reference year 2013.

In addition, the pre-contact phase of the Integrated Business Statistics Program now includes an EQ application for the Business Activity, Expenditure and Output Survey. This survey asks respondents to self code their industry (NAICS) classification and to identify products sold or manufactured for some industries (non-store retail and manufacturing). The Business Activity, Expenditure and Output Survey also includes modules that are only used for portions of the sample to identify the presence of research and development activities or capital expenditures for subsequent surveys on the same topics. The response rate for the 48,000 questionnaires was 73%. The response rate includes responses from Computer Assisted Telephone Interview (CATI) follow up of non-response units.

More recently, Electronic Questionnaires are being developed for SPPIs. (Price surveys do not lend themselves to be part of the Integrated Business Statistics Program.) Additional functionality that was not required for turnover surveys had to be developed for the SPPIs. This functionality included: ability to use prefilled data; collection of historical/delinquent data; and tracking and collection of longitudinal data. With these added enhancements, electronic questionnaires are proving beneficial in the collection of price data.

The paper is divided into five sections. Section Two provides an overview of SPPI collection with paper questionnaires (prior to EQ implementation). Section Three details some specific considerations in transitioning to EQ and describes the new SPPI collection process flow with EQ. Section Four summarizes some preliminary results in using EQ to collect price data. Finally, Section Five discusses further plans to implement EQ into the SPPI program.

2 Overview of SPPI collection before EQ

The process flow for mail out and collection of SPPI paper questionnaires required subject matter areas to spend a significant amount of time verifying the accuracy of the sample information and where applicable, the prefilled product and price data. This was done to protect the confidentiality of our respondents and their data, as well as to maintain the quality of our indexes.

Each quarter, respondents who have consented to a prefill option received a paper questionnaire that contained a list of the products they had reported the previous quarter. In addition to the products themselves, the paper questionnaires also contained corresponding product specifications (description, manufacturer, unit of measure) and the average purchase and selling prices for each product being repriced.

When any of this information changed, the respondent updated the information by writing the new information on the questionnaire itself, reporting their prices for the current quarter and returning the questionnaire to Statistics Canada for processing. Respondents were required to authorize the use of “prefill” each quarter. Any change to the contact information for a paper questionnaire required that we terminate the prefill and revert to a blank questionnaire (all product and price information is removed) until such time as the changes were confirmed. The paper questionnaires were returned to Statistics Canada where they were imaged and captured into the data collection system and any edits would be triggered and followed up with the respondent. This was a highly intensive and manual process.

This process took considerably more time and resources for verification and follow-up with the respondent versus the current EQ applications being put in place. Details on the transition to EQ and efficiencies are discussed in section 3.2.

3 Conversion to EQ

3.1. Confidentiality

One of the first challenges in developing an electronic questionnaire pertained to the protection of respondent-specific data. Statistics Canada put in place a specific Directive on the Transmission of Protected Information to ensure that our processes to send or receive protected information adhere to the legal requirements outlined in the Statistics Act and respect government-wide security policies. Among other things, the Directive applies to the following activities:

- returning sensitive statistical information previously provided by respondents to aid in future data collection;
- returning sensitive statistical information previously provided by respondents, following a request for this information from a respondent;
- collecting survey information via electronic collection services;
- collecting survey information using a questionnaire prefilled with sensitive statistical information from a previous collection period (not including “label information”).

Three types of data are defined in the directive with different rules governing the prefilling of information in an electronic questionnaire.

Label information is information that directly identifies a person, business, or organization, and includes name of the business, name of the respondent, address, etc. Such information is required to deliver an EQ to the correct respondent.

Survey characteristics for business respondents include such elements as the North American Industry Classification (NAICS) and commodity descriptions (including those provided by

respondents). Such information is permissible for inclusion in an EQ application as required, without prior consent from a respondent. Since price collection involves repricing of representative products, the SPPI EQs are personalized with specific commodity descriptions unique to each product that is being priced by the respondent.

Survey data include all other data provided by respondents and are only prefilled into EQ applications in specific situations for which prior consent by the respondent is required.

Access to these data is controlled using encryption technology. Respondents have a unique identifier determined by Statistics Canada and a password set and controlled by the respondent. Together, the two pieces of information form a “shared secret”. This shared secret is saved on the Statistics Canada Business Register along with a flag indicating if the respondent provided consent to use previously reported data through this mode for subsequent reference periods of the same survey. This process ensures that reported data is provided only to the respondent who provided the information in the first place. A temporary password may be set with the respondent during pre-contact, or a password may be created or modified by the respondent in the application itself.

Examples of prefilled survey data:

a) Temporary storage of an incomplete questionnaire

A respondent may choose to complete the electronic questionnaire in more than one session. The respondent will create a password in EQ allowing him/her to continue completing the questionnaire at a subsequent sitting.

b) Data from previous periods used for edits

Turnover surveys have the option of loading data from the previous period into the EQ application for a particular respondent in order to use for historical edits while the respondent is entering data. Prior consent is required by the respondent.

c) Prefilled data from previous periods

Sub-annual prices surveys typically include the prices reported in the previous period.

Where a respondent does not consent to the prefilling of survey price data or in cases where a shared secret has not been established, the EQ only contains the commodity descriptions and does not display any previously reported price data.

To adhere to this directive, several options were considered and tested in EQ. Where possible, and prior to distribution of the EQ, Statistics Canada collected e-mail addresses from respondents to which respondents could be sent a link to the survey and their access code. For pre-filled questionnaires, respondents were contacted to establish a temporary password. In some cases, Statistics Canada set a temporary password for respondents using information that was known to both Statistics Canada and the respondent. A reference to the temporary password together with the EQ invitation was subsequently emailed to the respondent who changed it to a permanent password once they accessed the EQ application.

3.2 Content Changes From Paper to Electronic

The original plan for implementation of electronic questionnaires for prices surveys was to replicate the existing paper questionnaires. Through consultation and testing with survey respondents, it became clear that changes in survey content would improve the ease of use,

minimize response burden and improve the quality of the survey data and ultimately of the price indexes.

In the paper versions of many SPPI questionnaires, Statistics Canada collects three months of data on a quarterly cycle, however to accommodate the longitudinal nature of our surveys we had to keep multiple cycles open for collection of late responses. Outstanding data from previous periods are sent on a separate questionnaire form. In transitioning to EQ this approach was not appealing to respondents who could potentially be faced with the possibility of receiving multiple EQ invitations/links as well as email reminders for each quarter that needed to be collected. Such surveys are being redesigned to collect outstanding periods in addition to the current quarter of data in one EQ.

An advantage in transitioning to EQ is the opportunity to develop a more direct and efficient approach to data collection in terms of how questions are asked, enabling Statistics Canada to interact with a respondent during completion of the survey, thereby minimizing respondents' burden. EQ facilitates the building of flows and edits directly into the questionnaire which could not be done on paper. EQ applications can be programmed to resolve edits that would normally prompt an interviewer to call a respondent to validate an unexpected response. In the EQ, respondents are prompted to provide reasons and to explain potential changes in quality of their service when prices change unexpectedly. This allows respondents to correct errors and/or to explain the reason for the change at the time of reporting (rather than weeks later). The functionality of "drop-down" menus, for example, minimizes both respondent burden and the chance of error.

As well, EQ enables subject matter areas to request additional products through the EQ application, rather than managing this process using follow-up logs and one-off requests to the collection areas to make individual respondent follow-up calls. This results in decreased respondent burden and collection costs, and also helps strengthen the accuracy and quality of our indexes.

The following examples illustrate the enhanced flexibility of EQ in terms of building in flows and directing respondents. Figure A shows the question on product availability on the paper version of the Retail Services Price Report. In the EQ version (Figure B), the built-in flows take the respondent where they must go.

Figure A – Paper questionnaire version of Product Availability – Retail Services Price Report

Products

1. Was the following product **available for sale** by this business between _____ and _____ ?
Available for sale means available for customer purchase at any time during the reporting period.

Product Name: _____
 Description: _____
 Product code: _____

Yes → Please verify the specifications in the "Product Information" section below. Make any necessary corrections.

No → Why was this product not available for sale between _____ and _____ ?

Seasonal item → Go to next product

Temporarily out-of-stock / Backordered → Go to next product

Discontinued

Other reason – specify: _____

2. Did this business have a **similar product** available for sale during that period?
Similar product is one with comparable characteristics or specifications to what is being replaced. It should have the same functionality and serve the same market niche.

Yes → Please modify the following information for a **similar product** to replace _____

No → Please modify the following information for a product to replace _____

You may choose a product in the same department or line, according to annual sales revenue.

Figure B – EQ Version of Product Availability – Retail Services Price Report

1. Was the following product **available for sale** by this business between and ?
Available for sale means available for customer purchase at any time during the reporting period.

Product Name: Apples
 Description: Computer products
 Product Code: 2

Yes

No

3. Please verify the product information below. ? Help

Please make any necessary corrections or updates.

Name
 Apples

Description
 Computer products

Manufacturer
 Mac

1. Was the following product **available for sale** by this business between and ?
Available for sale means available for customer purchase at any time during the reporting period.

Product Name: Apples
 Description: Computer products
 Product Code: 2

Yes

No

↳ Why was this product not available for sale between and ?

<< Select >>
 << Select >>
 Seasonal Item
 Temporarily out-of-stock / Backordered
 Discontinued
 Other

Stop & Finish < Return To Summary Next >

The question about reason for price change must be laid out in table format for the paper question (Figure C), however on EQ we can use drop-down menus to assist respondents and minimize respondent burden (Figure D).

Figure C – Paper questionnaire version of Reason for Price Change – Retail Services Price Report

5. For any month where there was a change in the vendor price or the retail price, please select the main reason for the change:

	Vendor price			Retail price		
Change in supplier	<input type="radio"/> 0300_1	<input type="radio"/> 0310_1	<input type="radio"/> 0320_1	<input type="radio"/> 0340_1	<input type="radio"/> 03410_1	<input type="radio"/> 03420_1
Exchange rate	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2	<input type="radio"/> 2
Promotion / End of promotion	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3	<input type="radio"/> 3
Clearance	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4	<input type="radio"/> 4
Commodity pricing	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5	<input type="radio"/> 5
Inflation	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6	<input type="radio"/> 6
Other	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7	<input type="radio"/> 7
Other reason – specify:	<input type="text"/> 0301_1	<input type="text"/> 0311_1	<input type="text"/> 0321_1	<input type="text"/> 03401_1	<input type="text"/> 03411_1	<input type="text"/> 03421_1

Figure D – EQ version of Reason for Price Change – Retail Services Price Report

7. What was the main reason for the change in **vendor price**?

\$400 and \$500

Reason for price change:

<<< Select >>>

- <<< Select >>>
- Change in supplier
- Exchange rate
- Promotion / End of promotion
- Clearance
- Commodity pricing
- Inflation
- Other

\$550 and \$600

Reason for price change:

<<< Select >>>

8. What was the main reason for the change in **retail price**?

\$459.365 and \$575

Reason for price change:

<<< Select >>>

- <<< Select >>>
- Change in supplier
- Exchange rate
- Promotion / End of promotion
- Clearance
- Commodity pricing
- Inflation
- Other

\$625 and \$700

Reason for price change:

<<< Select >>>

3.3 EQ Process Flow

A diagram showing the process flow of the electronic questionnaire for the Retail Trade Price Report may be found in Appendix A. All Statistics Canada EQ applications use a common look and feel and provide common instructions to respondents. The first section of the electronic questionnaire includes information to respondents about the purpose of the survey and information about the authority under which it is collected, navigational features and tips about the application, reporting instructions (which are survey specific) and respondent business and contact information.

Following the standard “front-end” portion of the questionnaire are the product and pricing questions. As with the paper questionnaires, the firm-specific detailed product information is prefilled in the EQ. There is additional functionality allowing respondents to supply the required information to replace products. When data are missing or a significant change in price is noted by the built-in edits, the respondent is prompted to provide reasons, either from a drop-down list or as “other” with space to type in the source of the omission or change.

As mentioned in the previous section, once the data for the current quarter (and any delinquent periods, if applicable) has been reported the respondent may be asked to provide information for up to three additional products, including new product specifications and prices. This request is only made of respondents when subject matter analysts determine that additional price quotes are required from that firm to ensure index quality.

The final screens of the questionnaire follow standard EQ templates. Since respondents have an opportunity to receive the EQ with prefilled price data from previous periods, there is a screen where they can consent to prefill. Next, the EQ captures information about the contact person, the time spent completing the questionnaire (to monitor response burden) and an option to provide comments about the questionnaire. The final screen prompts the respondent to print a copy for their records and to submit the questionnaire to Statistics Canada.

4 Results

In 2013, Statistics Canada implemented an EQ application for the Accounting Services Price Index (ASPI), an annual SPPI. While it follows a simpler process than sub-annual indexes, it served as a proof of concept for the other SPPIs. Results from the change in collection mode with the migration to EQ for this survey are summarized in this section.

With a sample size of 587, it was decided to make the ASPI EQ the default mode of collection for all respondents. E-mail invitations were sent to those respondents for whom Statistics Canada had e-mail addresses on file (nearly two-thirds of the survey sample). The other third received a letter with the Statistics Canada collection website address and a Secure Access Code to complete the survey online. Paper questionnaires were only mailed if specifically requested by the respondent.

Note that the paper questionnaires were not modified to reflect changes made to the electronic questionnaire.

Non-response follow-up calls were made beginning 30 days after the initial letters/e-mail invitations were sent and continued periodically until the end of the collection period. When respondents were called, they were encouraged to complete the survey on-line.

Table 4.1 shows that despite a shorter collection window for EQ, there was an improvement in the response rate and portion of unresolved edits by the end of collection.

Table 4.1

Table: Collection summary results			
	2011	2012	2013[*]
Sample size	650	608	587
Days in production	85	97	70
Response rate	64.0%	70.7%	71.7%
Cases with no follow-up required	238	184	256
(% of total)	36.6%	30.3%	43.6%
Cases with unresolved edit	178	203	139
(% of total)	27.4%	33.3%	23.6%

^{*}Introduction of EQ

From Table 4.2 you can see that the best responses came from those to whom an e-mail invitation was sent. This may be influenced by the likelihood that those for whom e-mail addresses were available are already regular respondents to our surveys and may be more inclined to report.

Table 4.2

Table: Questionnaires received, by mode of collection			
	Mailed (#)	Received (#)	Received (%)
E-mail (EQ) invitations	382	284	74.5%
Paper (EQ) invitations	205	107	52.2%
Paper questionnaires[*]	25	16	64.0%

^{*}Respondents that requested a paper questionnaire

Capturing potential changes in quality were challenging in the paper version of the questionnaire. When the change in price was great enough to trigger an edit, the respondent was contacted and asked to explain the source of changes in the price. This added extra burden to a respondent who may have forgotten what was reported. In addition, less experienced interviewers, unfamiliar with price concepts, did not always convey the information needed to understand the source of price movements. For example, it was not uncommon to receive vague comments such as “confirmed with respondent”.

With the electronic questionnaire, edits were run to compare prices with the previous year, triggering an additional quality change question. The new descriptions of causes of the price change aided the data confrontation and minimized the volume of manual adjustments that were required (Table 4.3). Fewer extreme observations were noted in 2013, presumably from respondents correcting errors directly before submitting the data in EQ. In addition, fewer and

shorter calls to respondents were needed to verify data that had failed edits after being sent to Statistics Canada.

Table 4.3

Table: Quality change and adjustments				
	Quality change description		Manual adjustments	
	2012	2013	2012	2013
<i>Audit, review and related services</i>	4	123	26	5
<i>Bookkeeping, compilation, payroll</i>	1	108	32	9
<i>Tax preparation for corporate clients</i>	0	71	19	4
<i>Tax preparation for individuals</i>	7	87	21	5

The end result not only yielded better results more efficiently, the EQ was also well received by respondents. In the final question of the survey, respondents are given the option to provide feedback regarding the EQ application. A few of the comments are noted below:

“I think this is an excellent move. Completing the questionnaire online is much easier. I do not have to look for the mail as I am always busy and I’m sure most of the respondents are as well.”

“Much easier to manage vs. paper reporting.”

“Much easier to complete than previous surveys (thank-you!)”

“Wonderfully designed questionnaire. Well done!”

“I enjoyed the ease of use and convenience of the on-line questionnaire as compared to the paper questionnaire filled out and mailed in for previous years”.

5 Future Plans

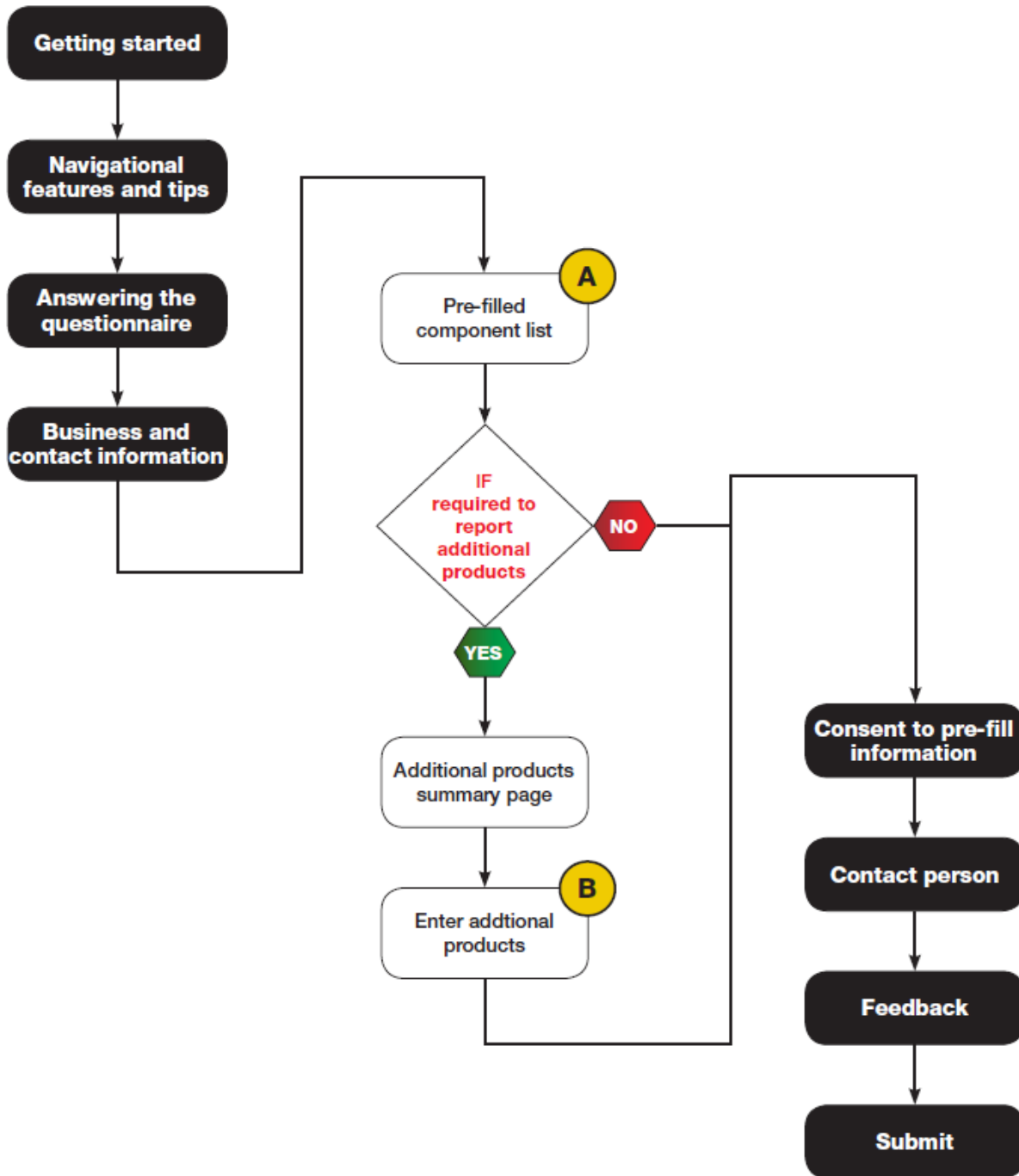
In the 2014/15 fiscal year, Statistic Canada plans to convert three more SPPIs to EQ. The Retail Services Price Index is the first sub-annual price index to use EQ. It was sent to respondents in September 2014 for the 2nd Quarter reference period. Unlike accounting, respondents were contacted by phone in advance of the mail-out and asked to provide an e-mail address. Thus the vast majority of respondents were sent an e-mail invitation.

The two surveys noted in this paper rely on a separate Blaise system for paper questionnaires. That means the additional cost of maintaining two systems. Statistics Canada has since developed a new version of its EQ infrastructure that will allow a single set of specifications to render an application to be used by the respondent (rEQ) and interviewers (iEQ). In this new infrastructure, data capture from paper questionnaires and Computer-Assisted Telephone Interview (CATI) capture will be done using the iEQ. This new version is in place for the turnover surveys and will be used by prices to develop our new EQ applications that are to be implemented in 2015 and beyond.

Appendix A

Retail Trade Price Report – EQ Flowchart

Designer: Mohammed Mustapha



Legend

X standard page

X go to

A Pre-filled component list

The pre-filled component list will be displayed based on the pre-filled data (products).

It will be displayed as follows:

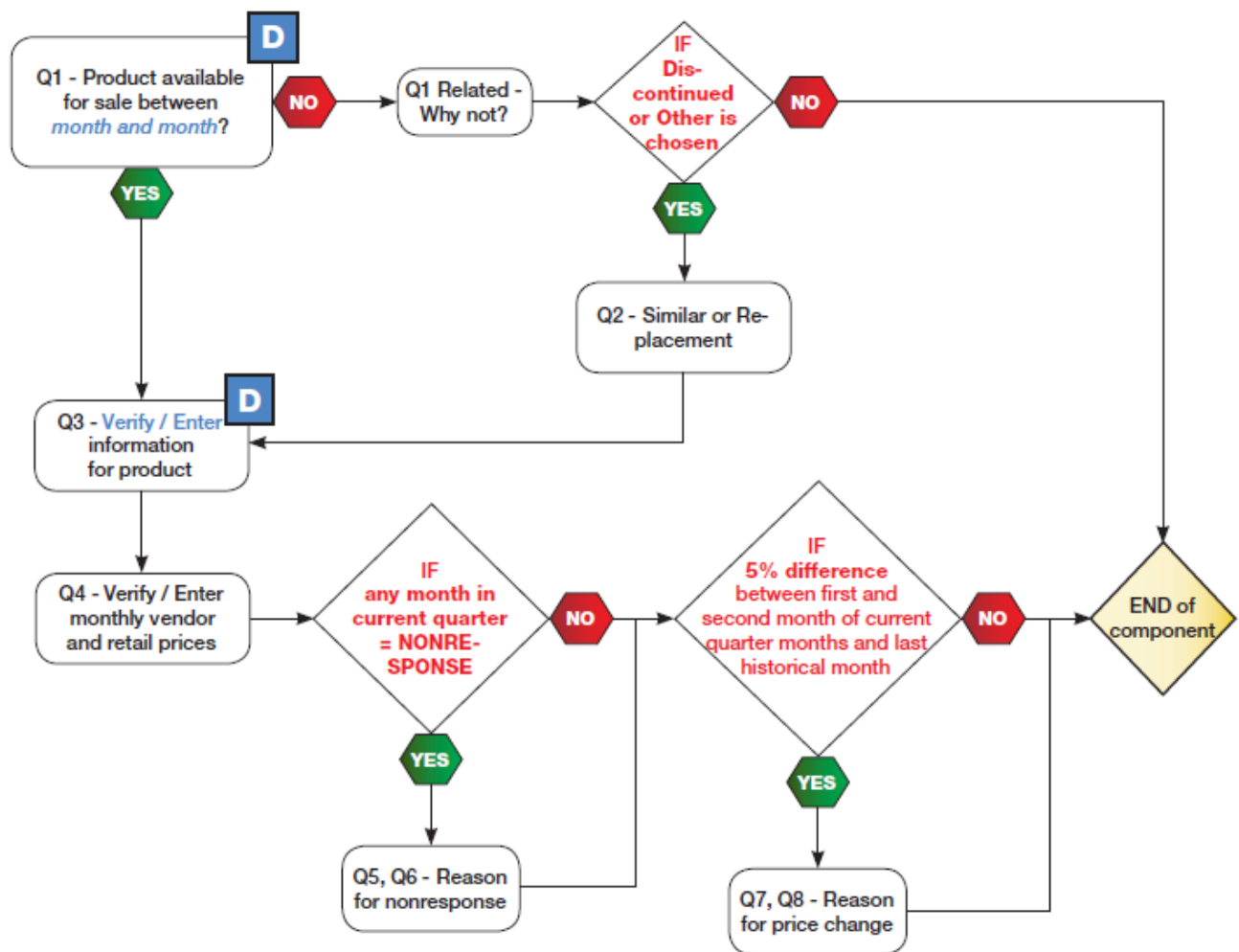
Product Name: Apples

Product Code: 987654321

Not started - press the Continue button to begin.

Continue >

Each component will flow as follows:



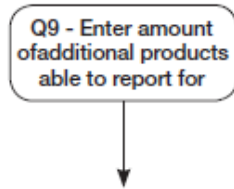
Legend

D Derived text

B

Enter additional products

If additional products need to be reported, respondent is required to report X additional products.



Each additional product will flow as follows (this may loop based on above input):

