DEVELOPING AN EFFECTIVE TARGETED MOBILE APPLICATION TO ENHANCE TRANSPORTATION SAFETY AND USE OF ACTIVE TRANSPORTATION MODES IN FRESNO COUNTY: THE ROLE OF APPLICATION DESIGN & CONTENT

Dr. Samer Sarofim
Craig School of Business
California State University – Fresno
Motivation

Current media vehicles used to target vulnerable road users (pedestrians & cyclists) seem to be lacking (effectiveness, platforms design and content effects).
Synopsis

• **Objective:**
  • Investigate the need and design & content factors needed in a mobile application

• **Impact:**
  • Enhancing safety and increasing the use of active transportation modes in Fresno County
Some Literature Background

• Mobile landscape influences various behaviors (Bruner & Kumar 2003) (Bruner & Kumar 2003)

• Mobile platforms affect consumer’s enjoyment, as well as perception of ease of use and usefulness (Cyr, Head, & Ivanov 2006)
Design Factors Effects

• Aesthetics

  - **Legibility**: Ability to understand and find one's way into an environment ([Singh et al., 2005](#))

  - **Complexity**: visual richness of the environment or the information rate ([Herzog and Leverich, 2003](#))

  - **Coherence**: refers to how the various elements hang together, their unity, patterning or the visual harmony ([Herzog and Leverich, 2003, Tveit et al., 2006](#))

  - **Mystery**: refers to those aspects of the environment, which encourage one to explore with a promise of gaining more information ([Herzog and Bryce, 2007](#))

• Appearance (attractiveness, organization, proper use of fonts, colors, and proper use of multimedia). e.g., Females favor colorful and beautiful appearances and non-conventional typefaces instead of simple, pale and conventional designs ([Moss et al., 2006](#))
Design Factors Effects

• Flow of Information
  
  • Control, attention focus, curiosity, and intrinsic interest (Chen et al. 2008)
  
  • Modular Design of Mobile: Straight, Curve, and Central Visual Flow (Yanli et al. 2019)

• Relevance of Information
  
  • General Content: content usefulness, completeness, clarity, currency, conciseness, and accuracy.

  • Specific Content: contact information, general provider information, service details, policies, customer support (Aladwani 2006)
Design Factors Effects

• **Time spent**
  
  • Visitors spent significantly more time on the homepage of the orange site they did on the homepage of the blue site

  • Visitors spent longer on linear pages than on nonlinear ones (i.e., indented lists) *(Bonnardel et al. 2011)*

• **Adoption of Technology**

  • Technology Acceptance Model *(Ahn et al., 2007, Davis et al., 1989, Harris et al., 2009)*
Measurements

• Design quality perception
• Visual design
• Attitude toward use
• Relevance of information
• Likelihood to use specific functions
• Technical quality
• Likelihood to download

• General quality
• App design quality perception
• Complexity
• Coherence
• Legibility
• Perceived Enjoyment
• App Adoption

Ahn et al., 2007; Al-Qeisi et al., 2014; Aladwani, 2006; Bonnardel et al., 2011; Bruner & Kumar, 2005; Cyr et al., 2006; Davis et al., 1989; Harris et al., 2009; Kim & Stoel, 2004; Kumar et al., 2017; Kumar et al., 2018; Lu & Rastrick, 2014; Rosen & Purinton, 2004; Shen, 2015; and Tarafdar; Zhang, 2008
Sample Color App Homepages

WALK AND BIKE FUN AND SAFE

WALK AND BIKE FUN AND SAFE

WALK AND BIKE FUN AND SAFE
Sample Menu, Safety Tips, and Weather Page

- Safety Tips
- Weather Conditions
- Guide to Trail
- Biking and Walking Community
- Events
- Promotional Offers

ROAD SAFETY TIPS
- Common Mistakes While Driving
- Road Safety Tips for Pedestrian
- Teaching Your Child Safe Crossing Behavior
- Safer Cycling Tips for Cyclist

ROAD CONDITIONS & WEATHER

Weather and tips on how to drive under special conditions
Sample: Biking and Walking Frequencies

**Frequency of Walks**
- Daily: 38%
- 4-6 times a week: 44%
- 2-3 times a week: 18%
- Once a week: 3%
- Never: 3%

**Frequency of Biking**
- Daily: 29%
- 4-6 times a week: 34%
- 2-3 times a week: 11%
- Once a week: 22%
- Never: 3%
Sample: Age
Sample: Ethnicity
Sample: Family Status

Marriage Status:
- Married: 52%
- Single (Never married): 10%
- Divorced: 35%
- Separated: 2%
- Widowed:

Children:
- Yes: 56%
- No: 44%
Sample: Education Level

- Less than High School: 9%
- High School Graduate (or GED): 13%
- Vocational or Technical Training: 13%
- Some College (No Degree): 13%
- 2-Year College Degree (Associate’s, etc.): 21%
- Bachelor’s Degree: 21%
- Master’s Degree: 7%
- Doctoral Degree (PhD, JD, MD, etc.): 5%
- Education: 30%
Sample: Employment Status

- Retired: 6.1%
- Military: 3.3%
- Unable to work (e.g., disability): 4.4%
- Out of work, but not looking for work: 14.4%
- Out of work, but looking for work: 11.7%
- Student: 6.1%
- Homemaker or stay-at-home parent: 9.4%
- Self-employed: 14.4%
- Working part-time: 34.4%
- Working full-time: 34.4%
Results: Income Level
## Reliability

<table>
<thead>
<tr>
<th>Scale</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design Quality (3 items)</td>
<td>→ .78</td>
</tr>
<tr>
<td>2. Imagery Aesthetics (3 items)</td>
<td>→ .80</td>
</tr>
<tr>
<td>3. Coherence and Organization(4 items)</td>
<td>→ .87</td>
</tr>
<tr>
<td>4. Perceived Enjoyment (3 items)</td>
<td>→ .82</td>
</tr>
<tr>
<td>5. Intention for app adoption (6 items)</td>
<td>→ .92</td>
</tr>
</tbody>
</table>
Figure 1: The Perceived Importance of the Mobile Application Functions

One Sample T-test: Means are significantly higher the mid-point of the scale (P < .01)
Figure 2: The Appeal, Memorability, and Attractiveness of Tested Names of the Mobile Application

One Sample T-test: Means are significantly higher the mid-point of the scale ($P < .01$)
Figure 3: The Acceptance of Proposed Mobile Application Colors

One Sample T-test: Means are significantly higher the mid-point of the scale (P < .01)
Figure 4: The Perception of Different Factors of the Design & Content of the Main Drop-Down Menu

One Sample T-test: Means are significantly higher the mid-point of the scale (P < .01)
Figure 5: Opinions Regarding the Overall Design of the Mobile Application

One Sample T-test: Means are significantly higher the mid-point of the scale (P < .01)
Figure 6: Behavioral Intentions Towards the Proposed Mobile Application: Intentions to Adopt and Recommend

One Sample T-test: Means are significantly higher the mid-point of the scale (P < .01)
Brief Conclusions

• There is a need and acceptance among Fresno County pedestrians & cyclists for a mobile application specifically designed for active transportation modes

• Safety Information, Weather Conditions, Guide to Trails, Events for walkers and bikers, and Promotional Offers are important features for the targeted audience

• The proposed design were perceived favorably on factors like design appeal, attractiveness, relevance of information, content importance, usefulness of functions, concision, personalization & customization, imagery aesthetics, coherence & organization, memorability & distinction of app features, and perceived enjoyment.

• The targeted audience indicated a favorable likelihood to adopt the application and recommend it to others

• Willingness to pay an average of 2.38 USD to purchase the application
Outcomes

This research benefits the public, transportation authorities, city administrators, and policymakers.

• Aligned with SB1, Objective 1: leverage the use of mobile technologies and shall align with the overall objective of developing and investing in “smart city” endeavors.

• Aligned with SB1, Objective 4: Provide evidence-based and theory-driven strategies that contribute to creating safer communities and greater opportunities for use of active transportation modes (i.e., biking and walking) through inducing positive behavioral changes.

• Aligned with SB1, Objective 7: as inform and improve decision-making on transportation-related issues, namely traffic safety.
Thank You!