Results from a Test of Online Modes for the Consumer Expenditure Diary Survey

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2018 Joint Statistical Meetings
07/31/2018

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Outline

I. Background
II. Study Design
III. Usability Test Results
IV. Conclusions and Recommended Changes
I. Background
Gemini Redesign Project

“... is the multi-year redesign project for the purpose of researching, developing, and implementing an improved survey design to improve data quality through a verifiable reduction in measurement error.”
Background

- **CE Diary** - one of two components of the CE Surveys used to capture smaller and more frequent expenditures.
- Current diary is a paper diary with a household-level respondent and covers two one-week reporting periods.
- Part of an iterative review and development of online platform for the CE Diary.
  - Web Diary Feasibility Test - 2013
  - Individual Diary Feasibility Test (IDFT) - 2014
  - Proof of Concept Test - 2015
  - Electronic Diary Desktop Design Improvements - 2016
II. Study Design
Online Diary Improvement Project - Overview

- Developed collaboratively with Westat building on prior research and diary data requirements.
  - Modernization – Flexible instrument that can add and adapt to new technologies
  - Access across multiple platforms specifically mobile optimization
  - Person-level diary assignment
- Instrument developed using open-source programming software.
  - Adaptive web design – optimized for mobile and desktop
  - Design elements were the same across device types
Online Diary Improvement Project – Design & Methods

- Household recruitment for usability test.
  - Desktop/Laptop and Smartphone ownership
  - Multiple age eligible household members (71% of households)

- Procedure: placement interview; diary reporting; pick-up interview
  - In-person interviews conducted March 2017 – May 2017
  - Completed 62 placement interviews and 61 pick-up interviews
  - Incentive: $40 for the main diarist and $10 for the other household members
Desktop Diary View

Consumer Expenditure Diary

Add Expenses

- Date: Wednesday, July 5
- Type: Meals, Snacks, and Drinks Away From Home
- Details:
  - Describe meal: Enter description
  - Total cost (include tax and/or tip): $0.00
  - What meal was this?:
    - Breakfast
    - Lunch
    - Dinner
    - Snack/Other
  - Select any alcohol included:
    - None
    - Beer
    - Wine
    - Other

My Expenses

- Wednesday, July 5 (0) - No expenses reported.
- Thursday, July 6 (0) - No expenses reported.
- Friday, July 7 (0)
- Saturday, July 8 (0)
- Sunday, July 9 (0)
- Monday, July 10 (0)
- Tuesday, July 11 (0)
Mobile Diary View

Add Expenses

Date: Wednesday, Jul 5
Select type of expense:
- Meals, Snacks, and Drinks Away From Home
- Food and Drinks for Home Consumption
- Clothing, Shoes, Jewelry, and Accessories
- Medical Expenses and Supplies
- Entertainment and Recreation
- Home Furnishings and Decorative Items
- Education Expenses and Supplies
- Transportation Expenses
- Personal Care or Hygiene Items
- All Other Products, Services, and Expenses

Type: Meals, Snacks, and Drinks Away From Home
Detail:
Describe meal
Enter description
Total cost (Include tax and/or tip): $0.00
What meal was this?
- Breakfast
- Lunch
- Dinner
- Snack/Other

Select any alcohol included:
- None
- Beer
- Wine
- Other
III. Usability Test Results
Research Questions

- Compliance and Usage
  - How well do different household members comply with diary task?

- Device Usage
  - What are the characteristics between diary usage by device?
  - Are there differences in types of expenditures entered by device type?
  - Are there any barriers to accessing the online diary?

- Data Quality
  - Do expenditures indicate problems or category mismatches?
Compliance

How well do different household members comply with the diary task?

Composition of recruited sample
- 62 main diarist – responsible for encouraging other HHM participation
  - 48.3% above the age of 40, predominantly female, education evenly distributed
  - 72 other household members

Access Use
- Access – log-on and create password
- Use – enter an expense
Compliance - Results

- **Access and Use**
  - 61 of 62 (98%) main diarist accessed the diary
  - 50 of 72 (69%) other household members accessed the diary
  - Similar results for use

- **Comply with directions to access and change password day of visit**

<table>
<thead>
<tr>
<th>Days from visit</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Diarist</td>
<td>51%</td>
<td>16%</td>
<td>8%</td>
<td>7%</td>
<td>5%</td>
<td>5%</td>
<td>2%</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>22%</td>
<td>18%</td>
<td>10%</td>
<td>10%</td>
<td>6%</td>
<td>14%</td>
<td>14%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Distribution of Initial Diary Access

- Main Diarist
- Other Household Members
Expense Reporting Behavior

Main Diarist

Other Household Members
Expense Entry Timeliness

- Timely entry of expenses
  - Suggest attentiveness to the diary task
  - Better data: less time for recall; less likely to forget expense
  - Distributional difference between expense date and entry date

<table>
<thead>
<tr>
<th>Difference</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Diarist</td>
<td>31.0</td>
<td>33.2</td>
<td>11.3</td>
<td>11.2</td>
<td>4.6</td>
<td>2.5</td>
<td>6.2</td>
</tr>
<tr>
<td>Other</td>
<td>15.1</td>
<td>36.4</td>
<td>9.0</td>
<td>9.2</td>
<td>9.0</td>
<td>6.7</td>
<td>14.6</td>
</tr>
<tr>
<td>All</td>
<td>27.0</td>
<td>34.0</td>
<td>10.7</td>
<td>10.7</td>
<td>5.7</td>
<td>3.6</td>
<td>8.3</td>
</tr>
</tbody>
</table>
Device Usage - Characteristics

What are the characteristics of diary usage by device?

- Half of main diarists used mobile with one-third only using mobile
- Why not more mobile usage: smaller screen, lack of tactile keyboard
- Desk/Laptops used more (1,522;679), mobile more timely

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Desk/Laptop</th>
<th>Mobile</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Diarist (n=61)</td>
<td>43</td>
<td>31</td>
<td>13</td>
</tr>
<tr>
<td>Other (n=49)</td>
<td>37</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difference</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desk/Laptop</td>
<td>24%</td>
<td>31%</td>
<td>12%</td>
<td>12%</td>
<td>21%</td>
</tr>
<tr>
<td>Mobile</td>
<td>33%</td>
<td>41%</td>
<td>8%</td>
<td>8%</td>
<td>10%</td>
</tr>
</tbody>
</table>
# Device Usage – Expense Types

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>Desk/Laptop</th>
<th>Mobile</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Meals, Snacks, and Drinks Away From Home</td>
<td>15.0%</td>
<td>30.2%</td>
<td>19.7%</td>
</tr>
<tr>
<td>2 - Food and Drinks For Home Consumption</td>
<td>52.9%</td>
<td>21.5%</td>
<td>43.2%</td>
</tr>
<tr>
<td>3 - Clothing, Shoes, Jewelry, and Accessories</td>
<td>6.0%</td>
<td>6.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>4 - Medical Expenses and Supplies</td>
<td>1.9%</td>
<td>2.4%</td>
<td>2.0%</td>
</tr>
<tr>
<td>5 - Entertainment and Recreation</td>
<td>2.1%</td>
<td>5.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td>6 - Home Furnishings and Decorative Items</td>
<td>0.3%</td>
<td>2.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>7 - Education Expenses and Supplies</td>
<td>0.4%</td>
<td>0.7%</td>
<td>0.5%</td>
</tr>
<tr>
<td>8 - Transportation Expenses</td>
<td>6.6%</td>
<td>9.7%</td>
<td>7.6%</td>
</tr>
<tr>
<td>9 - Personal Care, or Hygiene Items</td>
<td>3.7%</td>
<td>8.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>10 - All Other Products, Services, and Expenses</td>
<td>11.1%</td>
<td>12.5%</td>
<td>11.5%</td>
</tr>
</tbody>
</table>
Barriers to Access – Failed Login Attempts

Are there any barriers to accessing the online diary?

▶ Setting/remembering password most reported barrier

▶ Password
  – Eight characters: number, upper & lower-case letter, special character (!@#$%^&*)
  – One-half of all failed attempts occurred before setting a new password

<table>
<thead>
<tr>
<th>Total # of failed attempts</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>46.9</td>
<td>12.6</td>
<td>8.1</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6</td>
<td>4.5</td>
<td>17.1</td>
</tr>
</tbody>
</table>
Data Quality

Do expenditure descriptions indicate problems or category mismatches?

- Description field: open-ended text field for describing expense
  - Red polo shirt; 2 liter coke; Bananas; Gasoline; Etc...

- Type of issues identified – independent coding and review
  - Including multiple items in one entry
  - Vague descriptions: item or expense is unclear (e.g., food, clothes, cleaning)
  - Establishment name: (e.g., Wegmans)
  - Incorrect category
  - Unidentifiable
Data Quality – Expense Description

- Overall, poor quality descriptions were low (of n = 2,255 total expenses)
- Issues clustered within respondents, or affect specific category
  - 14 respondents account for over half (55%) of coded issues

<table>
<thead>
<tr>
<th>Description Issue Type</th>
<th>Count</th>
<th>Percent/All Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple items</td>
<td>52</td>
<td>2.3%</td>
</tr>
<tr>
<td>Vague description</td>
<td>37</td>
<td>1.6%</td>
</tr>
<tr>
<td>Establishment name</td>
<td>59</td>
<td>2.6%</td>
</tr>
<tr>
<td>Incorrect category</td>
<td>41</td>
<td>1.8%</td>
</tr>
<tr>
<td>Unidentifiable</td>
<td>13</td>
<td>0.6%</td>
</tr>
</tbody>
</table>
IV. Conclusions and Recommended Changes
Conclusions

Personal Diaries

- Near uniform use of online diary by main diarist (household respondent)
  - Usage lower for other HHM, but encouraging
  - Not ideal to rely on the main diarist to encourage and motivate other HHM to participate
  - Indications that other HHM start later and abandon sooner
Conclusions

- **Online Diaries**
  - Offers dimensions not available with paper: use of multiple devices, mobility
  - Mobile devices were frequently used, but not as expected
    - Most respondents used at home – still convenient
    - Receipt complexity influencing device type used?
  - Expenses entered via mobile device were more timely
  - Password the biggest barrier to access – and mobility
  - Data quality – low incidence of issues, but still problematic
    - E.g., 52 instances of multiple entries can equal 100-150 missed expenses
Recommended Changes

- Diary Placement
  - Obtain main diarist commitment, collect other HHM contact information, and incentivize recruitment

- Design, layout, and function of the online diary
  - Simplify access
    - Passwords & Usernames: simplify requirements, allow username changes, allow saving
  - Provide summary statistics of spending for HH
  - Active feedback
    - E.g., Modal pop-up when entry saved
Recommended Changes

Future Enhancements

- Features using the smartphone camera
  - Receipt scanning, barcode scanning, item detection/machine learning and pictures of products

- Features using the smartphone microphone
  - Speech-to-text functionality

- Features using smartphone GPS or geolocation
  - Geofencing
Contact Information

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