

VoltWagons

*Getting people out of cars and onto bikes with
electric bike pusher trailers*



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VoltWagon - Getting people out of cars and onto bikes

Introduction

The most efficient form of transportation is the bicycle. Getting people out of cars and onto bikes will conserve oil, reduce greenhouse gas emissions and make for a healthier population.

However, many people do not like riding bikes because of the effort it takes and there is no cargo capacity. A technological advancement that can overcome these disadvantages is the electric pusher trailer. This is a self-contained bike trailer that contains the motor, controller and batteries and attaches quickly to any existing bicycle. These are easy to ride, provide a cargo box and can be easily disconnected from the bike.

An electric bike pusher trailer is being developed by Gregg Meyer of Smile Bikes and is called the VoltWagon.

This paper is an economic analysis of the VoltWagon electric bike pusher trailer. It will look at the bicycle industries in general, the market for electric bikes and the competitive landscape of electric bike pusher trailers.



Industry Analysis

Before we look at the specifics of the electric bike market, it is helpful to look at the general bicycle industry first.

Size and Structure

In 2002 in the U.S., there were 36 establishments that were involved in bicycle and parts manufacturing producing \$842 million in value of shipments (U.S. Census Bureau, 2002). The large majority (over 99%) of the bicycles sold in the U.S. are imported from China and Taiwan (NBDA, 2008a).

In 2008, the latent demand for bicycles in the United States was estimated to be \$6.9 billion (about 18.5 million bikes) growing to \$8.8 billion by 2011 (Parker, 2005) (NBDA, 2008a).

The bike industry consists of two relatively independent segments: the low end sold through mass merchants and the high end sold through specialty bicycle retailers. While some product differentiation exists, particularly between high-end and low-end bikes, in each of these segments the market operates as a perfect competition where profits are very small and companies often go out of business (Townley, 2006).

Trek/Fisher, Specialized and Giant are the largest suppliers to independent bicycle dealers followed by Raleigh America, Cannondale, Electra, Haro, Red Line and Schwinn, in order by estimated unit market share (NBDA, 2008a).

Distribution Channels

The main distribution channels for bicycles are (NBDA, 2008a):

- Specialty bicycle retailers
- Mass merchant - such as department, discount and toy stores
- Chain sporting goods stores
- Outdoor stores - such as REI
- Mail order



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The mass merchants sold the most units, 74%, but since these are low-end products averaging \$80 each they account for only 35% of the total revenue. Chain sporting goods stores sold about 6% of the bicycles accounting for 9% of the revenues at an average price of \$255. These include stores such as The Sports Authority, Champs Sports, JumboSports, Sportmart and Big 5. Outdoor and mail order were responsible for only 3% of the unit sales at an average price of \$425 which represents 5% of the revenues (NBDA, 2008a).

There are about 4,300 specialty bicycle retailers that offer higher quality bikes and also rely on value added services. They sell only 17% of the total number of bikes but account for 50% of the total revenues. Each store averages \$649,000 in gross sales per year with a store size of about 4,000 square feet. 91% of these retailers have only one location. The average dealer's gets 47.4% of their revenue from bicycles, 35.5% from parts and accessories, 10.7% from bicycle repairs, 0.8% from bicycle rentals, and 5.4% from other sources. The average store sells about 650 bicycles per year and carries five bicycle brands. Dealer costs start about \$200 and average about \$500, with high-end bike costs in in the thousands of dollars. Gross margins on bicycles average about 37%, which is just below the break-even point of 38.6% for the average store so they rely on sales of other hard goods which have a higher 48% gross margin (NBDA, 2008a).



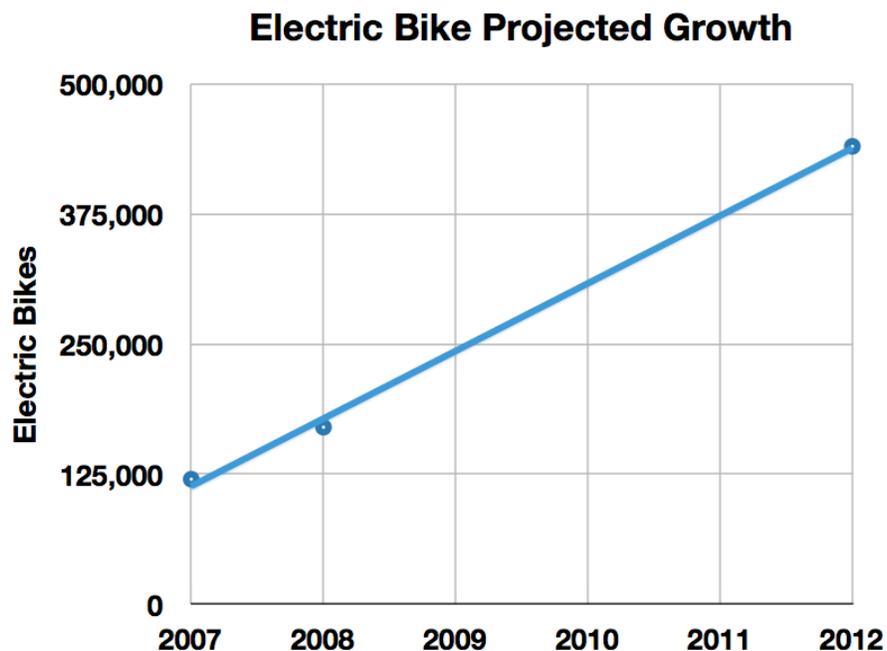
Market Analysis

Now that we have looked at the general bicycle industry, we will drill down into a market analysis for electric bikes.

Market Size and Growth

Worldwide 20.8 million electric bikes were sold in 2007, however only about 120,000 electric bikes were sold in the US in that year (NBDA, 2008b).

However, the total is expected to grow to 170,000 in 2008 and 220,000 in 2009 (NBDA, 2008b). Some optimistic estimates suggest that by 2011, electric bike sales will rise 194% to 500,000 (Workman, 2009).



Other estimates fall in line with this projection. For instance, Electric Bikes Worldwide Reports predicts that the worldwide electric bike market will more than double by 2012 (Hamilton, 2009). Longer term estimates look for a 6-fold increase in electric bike sales in 10 years (McClellan, 2008b).



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About 15 companies are now offering electric bicycles (Rigby, 2009) and many of these companies are expecting rapid growth in this segment. For instance, while BionX sold less than 8,000 units in 2008, they expect to sell 40,000 in 2009 and over 100,000 systems in 2010 (Hamilton, 2009).

Trends

With growing concerns over climate change, some people are looking for ways to reduce their greenhouse gas emissions and discovering the riding a bike can make a big difference. Also many municipalities are expanding bike lanes and bike trails. Through these effects and others, the usage of bicycles is expected to continue growing (Wang, 2008).

With rising oil prices, people will look for ways to cut down on their transportation costs and will increase their purchases of electric bikes. For instance, Bernson EV had significantly increased demand for its electric bike conversion kits in 2008 when gas prices soared to almost \$4 per gallon (Meyer, 2009a). Other bike shops reported brisk sales of \$2,000 electric bikes to novice buyers in 2008 when gas prices were high (McClellan, 2008a).

Target Customers

The following customer segments have been identified as targets for electric bikes (Meyer, 2009a):

- College Students
- Big-city dwellers
- Commuters
- Seniors
- Shopper/errand runners
- LOHAS
- Car-less: low-income

Bicycling Demand

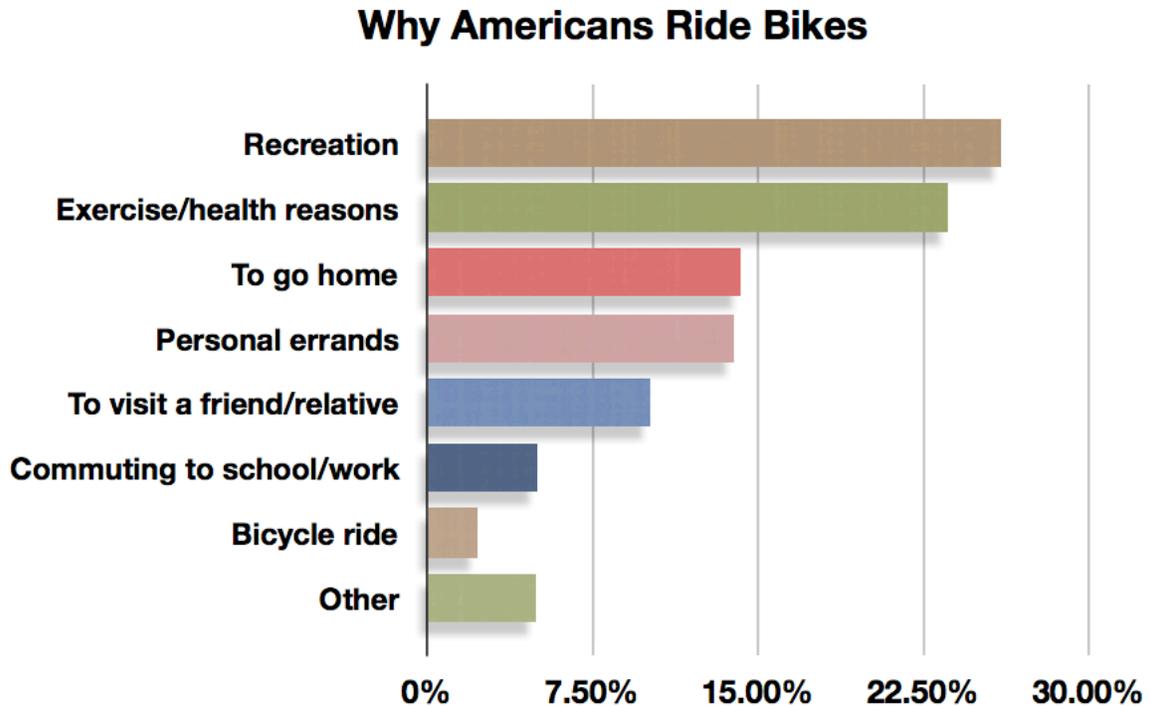
A study in the summer of 2002 (May - August) found that about 57 million Americans rode bikes at least once in a 30-day period during this time. A total of 91 million bicycle trips were



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taken with an average length 3.9 miles per trip. Only 7.3% of bicycle rides had a length of more than 10 miles (DOT, 2002).

Here are the reasons reported why Americans ride bikes: (DOT, 2002)



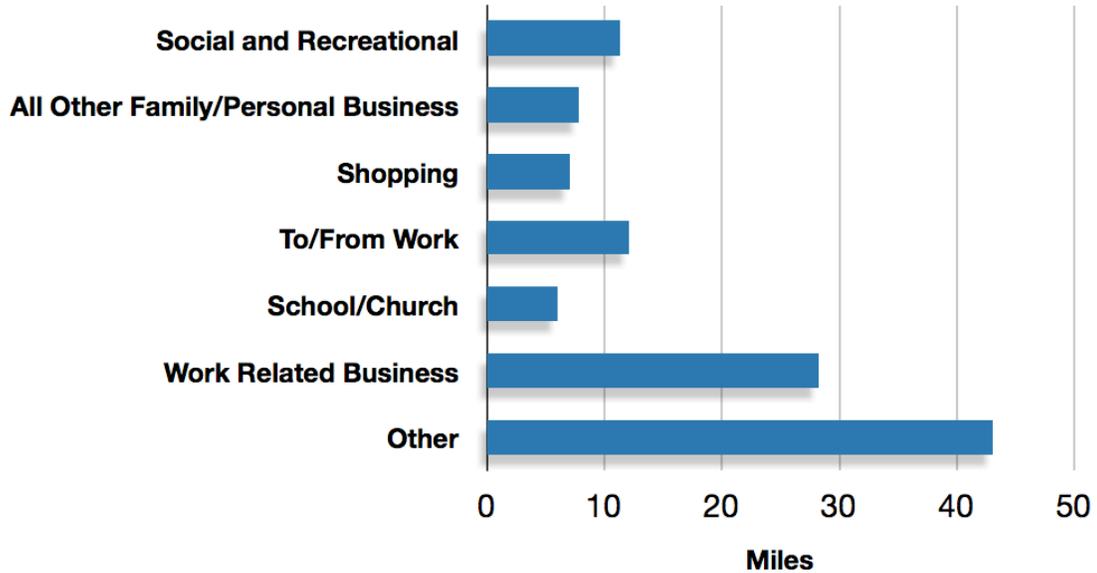
Car Trip Demand

Personal car transportation still accounts for the bulk of miles that Americans travel. However, many trips were short. In a Department of Transportation study of travel trends in 2001, it was found that the average car trip was about 10 miles (Hu & Reuscher, 2004). The breakdown of trip length is as follows:



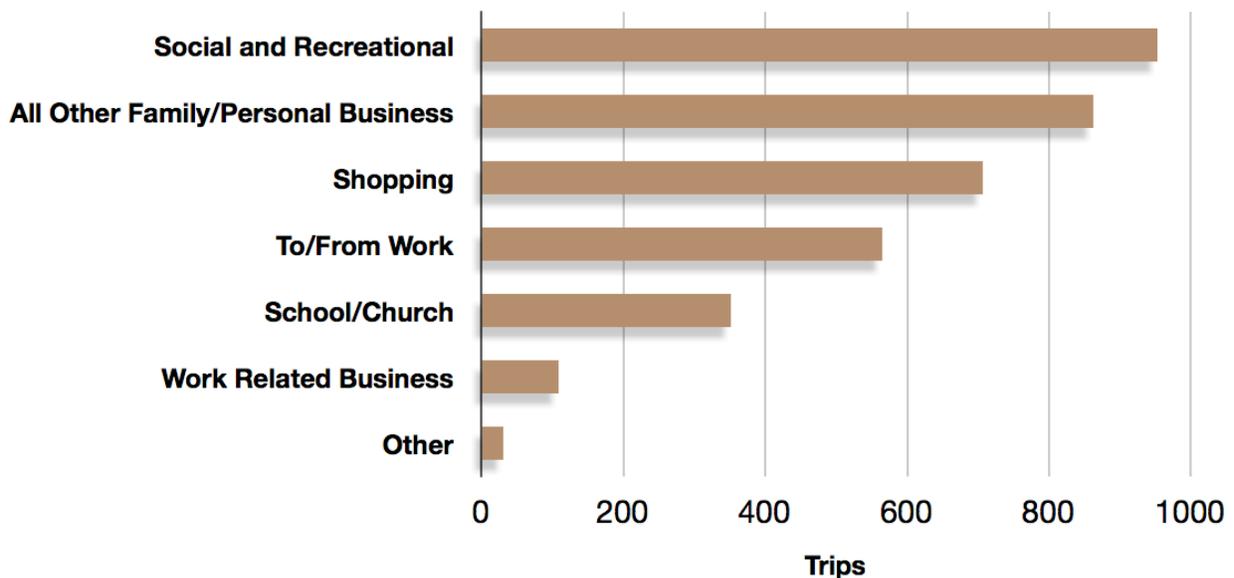
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Car Travel - Average Person Trip Length



The annual average trips per household are based on household numbers, not individual trips. For comparison, Hu & Reuscher found that on average there were 3.74 person trips per day.

Car Travel - Average Annual Person Trips per Household





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Lastly, Hu & Reuscher identified that in densely populated areas (10,000 people per square mile) over 30% did not own a vehicle and very few trips were taken on public transportation.

The conclusion from these results is that most car trips are short and thus it is possible that they could be replaced by bike trips.



Competitive Analysis

Lastly, let's look at the the competitive landscape for the VoltWagon electric bike pusher trailer.

Rivals

Currently, there are no electric bike pusher trailers for sale except for plans on how to make the [Birdwell Bike Pusher](#). Therefore, rivals consist of kits that convert an existing bike into electric propulsion and integrated electric bikes. Both of these options will require the purchase of a trailer in order to have cargo capacity.

Electric Conversion Kits

Electric conversion kits allow an end-user to convert their (suitable) existing bike into an electric bike. These kits consist of a hub motor, controller, batteries, charger, throttle and wiring. Usually they are more suited for installation by mechanically adept users. However, they are generally lower in cost than integrated electric bikes and can be installed on an existing bike.

Some examples of electric bike conversion kits and prices are:

- [Bionx](#) (\$1,700)
- [Crystalyte](#) (\$500-\$1400)
- [Wilderness Energy](#) (\$300-\$500)



Wilderness Energy Kit

Integrated Electric Bikes

Integrated electric bikes are simply bikes that are designed with the electric parts already built in and therefore don't need any (additional) assembly. This makes them suitable for people who are not mechanically adept and they can also be better integrated and more sturdy than a bike with a conversion kit. However, they are generally more expensive than kits and there is a limited selection of bike types which means that users may not be able to find a bike type that suits them.



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Some examples of integrated electric bikes and prices are:

- [Currie](#) (\$500-\$3,000)
- [Ecobike Electric Bicycles](#) (\$1,600-\$1,700)
- [EG Bikes](#) (\$1,000-\$1,300)
- [eZee Bikes](#) (\$2,000-\$2,700)
- [Giant](#) (\$1,600-\$2,200)
- [Optibike](#) (\$6,000)
- [Pedego](#) (\$1,100-\$1,600)
- [Sanyo eneloop](#) (\$2,300)
- [Schwinn](#) (\$2,200-\$3,500)
- [Ultra Motor A2B](#) (\$2,700)



Currie Electric Bike

Bike Trailers

Both conversion kits and integrated electric bikes do not have any cargo carrying capacity. In order to approach the functionality of an electric bike pusher trailer, a bicycle cargo trailer will need to be added.

Here are some examples of bicycle cargo trailers with prices:

- [Burley Encore Bike Trailer](#) (\$475)
- [Burley Flatbed](#) (\$300)
- [Burley Nomad](#) (\$350)
- [Croozer Cargo Trailer](#) (\$200)
- [Croozer Travel Trailer](#) (\$350)
- [Sears Bee Foldable Bike Trailer](#) (\$190)



Croozer Travel Trailer

Substitutes

The most dominant substitute for an electric bike pusher trailer is simply driving in a personal car. Another popular substitute is riding a bicycle either with or without a trailer.



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Barriers to Entry

A patent has been granted covering the concept of a "Powered trailer to propel a two wheeled vehicle." (Bidwell, 2004) Bidwell has been contacted and is willing to license his patent for a nominal fee (Meyer, 2009b).

Another barrier to entry in some locations is the legal classification of this type of vehicle. Most municipalities will classify the pusher trailer as a bicycle as long as the motor size is under 750 watts and is not capable of exceeding 20 MPH. In this case, no license or insurance is required. However, if a municipality classifies electric bikes as motor-driven cycles, they may require a motorcycle license and insurance to operate.

Competitive Costs

The VoltWagon retails for \$900 which compares favorably with the alternatives.

Based on the prices stated above, the cheapest alternative would be to convert an existing bike to electric with a Wilderness Energy conversion kit and adding a Croozer Cargo Trailer for a total cost of about \$500 (bike not included). However, average costs for kit and trailers are about \$1,200. An integrated electric bike with trailer would be a minimum of \$700 with an average cost of about \$2,500.

Pricing and Margin

The current cost to produce the VoltWagon is about \$400. Once volume reaches about 1000 units, they can be produced in China which will cut manufacturing costs in half although adding other costs for shipping and quality control for a total cost of about \$300 (Meyer, 2009a). With a retail price of \$900 and a dealer price of \$600, this gives dealers a gross margin of 50% which is well above their margin on bikes. This also gives the manufacturer a margin of 50% which will increase to 100% once volume goes up and costs come down.



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Dealer Acceptance

Bike store dealers sell mainly to people that are in good shape and this limits their market potential. By offering the VoltWagon, bike stores can expand their market to include casual users and seniors thus differentiating their offering and increasing their revenues (Townley, 2006). Also the margins of 50% on the VoltWagon are well above normal margins on bicycles so they would help increase bike store profits.

VoltWagon Advantages

Electrified bikes have many advantages over regular bikes. Some of these are:

- Seniors and people that are not physically fit can still ride them
- Longer distances can be travelled
- Travel time is reduced
- Sweating can be eliminated which makes them suitable for commute to work

However, electric bikes still fall short of the VoltWagon electric bike pusher trailer.

Electric bikes weigh more than a regular bike, sometimes significantly. For instance, a low-end electric bike will have a battery pack that weighs about 20 lbs and the motor and controller can add another 20 lbs for a total of 40 lbs increase in weight. This can make it significantly harder to pedal when electric assist is not being used, especially when starting out from a stop and going uphill. In addition, if the weight is not placed low on the bike (for instance if it is mounted on the rear bicycle rack) then the bike can become top heavy and be hard to hold upright at a stop. Finally, if the wheel motor is on the front wheel, it can make steering feel sluggish.

The VoltWagon overcomes these problems. By keeping the weight off of the bike, it is no longer top heavy or have sluggish steering. When the accelerator is engaged, all the rider feels is a smooth boost of power. While the weight of the trailer will make it more difficult to operate the bike without electric boost, the trailer can be detached from the bike in seconds when the rider desires to ride the bike normally.



Conclusion

There are many opportunities for the VoltWagon. Some customer segments that are already riding bikes like college students, big-city dwellers and commuters can benefit from the VoltWagon for added convenience and longer range. Low-income people that don't have a car can gain most of the benefits of a car with much less cost. Also people in densely populated areas that don't have a car can use a VoltWagon without the cost and hassle of parking considerations.

A larger opportunity for the VoltWagon is getting people out of cars. While many people ride a bike once or twice a month, they are also driving over 100 times per month and the majority of these trips are less than 12 miles. If only a small percentage of these trips taken by car used a VoltWagon instead, it would represent a huge increase in the number of bicycle trips.

The electric bicycle market is growing rapidly. With worries about climate change and higher gas prices, more people are looking for alternatives. Electric bike sales are expected to double by 2012.

While chain stores and mass merchants sell the most bicycles, these are low end units. The VoltWagon would be best suited for sale in specialty bike stores and would be a welcome product to enhance their profit margin and widen their customer base.

VoltWagons have many advantages over electric bikes. There is no direct competition for electric bike pusher trailers and at a cost of \$900, is competitive with alternatives.

Getting people out of cars and onto VoltWagons will help save oil, reduce greenhouse gas emissions and make them healthier. The future looks bright for the VoltWagon.



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References

- Bidwell, J.L. (2004). U.S. Patent No. 6725955. Washington DC: U.S. Patent and Trademark Office. Retrieved 4 November 2009 from: <http://www.google.com/patents?id=dGoQAAAAEBAJ>
- DOT. (2002). National Survey of Pedestrian and Bicyclist Attitudes and Behaviors. *U.S. Department of Transportation's National Highway Traffic Safety Administration and the Bureau of Transportation Statistics*.
http://drusilla.hsrc.unc.edu/cms/downloads/NationalSurvey_PedBikeAttitudes_Highlights2002.pdf
- Hamilton, T. (2009). *The BionX Man*. Retrieved 4 November 2009 from thestar.com:
<http://www.thestar.com/article/678181>
- Hu, P.S., & Reuscher, T.R. (2004). Summary of Travel Trends: 2001 National Household Travel Survey. *U.S. Department of Transportation Federal Highway Administration*.
<http://nhts.ornl.gov/2001/pub/STT.pdf>
- McClellan, D. (2008a). Eco Concerns Spur Sales Of Electric Bikes. *Bicycle Retailer & Industry News*, 17 (15), 1-49. Retrieved from [Business Source Complete database](#).
- McClellan, D. (2008b). E-Bikes Remain an Untapped Industry Boon. *Bicycle Retailer & Industry News*, 17 (15), 37-51. Retrieved from [Business Source Complete database](#).
- Meyer, G. (2009a, October 19). Personal communication. President, Smile Bikes.
- Meyer, G. (2009b, November 14). Personal communication. President, Smile Bikes.
- NBDA, (2008a). 2008 - The NBDA Statpak. *National Bicycle Dealers Association*. Retrieved 26 October 2009 from: <http://nbda.com/page.cfm?pageID=34>
- NBDA, (2008b). Bicycle Industry Facts. *National Bicycle Dealers Association*.
http://www.interbiketimes.com/pdf/Bicycle_Industry_Facts_Sheet--Fall2008--Final.pdf
- Parker, P. (2005). 2006-2011 World Outlook for Bicycles. *World Outlook Report 2006-2011: Bicycles*, 1-186. <http://search.ebscohost.com>
- Rigby, B. (2009). Electric bikes start to gain traction. Retrieved 4 November 2009 from Reuters.com:
<http://www.reuters.com/article/wtUSInvestingNews/idUSTRE58G5Y820090917?pageNumber=1&virtualBrandChannel=11604>
- Townley, J. (2006). A Case Study In Perfect Competition: The U.S. Bicycle Industry. Retrieved 26 October 2009 from <http://www.jaytownley.com/the-bicycle-industry-competition>
- Wang, C. (2008). Bicycle Manufacturing 2009. *TIER Industry Report - Bicycle Manufacturing*, 1-7.
<http://search.ebscohost.com>
- Workman, D. (2009). Electric Bike Export Opportunities. Retrieved 4 November 2009 from
http://international-trade-leaders.suite101.com/article.cfm/electric_bike_export_opportunities
- U.S. Census Bureau. (2002). 2002 Economic Census - Motorcycle, Bicycle, and Parts Manufacturing: 2002. Retrieved 26 October 2009 from U.S. Census:
<http://www.census.gov/prod/ec02/ec0231i336991.pdf>