CSUTC California State University Transportation Consortium

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

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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 <u>(Singh et al., 2005)</u>
 - **Complexity**: visual richness of the environment or the information rate (<u>Herzog and Leverich, 2003</u>)
 - **Coherence:** refers to how the various elements hang together, their unity, patterning or the visual harmony (<u>Herzog and Leverich, 2003</u>, <u>Tveit et al., 2006</u>)
 - Mystery: refers to those aspects of the environment, which encourage one to explore with a promise of gaining more information (<u>Herzog and Bryce, 2007</u>)
- **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) (<u>Bonnardel et al. 2011</u>)
- 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



Sample Menu, Safety Tips, and Weather Page

Q 🔀 App name Safety Tips Weather Conditions Guide to Trail **Biking and Walking Community Events Promotional Offers**





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ROAD CONDITIONS & WEATHER

Weather and tips on how to drive under special conditions



Sample: Biking and Walking Frequencies







■ Daily ■ 4-6 times a week ■ 2-3 times a week ■ Once a week ■ Never

Sample: Age



Sample: Ethnicity

Enthnicity



 American Indian or Alaska Native
Hispanic/Latino
Black or African American
Native Hawaiian or Other Pacific Islander
White or Caucasian
Asian
Multiracial
Other
Prefer not to answer

Sample: Family Status





Married Single (Never married) Divorced Seperated Widowed

Yes No

Sample: Education Level

Eduation



Less than High School
High School Graduate (or GED)
Vocational or Technical Training
Some College (No Degree)
2-Year College Degree (Associate's, etc.)
Bachelor's Degree
Master's Degree
Doctoral Degree (PhD, JD, MD, etc.)

Sample: Employment Status



Results: Income Level

Income



Reliability

	Scale	Cronbach's Alpha
1.	Design Quality (3 items)	→ .78
2.	Imagery Aesthetics (3 items)	→ .80
3.	Coherence and Organization(4 items)	→ .87
4.	Perceived Enjoyment (3 items)	→ .82
5.	Intention for app adoption (6 items)	→ .92

Figure 1: The Perceived Importance of the Mobile Application Functions



Figure 2: The Appeal, Memorability, and Attractiveness of Tested Names of the Mobile Application



Figure 3: The Acceptance of Proposed Mobile Application Colors



Figure 4: The Perception of Different Factors of the Design & Content of the Main Drop-Down Menu



Figure 5: Opinions Regarding the Overall Design of the Mobile Application



Figure 6: Behavioral Intentions Towards the Proposed Mobile Application: Intentions to Adopt and Recommend



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!