Electric powered two-wheelers: a game-changer in Asia and beyond?

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What are “e-bikes”
China Market

- Simply put, e-bikes are fastest and largest growth of alt-fuel in history of motorization
Benefits compared to what?

- China: e-bike tend to displace transit...and cars

Previous e-bike studies and potential mode shift.
Benefits compared to what?

- Kunming: bicycles dying, 1 in 4 e-bikes displace car-based trip
E-bike riders as future car owners

**Kunming:** ~40% of e-bike riders have car in household, now more than bicycles and relatively large fraction plan to purchase

**In Kunming:** Household vehicle ownership and purchase plans.
E-bike riders as future car owners

- Is Kunming representative?
- We conducted a national telephone survey and found similar results: HH car ownership (19-40%), purchase plans (8-30%).
- Hierarchical logit for car purchase: HH variables matter most, some city/regional-level data.
Is China’s experience reproducible?

- **Vietnam**
  - E-bikes can’t compete with gas scooters
  - E-scooter share maximized if it is:
    - High Performing (fast, high range, and low recharge time)
    - Price can be high (WTP for performance)
    - Tax incentives can have a very strong impact

- **India**
  - E-bikes can’t compete with gas scooters
  - E-scooter share maximized if it is:
    - Moderately Performing (medium speed, weight, capacity)
    - Price must be moderate (no WTP for performance)
    - Some interest in initial prices by novel battery financing mechanisms
Alternative models needed

- Bikeshare/Scooter share
  - Stated preference mode switch model of e-bike sharing vs. bicycle sharing
  - E-bike riders more likely on bad air days, hot days, longer trips, compete with transit.
  - E-bikes tend to pull from “non-sheltered” modes more
  - Young- and middle-aged male respondents more likely to use e-bikes and bikeshare in general
Now beyond Asia: little research

- In Austria...early adopters are predominately comprised of persons >60 years, used for leisure trips, and barely substitute carbon intense modes.
- German naturalistic study reveals minor differences among e-bike users and bicyclists
- Surprisingly little (English language) literature

Behavioral Research: N. America

- In bikeshare study in Knoxville:
  - e-bike riders ride longer distances
  - e-bike’s displace 11% car trips (bicycles replace 0%)

- In Sacramento qualitative analysis reveals many motivations for purchase and use

- Nationwide survey by MacArthur found:
  - Almost 65% of respondents replace some car trips

Key findings from UTK study

- E-bike trip lengths longer
- More utility errand-type trips
- More comfortable
- People used regular bicycles more than we expected (both free). 30% of bicycle choosers disliked e-bike (43% of women)
- Battery swapping only needed for really high turnover

Conclude

- Are e-bikes a game changer?
  - In China, without a doubt
  - In USA, about 200k sold last year
  - In Europe, about two million sold
  - At this year’s Interbike, Gary Fisher called e-bikes the “next big thing” for the bicycle industry

- In China: E-bikes are a disruptive mode

- In the West: E-bikes increase the utility of bicycling

- In the end: Very little is really known about this technology, especially in the West.
What’s next

- Developing a research consortium on Light EV research and education
- Linking academic partners (currently UTK, PSU, and Monash University) with industry, government, and non-government orgs.
- Inaugural kick-off workshop Nov 4-5, 2014
Transportation Research Board (TRB) Activities

- Joint subcommittee revived in 2011 under TRB’s Bicycling committee
- Current co-chairs C. Cherry and G. Rose
- Active in developing calls for papers, research need statements, conference sessions etc.
- About 40 people on the roster of members
- TRB is the single largest venue of publishing LEV research
Transportation at UTK
Thanks

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