Adoption of smart voice assistants technology among Airbnb guests: A revised self-efficacy-based value adoption model (SVAM)

Dongmei Cao, Yan Sun, Edmund Goh, Rachel Wang, Kate Kuiavska
Motivation

- **Airbnb** is one of the most successful sharing economy models that has disrupted the hospitality industry.
  - One key differentiating factor of Airbnb: **engaging communication** between the hosts and guests.
- Not all guests appreciate atmospheric interactions, and some prefer the serenity of being left alone.
- Also, the **COVID-19 pandemic** has forced hospitality providers to offer **contactless service**.
- The **installation** of a smart speaker and voice assistant (SVA) in hospitality and Airbnb accommodation has gained momentum in recent years.
Motivation

- Extant literature in SVAs adoption in the traditional hotels suggests:
  - Customers have increased sophisticated expectations for the technological in-room amenities.
  - On the contrary, non-tech savvy guests lack the confidence to use SVAs.
  - Privacy risks of using smart technologies might hinder guests from technology adoption.
- However, little study has investigated the adoption of SVAs among Airbnb Guests.
  - Customer expectations and needs may be different from that of the traditional hotels.
- Consequently, the paper aims to understand Airbnb guests’ intention to adopt SVAs by developing a theoretical model examining the influential factors in Airbnb listings.
Literature review

- **SVA technology:**
  - ‘internet-connected software which responds to voice commands to provide content and services, interacting with users via digitally-generated voice responses’ (Centre for Data Ethics and Innovation, 2019).

- **Social cognitive theory (SCT):**
  - proposes that individual factors, social factors and behaviours are interconnected.
  - among other SCT elements, self-efficacy has been widely applied in information system adoption studies mostly as a control variable.
Literature review

- **SVAM** (self-efficacy-based value adoption model, Zhu et al., 2017):
  - applies SCT to the context of ridesharing applications, where **self-efficacy** plays a pivotal role influencing cognitive, emotional and social determinants of behaviour in the model.
  - integrate a range of perceived value factors (negative and positive).
- A revised SVAM is applied within the **Airbnb setting**, examining three research questions:
  - What **factors influence** Airbnb guests' intention to adopt SVAs?
  - How is **self-efficacy** related to Airbnb guests' intention to adopt SVAs?
  - To what extent does SVA adoption intention differ between **different participant groups** by their SVAs user experience (e.g. more frequent users versus occasional users)?
Hypotheses development

- Hypotheses are based on the theoretical structure of self-efficacy that refers to the extent of an individual's confidence in their capabilities to perform a task or achieve a goal (Bandura, 1986).

- Functional value:
  - convenience and hands-free control

- Emotional value:
  - the degree to which users expect to gain hedonic rewards

- Social value:
  - ability to interact with SVA using natural language

- Privacy risk:
  - negative association with disclosing performance information of SVA usage

Fig. 1. Conceptual model of guests’ SVA adoption in Airbnb.
- H1: SE is positively related to Airbnb guests’ perceived Functional value of SVA usage.
- H2: SE is positively related to Airbnb guests’ perceived Emotional value of SVA usage.
- H3: SE is positively related to Airbnb guests’ perceived Social value of SVA usage.
- H4: SE is positively related to Airbnb guests’ perceived Privacy risk of SVA usage.
- H5: SE is positively related to Airbnb guests’ SVA adoption intention

Fig. 1. Conceptual model of guests’ SVA adoption in Airbnb.
- H6: The perceived **Functional** value of using SVA is **positively** related to SVA adoption intention.
- H7: The perceived **Emotional** value of using SVA is **positively** related to SVA adoption intention.
- H8: The perceived **Social** value of using SVA is **positively** related to SVA adoption intention.
- H9: The perceived **Privacy** risk of using SVA is **negatively** related to SVA adoption intention.
Methodology

- Measurement:
  - The theoretical model consists of six constructs:
    - Self-efficacy, functional value, emotional value, social value, privacy risk, and adoption intention.
    - Each of them is measured by several items according to previous research.
  - A 5-point Likert scale was used:
    - labelled from 'strongly disagree' ('1') to 'strongly agree' ('5').

- Sampling:
  - target population:
    - UK Airbnb guests who have experienced Airbnb stay (at least one stay) and SVAs usage.
    - The case of Amazon Alexa and Google SVA in Airbnb will be investigated.
  - The participants were recruited via Amazon Mechanical Turk (MTurk): an online platform popular in social science research.
Methodology

- **Data and procedure:**
  - **pilot study:**
    - Eight voluntary respondents
    - three fellow postgraduate researchers.
    - five local residents who all had experience of Airbnb stay and SVA usage.
  - **final dataset:**
    - 255 responses were extracted as valid for further analysis
  - **statistical analysis:**
    - partial least squares structural equation modelling (PLS-SEM)
    - estimate complex cause-effect relationship models with latent variables
Methodology

- Statistical analysis on collected data:

### Table 2
Descriptive statistics of the respondents.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Category</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female/Male/Prefer not to say</td>
<td>871617</td>
<td>34.1/63.1/2.8</td>
</tr>
<tr>
<td>Age</td>
<td>18 to 24/25 to 34/35 to 44/45 to 54/55 and above</td>
<td>4712954196</td>
<td>18.4/50.6/21.2/7.4/2.4</td>
</tr>
<tr>
<td>Education</td>
<td>High school or less College or university Advanced degree</td>
<td>2715771</td>
<td>10.6/61.6/27.8</td>
</tr>
<tr>
<td></td>
<td>Everyday user/Occasional user</td>
<td>125130</td>
<td>49/51</td>
</tr>
<tr>
<td></td>
<td>Amazon Alexa/Google Assistant/Apple Siri</td>
<td>13311991</td>
<td>52.2/46.7/35.6</td>
</tr>
<tr>
<td></td>
<td>Once/2-5 times/6 and more times</td>
<td>4314369</td>
<td>16.9/56.1/27.0</td>
</tr>
</tbody>
</table>

*a This is a multiple-choice question to the indicator, SVA current usage. Some use more than one SVA, and therefore, the sum of the frequency is more than the sample size (n = 255).*
Analysis and results

- measurement model analysis:
  - including factor loadings, internal consistency, convergent and discriminant validity.

- factor loadings exceed the recommended threshold value of 0.7, indicating acceptable measurement reliability
Analysis and results

- measurement model analysis:
  - including factor loadings, internal consistency, convergent and discriminant validity.

<table>
<thead>
<tr>
<th>Construct internal consistency, convergent and discriminant validity.</th>
<th>CR</th>
<th>CA</th>
<th>AVE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Adoption intention</td>
<td>0.929</td>
<td>0.893</td>
<td>0.766</td>
<td>0.906</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Emotional value</td>
<td>0.904</td>
<td>0.859</td>
<td>0.702</td>
<td>0.805</td>
<td>0.891</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Functional value</td>
<td>0.920</td>
<td>0.870</td>
<td>0.794</td>
<td>0.735</td>
<td>0.803</td>
<td>0.833</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Privacy risk</td>
<td>0.849</td>
<td>0.733</td>
<td>0.653</td>
<td>-0.205</td>
<td>-0.072</td>
<td>-0.018</td>
<td>0.842</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Self-efficacy</td>
<td>0.907</td>
<td>0.865</td>
<td>0.709</td>
<td>0.327</td>
<td>0.499</td>
<td>0.565</td>
<td>0.229</td>
<td>0.875</td>
<td></td>
</tr>
<tr>
<td>6 Social value</td>
<td>0.902</td>
<td>0.784</td>
<td>0.821</td>
<td>0.629</td>
<td>0.700</td>
<td>0.748</td>
<td>0.009</td>
<td>0.457</td>
<td>0.808</td>
</tr>
</tbody>
</table>

- used Cronbach’s alpha (CA) and composite reliability (CR) coefficients to examine internal consistency:
  - Based on Hair et al.’s (2019) guidelines, both parameters should exceed a minimum of 0.7 and remain below 0.95.
  - According to the table, the proposed model for the present study meets the criteria.
Analysis and results

- measurement model analysis:
  - including factor loadings, internal consistency, convergent and discriminant validity.

Average variance extracted (AVE) measures the convergent validity of a construct.
  - the suggested threshold value: above 0.5 (Hair et al., 2019).

Discriminant validity was examined via cross-loading indicators on unrelated constructs and the Fornell-Larcker criterion (Hair et al., 2019).
  - AVE’s square root on the diagonal is higher than its corresponding correlations with other latent variable, suggesting good discriminant validity (Hair et al., 2019).
Analysis and results

- Structural model analysis:
  - conducted Algorithm test and Bootstrapping test with 5000 subsamples.

suggest that except for H8, eight of the nine proposed hypotheses were supported.
- Self-efficacy was a strong predictor of perceived SVAs values

<table>
<thead>
<tr>
<th>Paths</th>
<th>Coefficients</th>
<th>T Statistics</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: SE → FV</td>
<td>0.585***</td>
<td>11.686</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: SE → EV</td>
<td>0.499***</td>
<td>8.722</td>
<td>Supported</td>
</tr>
<tr>
<td>H3: SE → SV</td>
<td>0.486***</td>
<td>8.056</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: SE → PR</td>
<td>0.229**</td>
<td>3.155</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: SE → AI</td>
<td>-0.141**</td>
<td>2.848</td>
<td>Supported</td>
</tr>
<tr>
<td>H6: FV → AI</td>
<td>0.295***</td>
<td>3.905</td>
<td>Supported</td>
</tr>
<tr>
<td>H7: EV → AI</td>
<td>0.576***</td>
<td>7.747</td>
<td>Supported</td>
</tr>
<tr>
<td>H8: SV → AI</td>
<td>0.075*</td>
<td>1.373</td>
<td>rejected</td>
</tr>
<tr>
<td>H9: PR → AI</td>
<td>-0.126**</td>
<td>3.272</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note: ***$\rho < 0.001$, **$\rho < 0.01$, *$\rho < 0.05$ (two-tailed).
Analysis and results

- Multi-group analysis:
  - test if participant groups (everyday vs occasional) have significant differences in the model.
The effect of self-efficacy on functional value differs significantly ($\Delta \beta = 0.252; \rho = 0.011$) between the two groups.

Effects of functional value, privacy risk, and self-efficacy on adoption intention, and the effect of self-efficacy on privacy risk, are all significant in G2 but insignificant in G1.

<table>
<thead>
<tr>
<th>Coefficients ($\beta$)</th>
<th>t-Values</th>
<th>$\Delta \beta$</th>
<th>p-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>G2</td>
<td>G1</td>
<td>G2</td>
</tr>
<tr>
<td>Emotional value -&gt; Adoption intention</td>
<td>0.616***</td>
<td>0.560***</td>
<td>4.491</td>
</tr>
<tr>
<td>Functional value -&gt; Adoption intention</td>
<td>0.128</td>
<td>0.262**</td>
<td>0.734</td>
</tr>
<tr>
<td>Privacy risk -&gt; Adoption intention</td>
<td>-0.079</td>
<td>-0.167*</td>
<td>1.218</td>
</tr>
<tr>
<td>Self-efficacy -&gt; Adoption intention</td>
<td>-0.086</td>
<td>-0.196**</td>
<td>0.745</td>
</tr>
<tr>
<td>Self-efficacy -&gt; Emotional value</td>
<td>0.603***</td>
<td>0.412***</td>
<td>6.281</td>
</tr>
<tr>
<td>Self-efficacy -&gt; Functional value</td>
<td>0.709***</td>
<td>0.457***</td>
<td>10.939</td>
</tr>
<tr>
<td>Self-efficacy -&gt; Privacy risk</td>
<td>0.218</td>
<td>0.295**</td>
<td>0.970</td>
</tr>
<tr>
<td>Self-efficacy -&gt; Social value</td>
<td>0.559***</td>
<td>0.377***</td>
<td>6.011</td>
</tr>
<tr>
<td>Social value -&gt; Adoption intention</td>
<td>0.193</td>
<td>0.105</td>
<td>1.711</td>
</tr>
</tbody>
</table>

Note: ***$\rho < 0.001$, **$\rho < 0.01$, *$\rho < 0.05$ (two-tailed).
Discussion and conclusion

- This study aims to understand guests’ intentions to adopt SVA technology in Airbnb accommodation.
- Our evidence suggests that SVA self-efficacy is a strong predictor of perceived functional, emotional and social values (H1, H2 and H3).
  - It implies that people with greater confidence to perform SVA tasks are more likely to perceive SVA values.
- SVA Self-efficacy is found to be positively related to perceived privacy risk (H4).
  - It suggests that higher self-efficacy is more likely to cause perceived privacy risk of using SVA.
- SVA self-efficacy is positively related to SAV adoption intention (H5) in the Airbnb setting.
- Both perceived functional and emotional values as strong predictors of SVA adoption intention during a stay in Airbnb (H6 and H7).
- Perceived social value attributes a smaller and insignificant contribution (H8).
Limitations

● The study deliberately restricted the demographic profile to match a typical audience of in-home smart speaker users and Airbnb users.
  ○ not be generalizable beyond the young, educated and tech-savvy population.
● Some results from comparing the different groups of consumers within the sample were not fully explained in the current study.
Thank you!