



There's an App for That: A Data Quality Review of a Transition from PAPI Data Collection to Smartphone Data Collection in a Vendor Management Study

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Overview of Presentation

- Overview of project
- The Paper Instrument used in 2005
- The Smartphone Instrument used in 2013
- Data quality comparisons
- Advantages to using Smartphones
- Potential Disadvantages to using Smartphones

Overview of the WIC Vendor Management Study

- WIC Vendor Management Study
 - Women, Infants and Children

- Funded by Food and Nutrition Service (FNS) of U.S. Department of Agriculture (USDA)

- Purpose of the study:
 - collect and analyze data about vendor management practices of state WIC Programs
 - determine extent to which WIC vendors nationwide violate program rules
 - determine factors associated with program violations

Overview of the WIC Vendor Management Study

- 4th round of study (last conducted in 2005)
- 119 Primary Sampling Units (PSUs) within the 39 of the 48 contiguous states and the District of Columbia
 - 16 “primary” vendors in each PSU and 4 “reserves”
- Send field staff into stores that participate in WIC
 - Compliance Buyers (CBs) pose undercover as WIC moms
 - Hired approximately 125 CBs for 2013 study
 - All female, child-bearing age (18-45)

Overview of the WIC Vendor Management Study

- CBs make purchases in grocery stores using WIC food instruments (FIs)
- CBs *observe* and *record* whether the store is in compliance with the rules and regulations of the program
- 3 types of buys per store during short data collection window:
 1. Safe Buy- *purchase all items on FI*
 2. Partial Buy- *attempt to leave off an item on FI*
 3. Substitution Buy- *attempt to substitute an item on the FI*

The Paper Instrument – Previous Rounds

- 3 different forms, depending on type of buy
 - Field staff had to choose the correct form
- Project staff had to merge variable information, print, collate, and stuff folders with forms
 - Over 4,700 buys conducted in 2005
 - Up to two weeks after training to get all paper work to field staff
- Each form approximately 8 pages
 - High printing costs
 - Large, heavy boxes of paper work sent to field staff



The Paper Instrument (cont'd)

- Compliance Buyers had to memorize information in the store, complete form after leaving store parking lot
 - Undercover nature didn't allow for paper forms to be used in the store
- Skip patterns had to be carefully followed
 - CBs were responsible for following skips that were mapped out on paper forms

The Paper Instrument (cont'd)

- Complicated shopping list tables had to be completed

| A | | | B | C | D SHELF PRICE | E ² RECEIP T PRICE | F |
|---------------------|-----|------|--------------|--------------|---------------------|-------------------------------------|---------------|
| Item Type | Qty | Size | Item Code | Brand/Flavor | Unit Price | | Price Code |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| Total Receipt Price | | | | | | \$ | |

The Paper Instrument (cont'd)

- Paper receipts had to be attached to matching forms
 - Receipts came detached from corresponding forms
 - Receipts faded quickly, making them difficult to read

- Forms were completed by hand then shipped with receipts to supervisors for QC check
 - Delay in getting data back to RTI for project staff QC
 - Illegible handwriting

- Supervisors sent QC'd forms to RTI and data entry staff entered into a data entry program

- Storage of paper forms

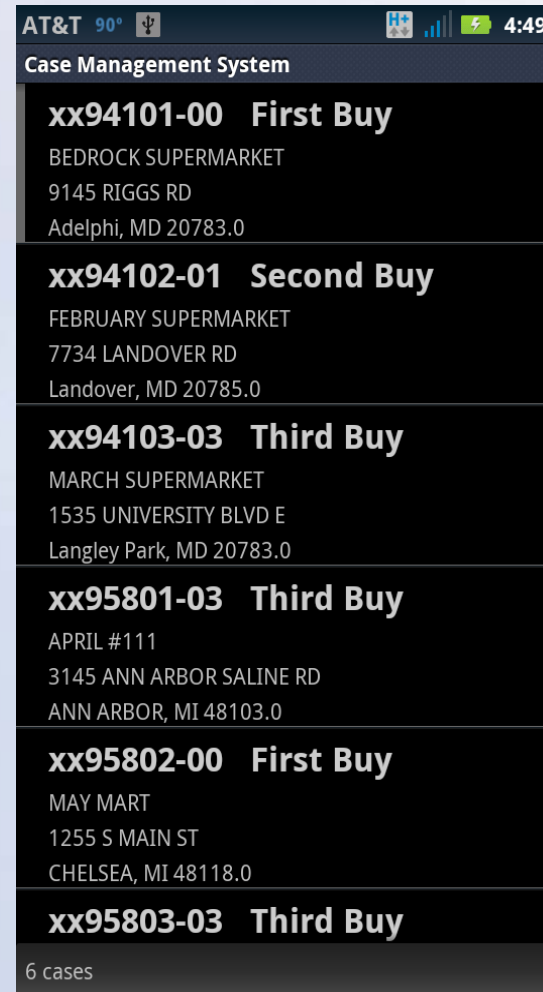
The Smartphone Instrument - 2013

- Used the Motorola Droid 3
 - Offered both touch-screen and keyboard data entry
 - Discontinued model so great deal on phones



The Smartphone Instrument (cont'd)

- Designed as two separate “apps”
 - Shopping List app
 - Compliance Buy Form app
- Accessed via a Case Management System (CMS)

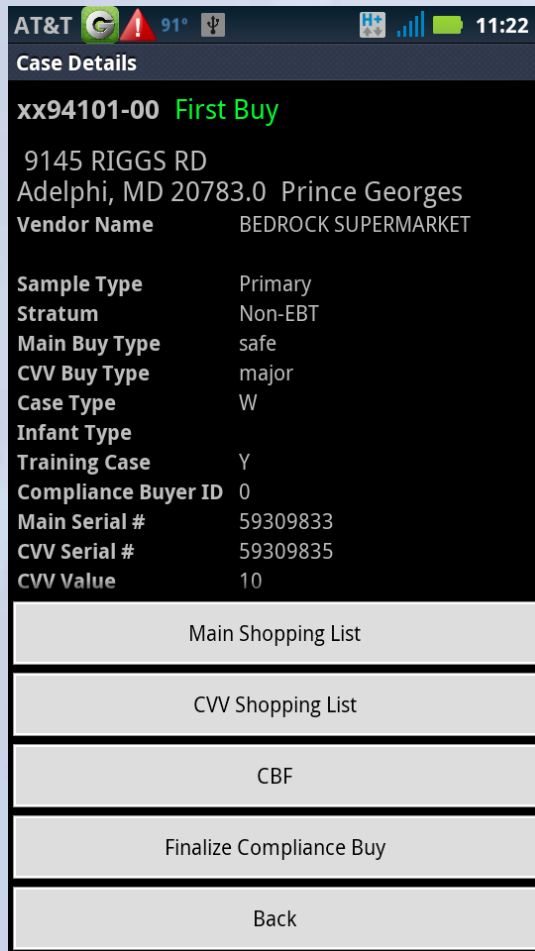


The screenshot shows a smartphone interface for a Case Management System. The status bar at the top displays 'AT&T 90°', signal strength, Wi-Fi, and battery icons, along with the time '4:49'. The app title is 'Case Management System'. The main content is a list of six cases, each with a unique ID, a buy order type, and the store name and address. The cases are:

| Case ID | Buy Order Type | Store Name | Address |
|------------|----------------|----------------------|--|
| xx94101-00 | First Buy | BEDROCK SUPERMARKET | 9145 RIGGS RD Adelphi, MD 20783.0 |
| xx94102-01 | Second Buy | FEBRUARY SUPERMARKET | 7734 LANDOVER RD Landover, MD 20785.0 |
| xx94103-03 | Third Buy | MARCH SUPERMARKET | 1535 UNIVERSITY BLVD E Langley Park, MD 20783.0 |
| xx95801-03 | Third Buy | APRIL #111 | 3145 ANN ARBOR SALINE RD ANN ARBOR, MI 48103.0 |
| xx95802-00 | First Buy | MAY MART | 1255 S MAIN ST CHELSEA, MI 48118.0 |
| xx95803-03 | Third Buy | | |

At the bottom of the list, it indicates '6 cases'.

The Smartphone Instrument (cont'd)



AT&T 91° 11:22

Case Details

xx94101-00 First Buy

9145 RIGGS RD
Adelphi, MD 20783.0 Prince Georges
Vendor Name BEDROCK SUPERMARKET

| | |
|---------------------|----------|
| Sample Type | Primary |
| Stratum | Non-EBT |
| Main Buy Type | safe |
| CVV Buy Type | major |
| Case Type | W |
| Infant Type | |
| Training Case | Y |
| Compliance Buyer ID | 0 |
| Main Serial # | 59309833 |
| CVV Serial # | 59309835 |
| CVV Value | 10 |

Main Shopping List

CVV Shopping List

CBF

Finalize Compliance Buy

Back

- Case Detail screen gives CBs all the information needed to complete a buy
- 3 versions of the form, but phone selects correct one based on case selected in CMS- no need for CB to choose

The Smartphone Instrument (cont'd)

- Compliance Buyers could take phones into store and enter information directly into the phone
 - Some information – about interactions during the checkout process – had to be completed after leaving store; but most difficult details no longer needed to be memorized
- Skip patterns were automatically programmed into the instrument
- Can't move forward without entering response
 - Decreased “missing” information

The Smartphone Instrument (cont'd)

- Shopping list programmed for easy data entry

Smartphone screenshot showing a Shopping List application. The list includes:

| Item | Quantity | Description |
|---------|----------|---|
| Milk | 2 | gallon(s) LIQUID non-fat (skim) or low- |
| Juice | 3 | 11.5/12 oz FROZEN or |
| ..Juice | 3 | 11.5/12 oz CONCENTRATE |
| Bean | 1 | lb(s) Dry or |
| ...Bean | 4 | 14-16 oz Dry or |

Buttons at the bottom: Register, Full Data Entry, Exit.

Smartphone screenshot showing a data entry screen for Milk. The screen displays:

Chosen Food: Milk

FID
2161

Food
Milk

Shelf Price Displayed?
[Dropdown menu]

Shelf_Price
[Text input field]

Buttons at the bottom: Back, Update.

The Smartphone Instrument (cont'd)

- Used camera app to take pictures of receipts
 - No receipts to ship
 - Photo files available immediately with data

- Used GPS app to locate stores

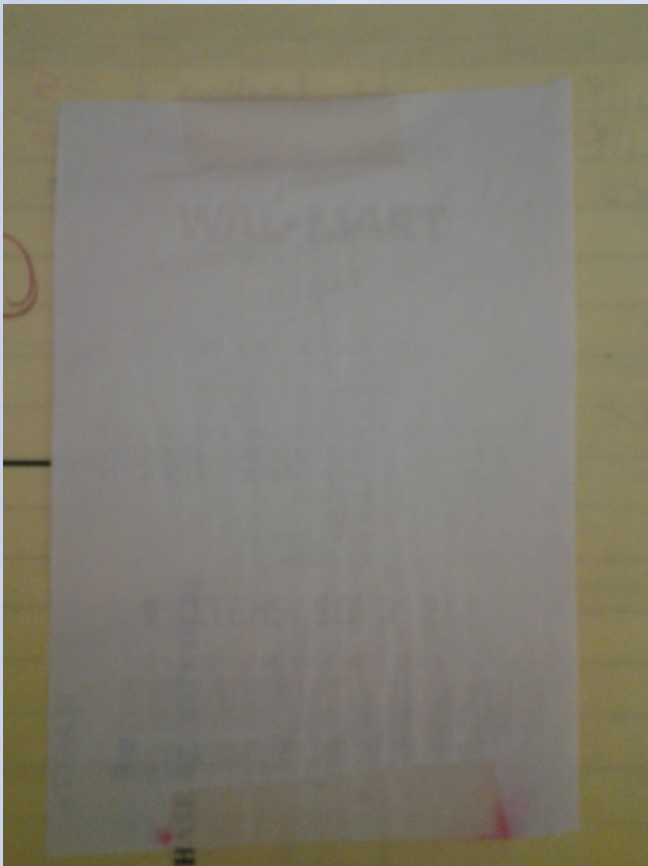
- Transmission- very simple process sending data straight to RTI from anywhere
 - No data entry
 - No delay in data receipt
 - Decreased costs- no QC by FSs, no shipping of paper forms

Data Quality: Paper VS. Smartphone



Quality of Receipts

2005 Paper Receipt



2013 Photo Receipt



Item Missingness

“Do you recall the total amount rung up on the register?”

2005: 90 missing

2013: 0 missing

Item Missingness

“Enter amount on register:”

2005: 49 missing

2013: 4 missing

Item Missingness

“Were you provided with a receipt for the WIC purchase?”

2005: 88 missing

2013: 0 missing

Item Missingness

“When were you asked to countersign the WIC food instrument?”

2005: 86 missing

2013: 7 missing

Anecdotal Data Quality Improvements

- Decreased number of discarded answers due to illegible handwriting/no receipt
- One instance of data falsification found early in data collection period
 - Allowing time for different CB to complete cases

Anecdotal Data Quality Improvements (cont'd)

Decreased QC/editing time:

- Bypassed FS review entirely
- Added preliminary QC of data early in data collection, ran frequencies, verified instruments working correctly early on (saved time later)
- Changing table from PAPI to Shopping List app saved untold man-hours of editing

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| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| | | | | | \$ | \$ | |
| Total Receipt Price | | | | | | \$ | |

Key Advantages of Using Smartphones

- Easier to carry (and conceal) than a laptop
- Ability to enter data while undercover, if needed
- Use of Smartphone camera, as needed
- Communication with field staff while in the field

Key Advantages of Using Smartphones (cont'd)

- Ability to make data and instrument corrections during data collection
- Ability to get data from field in real time
- Ability to do data review early in data collection
- Reduced item missingness
- Increased data quality

Potential Disadvantages to Using Smartphones- COST

- Costs associated with phone itself:
 - Purchase of phones
 - Monthly data plan
 - Monthly texting plan
 - Phone accessories

- Increased programming costs:
 - More up-front programming compared to PAPI,
 - Client may want to continue to make changes to instrument
 - More expensive labor pool



Potential Disadvantages to Using Smartphones- COST (cont'd)

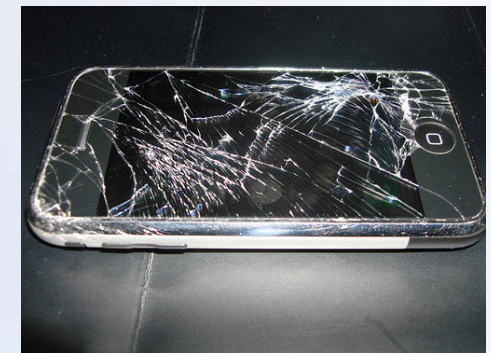
- Chose cell phone plans with good coverage, no big bills
- Project saved money by negotiating excellent deal on phones
- Watched closely to make sure there were no texting charges
- Provided inexpensive phone covers and car chargers
- Up-front programming costs off-set by lack of back-end data entry costs, no need for costly QC and data review

Potential Disadvantages to Using Smartphones- TRAINING

- Training older field staff on new technology could be difficult
- Training was 3 days
- We used the following training methods:
 - Lecture
 - Demonstration (phone hooked up to projector)
 - Round robin
 - Small Group Discussion
 - Individual Exercises
 - Hands-on Practice
 - Exit Exam
- After training, all FIs completed practice buy in home area; transmitted data in before being approved for data collection

Potential Disadvantages to Using Smartphones- INCREASED RISK

- Increased risk of damaged equipment
- Increased risk of driving while using Smartphone



- Increased risk of lost or stolen equipment

So...is it worth the switch from PAPI to Smartphone?



More Information

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