Statistics Finland

CPI price collection system with hand-held computers in Finland - experiences and development

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Abstract

Statistics Finland interviewers collect around 50,000 prices on 497 commodities from approximately 2,700 outlets for the Consumer Price Index. In the so-called regional price collection, the price collectors collect prices on clothing, consumer durables and services, etc., and the price collection of groceries covers food, beverage and daily products price observations. In addition, some 1,000 items of price data are gathered by centralised collection. Today, electronic collection is used in both the regional price collection and the price collection of groceries. Electronic collection has been used in Finland since 2001 in the CPI regional price collection, and the second generation of electronic collection was introduced in summer 2005. The same system is now also used in the price collection of groceries. The equipment is the Nokia Communicator 9500 smart phone, and the application is based on the *Celesta Smart Forms 2* programme. The data collectors' experiences form the electronic collection have been positive. The communicator is light (212g), easy to use and a modern way to work. The light device improves working conditions and ergonomics. There are also the benefits of using a hand-held computer that are mentioned in the ILO manual, namely efficiency in data transmission, better quality of data as well as elimination of transcription errors. The most important areas for development in the system are speeds of the application in the Communicator and the data transmission between the collectors and the CPI staff.

1. Introduction

The Consumer Price Index describes the price development of goods and services purchased in Finland by households in Finland. The Consumer Price Index is calculated with a method in which the prices of different commodities are weighted together with their shares of consumption. Each mid-month, Statistics Finland interviewers collect around 50,000 prices on 497 commodities from approximately 2,700 outlets for the Consumer Price Index. In the so-called regional price collection, 21 price collectors collect prices on clothing, consumer durables, etc. There are about 200 outlets per price collector, and 800 - 1,200 price observations per month per each price collector. In the price collection of groceries, there are 23 price collectors throughout the country, and about 1-10 groceries per collector. The number of price observations per outlet ranges from 180 to 220. In addition, some 1,000 items of price data are gathered by centralised collection. Today, electronic collection is used in both the regional price collection and the price collection of groceries. This paper describes the process of moving from paper-based data collection to electronic collection.

2. Projects concerning electronic collection

2.1. Regional price collection

Electronic collection has been used in the CPI price collection in Finland since 2001, when hand-held HP Jornadas computers were introduced in the regional price collection of the CPI. The HP Jornadas collection was based on Windows CE and Pocket Access database.

The data were converted to the Access database and then joined to the Sybase database in the CPI production system. The data were sent to and from the price collectors via email using a modem connection from price collectors side.

A project in which the aim was to renew the electronic collection system (second generation) was launched in September 2004 since HP Jordanas were no longer available and the machines had to be renewed. The time frame for the project was from September 2004 to May 2005. The requirements in the project were to keep the quality of the collected price information at least at the same level as earlier, to simplify the data transmission process and to improve the working ergonomics of the data collectors. The aim was to get an easy-to-use data collection system which could be introduced into the price collection of groceries. The new system was used in price collection for first time in June 2005. The project took 126 working days without the time spent on the coding of the application.

2.1.1. Finding of data collection equipment

The latest update of equipment was done in the project when the regional price collection system was renewed. Potential machines suitable for price collection were first studied keeping in mind the most cost-effective solution in the long-term. There were certain requirements for the new device:

- Keyboard (qwerty): needed for input of information during collection, without keyboard the process would have to be changed
- Screen size: big enough to accommodate all necessary information on an item without scrolling, and for readability adequate lighting when collecting data
- Battery must last for over 10 hours of work with one charge: one of the biggest challenges as data the collectors' working day can exceed 10 hours, and opportunities for recharging do not always exist
- Weight (not over 500g): very important as an ergonomic issue
- Network card / VPN Client feasible (not relevant)
- Moving to Symbian would increase the flexibility of the system.

The comparison was done between two hand-held computers and six smart phones. In some cases information about the characteristics was hard to find. The best hardware available was the Nokia Communicator 9500 (Picture 1): it was light, only 220 g, the keyboard was inbuilt (in many cases it was only available as an accessory), the batteries were long lasting, and the screen size was big enough. The operating system of the Nokia Communicator was Symbian.

Picture 1. Second generation of electronic collection at Statistics Finland: Nokia Communicator 9500.

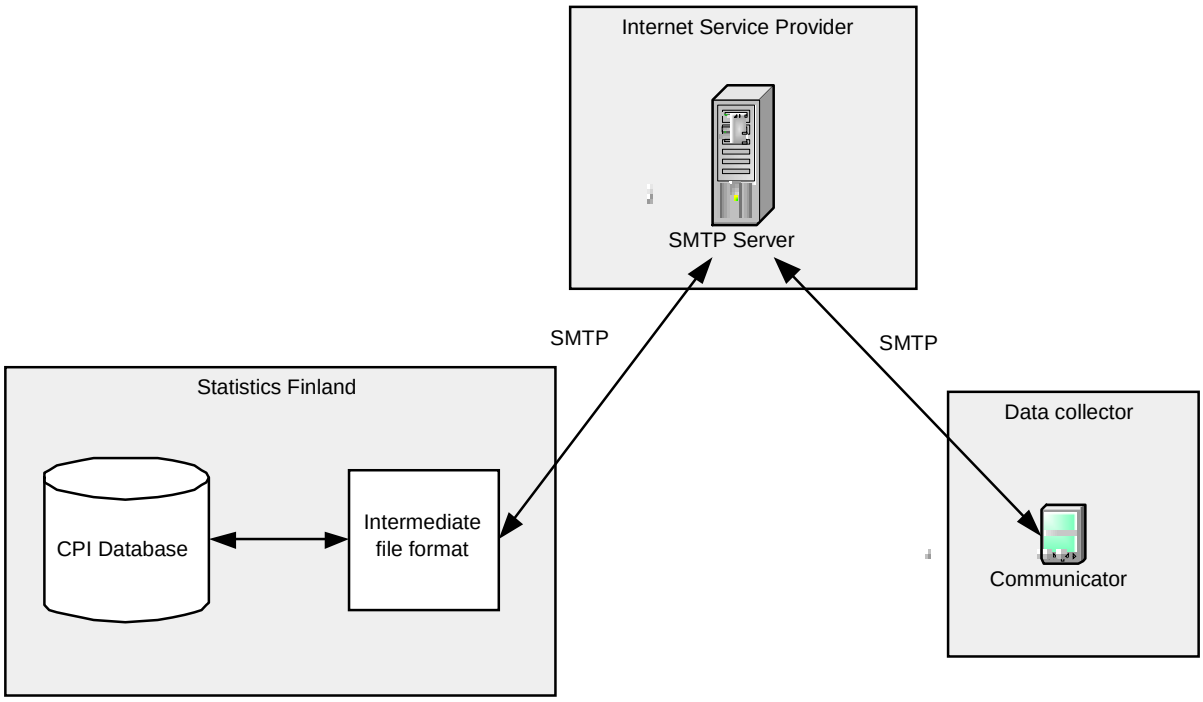
2.1.2. Building of the application

The application was bought from an external supplier. The project issued an open tender for competitive bidding and 16 firms made an offer. 3C Software Professionals Oy was selected to build the appli-

cation. The application is based on the *Celesta Smart Forms 2* programme. The designing was done by the CPI staff, and advice was sought from the price collectors at several stages, for the first time before the designing was started. Pilot testing was done by the CP staff and the price collectors. Recommendations and regulations of the ILO[1] and the European Union[2] were kept in mind in the designing.

In the application the collection data are transferred from the CPI production database into an intermediate file format (in this case CSV). This intermediate file is created for each data collector and once created is emailed to them. The data collectors import the intermediate file into the collection application. After the collection, the data are exported into the intermediate file format again and emailed back to Statistics Finland. Finally, the data are transferred back into the CPI production database (Picture 2). Application runs also in the Nokia Communicator 9300-model.

Picture 2. Flows of data in the collection process.



2.1.3. Training of data collectors

The new Communicators for the collectors and the CPI staff were received in April 2005. The machines of the CPI staff serve as a reserve for the collectors in cases of hardware malfunction. Before the Nokia Communicator system was commissioned, personal training was given by the CPI staff to the data collectors in the use of the new device in May 2005. The training comprised personal field training with CPI staff, a printed guide to the “Handeli 2” price collection programme, and phone assistance when needed. After the commissioning, all price collectors have received further annual training during which they can discuss problems encountered with the equipment or the collection application. Monthly letters with instructions concerning observations made by the CPI staff (e.g. on how to use the change of product-offer in the application) have also been sent to the price collectors prior to the start of the monthly collection. On-line help is quaranteed during the price collection.

[1] Consumer Price Index manual: Theory and practice. International Labour Organisation et al. 2004. p. 81-98.
[2] Compendium of HICP reference documents (2/2001/B/5). Eurostat. 2001.

2.2. Price collection of groceries

The price collection of groceries was made with paper forms up to 2006. The data collectors saved the collected data on the computer at home with the Blaise system, and then sent them via email to Statistic Finland, where the data were transferred to the CPI production database. The system was slow and separated the process from other production. For this purpose alone a separate data entry system and printing operations (paper forms were printed at Statistics Finland twice a year) as well as sending of the paper forms were required. The process was open to mistakes and its maintenance needed considerable information technology input.

The price collection of groceries was renewed in 2006, when the same system as in the regional price collection was introduced in it. This project took 114 working days, although the solution was ready for use with some changes. This was due to rearrangements in the CPI staff as the project leader changed during the process. The experiences gained in the renewing of the system of regional price collection were drawn on in the training of the data collectors, e.g. the training material was sent to the collectors in advance. When the data collectors used the new application for the first time in September 2006, they first collected the data on groceries with paper forms, and then saved the information at home onto their new Communicators. Since then, Communicators only have been used for the data collecting. Some problems have emerged with data transmission from the collectors to Statistics Finland, but telephone advice from the CPI staff has helped in these cases.

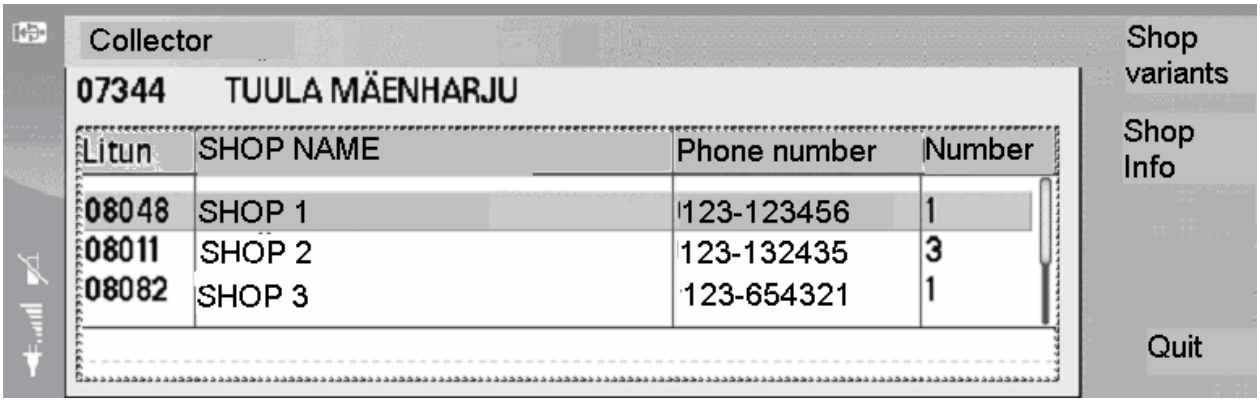
3. Quality control in the hand-held computers

Quality control in the electronic system used by the collectors can be broken down into the following components:

- Information is available on the collection (for the data collector as well as for the CPI team, e.g. item descriptions, comments),
- Information is available from the last observation on a product-offer
- Built-in validation checks.

The data collector can obtain a list of his/her collection outlets, which shows the number of product-offers without price observations in the observation month by outlet. A common item description is also available in the system.

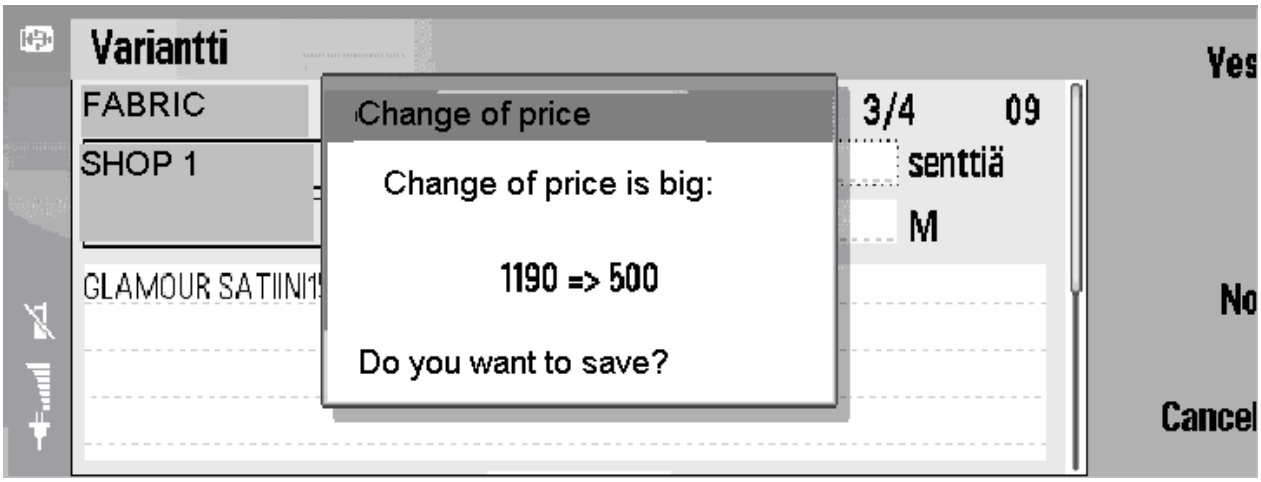
Picture 3. Information about collection outlets on the application screen.



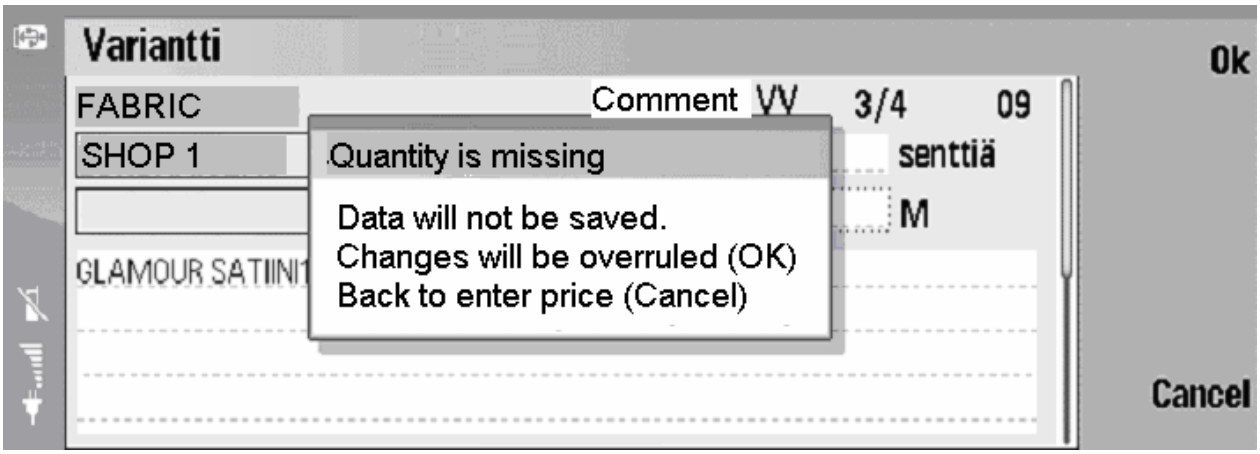
Information about the last price observation on a product-offer can be seen on the screen before the new observation on it. The collectors are instructed to enter item-specific product information, whereby it can be used in replacement cases and in the data validation made by the CPI staff. If there is a question or a comment from the CPI staff, the collector gets a remark about it when collecting data on the product-offer concerned.

There are specified limits to the prices of items, which are built-in validation checks. If the change in the price of an product-offer exceeds the limits, the system notifies about it automatically (Picture 5). Likewise, if quantity is missing for a product, the system does not allow the data to be saved for that product-offer. Comments can be written in the system by both the price collectors and the CPI staff, which also helps in the validating of the data.

Picture 5. Build-in validation check: change in price exceeds set limits, the application asks whether or not the observation should be saved.



Picture 6. Missing quantity of product: a notification is given that the data for the product-offer will not be saved. “Cancel” function allows going back to re-enter the price observation.



4. Benefits of the system

When the HP Jordanas collection was introduced in the regional price collection, the CPI staff could be reduced by one person since there was no need for data saving at Statistic Finland. Effects from the second generation system on collection costs are not available since change of the base year of the CPI took place during 2005 right after the renewal of the collection system.

The impact from the introduction of the electronic system in the price collection of groceries was assessed by measuring the saving made in the collection time, which was two per cent in 2007 compared to 2006. It can be assumed that the saving of time will increase even further this year, when the collectors have become fully familiar with the application. The time saved by the CPI staff was also considerable.

The new programme and the Communicators also brought other benefits. The number of uncollected observations is now available for the collectors as well as for the CPI staff, which is also working as quality control. The experiences of the data collectors have been positive. The communicator is light (212g), easy to use and a modern way to work. The light device improves working conditions and ergonomics.

The Communicator can also be used as a mobile phone, so there is no need to have a separate phone. There are also the benefits of using a hand-held computer quoted in the ILO manual, i.e. efficiency in data transmission, better quality of data as well as elimination of transcription errors.

5. Developing the system further

The application in the Communicator has been slower than expected, most likely due to the characteristics of the Communicator 9500. This has apparently been solved in newer models of the Nokia Communicator. The speed seems to depend on the size of the collector's data file. In the worst case, moving between items can take several seconds. When the next project to renew the electronic collection system is launched, maybe in 2009, the problem of the speed of the device has to be solved.

The data are still being transmitted via email but using the GPRS -connection, so the system is more stable than the old system was. In the near future it would be pertinent to ascertain whether it would be possible to use an email robot to send the data file to the collectors. It may become possible in future to transmit the database online with the VPN Client or similar system over GPRS. There are still some doubts about the VPN Client type of solution as the connection varies from one part of Finland to another, which could cause some problems during the data collection process.