The Product Life Cycle and the Use of Bicycles to Deliver Goods and Services

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This paper uses the product life cycle model to examine the bicycle’s use as a vehicle to deliver goods and services. Such uses were occasionally adopted during the bicycle’s earliest years, before it even had pedals! The high wheel bicycle and tricycle started a small growth phase that included message delivery on the former and postal service and newspaper delivery by the latter in Britain. The modern safety bicycle with pneumatic tires dramatically stimulated use for both recreation and delivery purposes. As motorized transportation developed, bicycle delivery use declined, but did not vanish completely. In recent decades, a small rebirth has occurred in both mail and message delivery because of the bicycle’s low cost and ability to get through urban traffic congestion. Bicycle marketers’ efforts to extend the product life cycle by developing the mountain bike also contributed to the re-adoption of the bicycle by police forces around the world.

INTRODUCTION

Given the current level of interest in "green marketing," it is surprising that the distribution of goods and services by bicycle has not received greater scrutiny, either in the present day or historically. For example, Donald A. Fuller in his book Sustainable Marketing: Managerial-ecological Issues (1999, p179) states:

Because transportation vehicles continuously consume energy (fuel) and discharge air emissions as they operate, the adoption of vehicle policies that stress fuel economy and the use of reduced emissions technology is an important consideration in achieving sustainability. Also, moving products fewer times and in large quantities (i.e., single products in bulk or consolidated shipments of different products) . . . tend to lower environmental emissions per unit of delivered product.

This statement obviously assumes only motorized vehicles (including ships and planes) may be used to distribute goods and services. Fuller completely ignores human powered vehicles. The use of human power for transport would necessitate smaller quantities being shipped in any given load with the trade-off of requiring more loads to ship the same amount of goods. Yet, "fuel" costs would be reduced to additional food and water and emissions would be non-existent. Despite the increase in number of trips, labor costs would likely decrease because of the lower wage of cyclists compared with operators of other forms of transport. Furthermore, traffic gridlock in urban areas would not delay distribution because human powered vehicles can effectively squeeze through traffic in situations where larger vehicles cannot. While human powered vehicles generally travel more slowly than motorized vehicles, in many cities, the short distance traveled gives the advantage to bicycles, particularly where gridlock is a factor.

This "motorized" perspective is typical of Americans. Even the classic bicycle-riding newspaper boy or girl seems to be disappearing from our neighborhoods. Yet, worldwide, more bicycle trips are taken in China everyday than in motor vehicles in the entire world. In Asia it is not unusual to see tricycles hauling half-ton loads. In Bangladesh, trishaws alone transport more tonnage than all motor vehicles combined (Lowe 1989). Non-motorized vehicles accounted for 36% of all freight-ton miles in 1985 in that city. Cycle rickshaws account for 10-20 percent of urban freight movement in many Asian cities (Reploge 1992, p. 78).

Similarly, Latin America has areas of substantial bicycle delivery use. Every month, 160 cyclists haul an estimated $1 million goods over the Simon Bolivar Bridge between Venezuela and Columbia (Economist 1994). In Bogota, Columbia, in the early 1980s, the largest bakery replaced most of its trucks with 800-900 delivery trikes that delivered baked goods to over 60,000 local shops. This reduced distribution costs from 27% of overhead to 8% (Sanders 1991, p. 63, VanderTuin 1986, p.2). It dramatically increased sales because bicycles could maneuver effectively through stalled traffic making delivery more reliable. Reportedly over 1000 new jobs were created, many for delivery people (McGurn 1999, p. 187).
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In Africa as well, the bicycle is used for transport. In the 35-kilometer radius around Kampala, the capital of Uganda in East Africa, the bicycle is used to haul 7,620 tons of crops annually in and out of the city. Similarly, bicycles are used to transport 2,134 tons of Charcoal, 1,043 tons of firewood and 300 tons of banana leaves. On one major roadway, Bombo Road, bicycle transport by 275 bicycles daily account for 40% of all commodity transport. Bicyclists carry the equivalent of 21 pick up truck sized loads each day, often pushing their one-speed bicycles uphill (Grisley 1995)

Even in America, many organizations have come to appreciate the value of the bicycle as a transportation vehicle. For example, Kennedy Space Center has 30 heavy-duty tricycles, two with trailers, and approximately 1000 bicycles to transport equipment and people within the 220 square mile facility (Kump 1992). Similarly, the Newport News shipyard has been using human-powered vehicles since the 1930s. As of 1988, it employed some 2,245 utility cycles to move people and equipment around its 2.2-mile site. Insurance giant, United Services Automobile Association, employees 80 tricycles in their 115 acre, four story building in San Antonio Texas. The building contains a wide service corridor that is one kilometer long. The trikes go as fast as electric "golf" carts, yet take up one third the parking space of a cart and repairing the trikes requires about $1500 and 90 person hours annually. A single "golf cart" having a bad year can exceed both these amounts (Olson 1999). Chem-tronics, a California manufacturer of titanium jet engine cases, adopted tricycles for its maintenance crew to travel the quarter mile trip between maintenance facility and factory. By cutting travel time from 6 to 3 minutes, the company saves about $25,000 per year, but the 12 trikes cost only $6,000 to purchase (Duvall 1992, p. 9). Other businesses, such as Anheuser-Busch, International Paper, Exxon, Texaco, General Motors, Chrysler, Ford, Martin-Marietta, Bethlehem Steel, and Boeing, started, in the late 1930s, making similar use of bikes and trikes. Many of these are indoor uses where motor vehicle emissions would be hazardous (Drake 1997; Perry 1995, pp 273-74). The U.S. Army has experimented with bicycles for troop transport since at least 1897 and continues to do so (Shaddy 1999).

Perhaps it is not surprising that marketers and marketing historians have ignored the bicycle. Bicycle historians themselves disagree as to whether the bicycle ever served as a transportation vehicle or whether it was (and is) merely a plaything for sport and recreation. Oddy (1994) argues that bicycles in the 19th and much of the 20th centuries offered no comparative advantage over other forms of transportation and were too expensive for use by the poor to reduce their transportation costs. Ritchie (1995, p. 32) disagrees: "The goal of cheap personal mobility . . . is perhaps more than any other the social force which has driven forward the evolution of the bicycle and the process of change in cycle technology." Both of these historians largely focus on the bicycle as a means of personal transportation, not as a vehicle for distributing goods and services. Yet, in making his argument, Ritchie cites an 1870 book describing postal service use of the bicycle in areas of England that lacked rail service and an 1889 book describing the use of the load carrying tricycle for distribution of goods to customers by package delivery firms, butchers, newsvendors, and milkmen.

This paper attempts to fill this gap in both marketing and cycling history by examining the history of the human-powered bicycle and tricycle as a means for distributing goods and services and the relationship with between these vehicles and the product life cycle of bicycles. Unfortunately, much delivery use by bicycles was considered too mundane to merit contemporaneous documentation and so the precise details are difficult to find. This paper will examine numerous examples to suggest that bicycle delivery has served and continues to serve as an important means of delivering goods and services to customers.

This paper begins with a brief overview of the evolution of bicycle design, focusing on utilitarian aspects in the context of the product life cycle. It then examines the history of specific uses including message delivery and package couriers as well as police and other emergency service providers. While these are not the only goods and services provided by bicycle delivery, they serve as useful examples of the scope of goods and services that have been so provided. Two other well-known bicycle uses, not treated here, are cycle-nickshaws (human-powered taxis) and the use of bicycles by the military to deliver messages, supplies, raiding parties and even troop movements. Both of these uses have been documented extensively elsewhere (e.g., Wheeler and T'Anson 1998; Gallagher 1992; Fitzpatrick 1998; Caiden and Barbee 1974).

THE PRODUCT LIFE CYCLE AND THE EVOLUTION OF DELIVERY BICYCLES

The development of the bicycle generally, and related delivery vehicles, can be examined by using the product category life cycle. This model posits four general stages of a product's life over time: introduction, growth, maturity and decline (Granthan 1997, Kotler 1991). Karl von Drais invented the predecessor of the modern pedal bicycle known as the draisine or hobbyhorse in 1817. The rider in the figure below is wearing the local postal service delivery uniform (McGurn 1999, p. 15) or military uniform (Street 1998, p. 15) because von Drais hoped to sell the machine for message delivery. This machine also was called the running machine because it was operated by the rider moving his feet along the ground —essentially running while astride the machine. While this development could constitute an early introductory stage, it was really more of a recreational fad that ignited quickly, but died out within 1-2 years.

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Although limited experimentation with human powered vehicles appears to have occurred in Scotland in the 1840s, including reported tea delivery in 1847 by Galvin Dalzel of Lesmangow (Reilly 2000, p. 9), it was over forty years later, in Paris in the early 1860s, that pedals were affixed to the front wheel of the hobby-horse. This heavy wrought iron and wood boneshaker was the true introductory stage of the bicycle. The Franco-Prussian War broke out in 1869, causing French velocipede factories to convert to munitions. British firms then took the lead in manufacturing as the bicycle evolved to the lightweight British ordinary constructed with hollow tubing and tension spoke wheels. At the same time as the ordinary, lightweight tricycles were produced. This marked the beginning of the growth phase as bicycling as a recreation grew in popularity and tricycling included women, at least those wealthy enough to afford a machine and a place to store it.

Some of these early tricycles in the 1870s or early 1880s were designed to appeal to a new market segment, beyond recreation. They were constructed with carrying capability and used for deliveries. Woodforde (1970, pp. 84-85) states that a British newspaper, the Evening Standard, started being distributed in 1884 by Singer tricycles called Carriers. This inspired the Post Office to follow suit the following year, despite testimony in Parliament by the postmaster general that tricycles were not well suited for distributing mail. However, Caunter (1955, p. 31) notes that Bayliss Thomas of England obtained a contract to supply carrier tricycles to the British postal service as early as 1881. Perhaps these early contracts were for limited numbers of delivery tricycles for experimentation. The first delivery tricycle documented by Pinkerton (1983) was actually the Horsham Pentacycle, made about 1885. This unusual machine was based on a high wheel ordinary with two wheels supporting a large basket in front and two wheels (instead of one on the normal ordinary) supporting two side rear baskets. This followed as early as 1886, by numerous brands of delivery tricycles, some with two wheels and a carrying box in the front, others with two wheels in and the carrying box in the rear (Pinkerton 1983). These basic designs are still in use today, although often with improved braking and gearing.

The majority of the growth phase as well as the maturity and decline phases of the bicycle product life cycle are represented by the dominance of the modern pneumatic-tired safety bicycle, developed in Britain in the late 1880s. Small modifications in this design were made to appeal to different market segments such as the small-wheeled BMX bicycle for kids in the 1960s and the mountain bike for adults (and bigger kids) in the late 1970s. Two wheeled carrier bikes also developed to appeal to the transport segment.

Bradbury Tradesman's Carrier Cycle of 1911 is one of the earliest known examples of a two wheeled delivery vehicle. It is a simple safety bicycle with a front attachment to hold a basket. By 1932, the Hopper Tradesman's Carrier had a much larger basket holder and smaller (fourteen inch) front wheel. At least by 1913, rear carriers also were used (Pinkerton 1983). The rear carrier can be used to carry rather large loads, either on top or with side baskets or panniers. The rear carrying tricycle uses a larger carrying area that is lower to the ground.

By about 1925, Smith & Co. in Denmark was producing both the "Transporter," a cargo bike with rear and front carriers and a smaller front wheel, as well as the "Long John" (Davidson & McGurn 1997, p. 31). This model has an elongated, low middle frame that supports a carrying platform between the front and rear wheels as illustrated by the 1930 Dutch milk delivery bicycle below.
Further development of carrier cycles led to relatively unique models such as the 1905 fireman's bicycle made by B.S.A. for firemen who worked at petrochemical factories, and the circa 1930 Art Nouveau Italian ice cream tricycle illustrated above.

In Great Britain, most of the major bicycle producers offered a delivery bike or trike at one time or another. Two firms that specialized in this market, Grindle and Fashley were combined when the latter purchased the former (Pinkerton 1983). Similarly, in the U.S., Tinkham Cycle Co. of New York was the largest early manufacturer of carrier tricycles (Adams 1996, p. 219). However, when Good Humor Ice Cream asked Worksman Cycles to build delivery tricycles, Worksman grew to its current position of dominating the U.S. market for carrier bicycles and tricycles (Zuckerman 2000).

Trailers represent another method of increasing the carrying capacity of bicycles and tricycles. They typically connect to either the rear hub or the seat post and may have one or two wheels, although four wheeled trailers also have been constructed. The one wheel trail tracks behind the bicycle well for rough or off-road duty, but typically has a lower carrying capacity, around 40 kg, compared with two wheel trailers that can carry 100 kg. Bicycle histories seldom discuss bicycle trailers, but a photograph from Nazi occupied Paris shows one in use (Eland 1997). U.S. patents for bicycle trailers date back at least to the 1970s and make references to earlier patents in the 1940s and 1950s. Trailers and cycle rickshaws represent the most recent attempts to prolong the bicycle's life cycle by changing it to appeal to the transportation market segment.

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Postal Delivery

As figure two illustrates, the earliest attempted delivery use for the bicycle was postal service and message delivery. The earliest rumor of mail delivery use occurs in Britain where an 1869 book refers to letterman riding the dandyhorse (hobby-horse). Presumably this occurred before the development of the boneshaker in the 1860s. Von Drais, the inventor of the hobbyhorse, reports in a German magazine that the machine was used to delivery mail in Britain in 1820. However, Street (1998, p. 64) is skeptical. He states that the Post Office Archives contain no reference to hobbyhorse use so if it occurred, it must have been experimental.

He does note that a Post Office "Green Paper" does refer to experimental use of a few "velocipedes" prior to 1880, but he believes those are likely pedaled bicycles or tricycles. This latter reference is consistent with Ritchie's (1995) citation, mentioned above, of an 1870 bicycle book describing British Post Office bicycle use. As noted above, Bayliss Thomas of England obtained a contract to supply carrier tricycles to the British postal service as early as 1881. "[S]oon after this form of vehicle was adopted by various tradesmen for the delivery of their goods" (Caunter 1955, p. 31). The pictures below show a Vienna postman on a tricycle in 1888, and British postal carriers using Triumph tricycles.

In Australia, bicycles also were adopted for postal service use. In July 1898, the Melbourne General Post Office, after a one-month trial, leased 14 bicycles for use by 18 men in shifts to carry mail throughout the city. One cyclist could do the work of a team of horses, wagon, driver and box-clearer, so that the post office saved 2000 Australian pounds per year. Each bicycle was leased for only 9 pounds per year. It was not unusual for Australian postal bicycles to carry 50 lbs of mail in all sorts of weather and last for fifteen years or more with minimal maintenance (Fitzpatrick 1980 pp. 54-55).

In the United States, the Journal of the Telegraph recommended boneshaker use for messengers by 1869. The earliest reported use was the post office in Port Jervis New York in that year (Dunham 1956, pp. 118-119). Prior to 1888, the U.S. Postal Service must have allowed delivery by bicycle, because as of that year it no longer provided bicycles. Riders abused them so the Postal Service supplied carriers with $2-$3 monthly maintenance allowance rather than bicycles themselves. Much of the promotion of the bicycle for message carrier use was sponsored by the military. The Connecticut National Guard formed a bicycle
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Squad for courier and reconnaissance work in 1891, followed by Rhode Island, New York, Massachusetts, Colorado and others state militia and guard units (Dunham 1956, p. 449-50).

The League of American Wheelmen, under Army direction, demonstrated a series of relays: between New York and Chicago in 1892 and 1895, over a 2,037 mile course in 1894, and between San Francisco and New York in 1896. In the 1895 Chicago-New York relay, a postal squad delivered a note from the Chicago Postmaster to his counterpart in New York in just 66 hours defeating an Army messenger team (Dunham 1956, pp. 451-52). In July 1894, the derby cycle company sold between 250-300 bicycles to mail carriers. This occurred after the Chicago Post office conducted its own experiment. Six sets of nine letters each to be delivered along an 18.5-mile route were given to carriers using different means of transportation. The cyclist won the race in one hour and twenty minutes followed by the horse rider 26 minutes later. The walking carrier took nearly 5 hours to complete deliveries (The Postal Record. 1894, p. 190). By 1895, Chicago had no less than 100 carriers on bikes at a savings of $5000 annually in transportation costs (Smith 1972, p. 48).

From July 7-18, 1894, a railway strike compelled Arthur Banta, a mail contractor, to form a bicycle relay team to deliver mail along the 210-mile route between Fresno and San Francisco for 25 cents per letter. Three cyclists worked in relays much like the pacey express and made the trip in 18 hours, delivering a total 380 pieces of "mail" during the strike. Income totaled $108.80, but expenses were $134.10 (The Central Region Bulletin 1987, Tripp 1951, p. 51). At least one postman in Phoenix made deliveries by bicycle in 1894 starting a long history of Postal Service bicycle use in Arizona (Pry 1990, p. 12). Thus, during the bicycle boom of the 1890s, bicycle delivery became commonplace in many areas.

As mail carriage increased, routes lengthened. The Annual Report of the Postmaster General listed $5,000 for a bicycle allowance in 1895 (The Central Region Bulletin 1987). Scheele (1970, p. 126) reports that by 1896, $560,000 was requested in the Post Office budget to cover horse-hire, streetcar fare and bicycle expense. This led to establishing more subsidy offices and substations to shorten routes. In 1914, a new statute was enacted authorizing payments to carriers injured or killed while on duty. Within two years, motorcycles and bicycles, which had been used on about 8,000 routes, were banned from rural delivery because of the danger. Lack of carrying capacity and lack of use in bad weather also were cited as reasons for the ban, which appears primarily directed at motorcycles (The Postmaster’s Advocate 1915). However, Roper (1917, 156) reports that in 1917 over 400 bicycles and motorcycles were used in the use, presumably in urban areas.

Throughout the 1920s and 1930s, bicycles continued to be used predominantly on a lease basis. After World War II, the Postal Service received 1500 Army surplus bicycles at a cost of $28.09 and began distributing these bikes to local offices. These bicycles contained front baskets, eliminating the need for the carrier to balance bulky mailbags (The Central Region Bulletin 1987). Scheele (1970, p. 183) states that bicycles were reintroduced in the Postal Service in 1952, so that by 1960, 4,273 bicycles were owned by the Postal Service. This may have been a re-introduction for rural delivery from the 1916 ban for that use. A post office in St. Petersburg Florida has used bikes exclusively since 1916; Newport News has used bikes since the 1930s and Coal City, Illinois reports using bicycle delivery since 1949 when it was established.

Of course, bicycles began being replaced by motor vehicles by the Postal Service in the early 1900s. In 1960, the Service used 36, 871 motor vehicles compared to the 4,273 bicycles noted earlier (Scheele 1970, p. 182). The decline continued at least through the oil crisis of the late 1970s. St. Petersburg went from 185 bicycles in 1962 to 14 by 1978. By 1990, it had 30 carriers operating by bicycle (Vavalla 1990). But the highest level of bicycle Postal Service use occurs in Arizona where 400 out of 1,700 post routes are serviced by bicycles compared with 120 routes in Florida and 20 in California. Arizona estimates annual savings of $50,000 per year by using bicycles instead of Jeeps in 1981 when a new bike cost only $200, but a Jeep cost $5000. Bicycles also were touted as accident free compared to the 70 Jeep accidents in 1980 (La Jeunesse 1981). Bicycling magazine notes that one bike postal service route saves about $5,000 per year over a truck. If just half of the 40,000 U.S. postal offices switched to cycling delivery, the U.S. Postal Service would save about $100 million per year (Metcalfe & Peidra 2000). Despite these advantages, bicycle mail delivery is still relatively rare in the U.S., in the decline stage of the product life cycle.

In some European countries, mail delivery by bicycle may still be in the maturity stage. In addition to the British experience, discussed above, the Danish Postal Service has used front-box delivery tricycles for many years, having more than 40 trikes in service in 1997 (Davidson & McGurn 1997, p. 38). The Swiss Postal Service uses more than 3,700 delivery bikes (Rhodes 2000).

Private Delivery Services

It is difficult to know whether private messenger services used bicycles because of the Postal Service or vice versa. In Western Australia, after the gold rush in the early 1890s, it was the private messenger services that came first. The lack of stock, scarcity of water and high summer temperatures in this desert area made it inhospitable to horses, but imported camels were very expensive. In late 1893, the bicycle started being used to delivery messages on the 100+ mile route between Southern Cross and Coolgardie. This service was expensive, but expanded throughout the goldfields. By 1897, these private services had been replaced by telegraph lines and regular mail.
services (Fitzpatrick 1980, pp. 158-66). In the United States and other developed countries, Western Union and other telegraph services employed fleets of bicycle messengers in most, if not all, major cities, by the turn of the century. By the 1930s, London boasted 1000 telegraph boys and Britain as a whole employed 7,000 (McGurn, 19999, p. 1550).

In 1907, six teenagers with two bicycles started the American Messenger Company in Seattle, perhaps the first on-demand bicycle courier service. This small company worked 24/7 delivering telegrams, waking up railroad crews needed for emergency runs, and delivering bail money for prisoners, food, beer and even drugs. In 1913, it merged with a motorcycle delivery company and bought its first automobile. This service, now called Merchants Parcel Delivery to emphasize its focus on packages and delivery for retailers eventually grew to become UPS (Hartung 1996). Yet even today, UPS still uses some bicycles. Paul Onzak delivers for UPS in Forty Fort, Pennsylvania using his tricycle and trailer. In 1998, UPS stopped replaced its vans with bicycles for city-center deliveries in Stuttgart, Germany. This was part of a program in that city to reduce traffic and vehicle pollution. Similarly, Airborne Express uses 150 tricycles to pick up parcels off the conveyor belt at its distribution center (Davidson & McGurn 1996, p 89).

With the advent of the telephone and automobile, by the 1930s, bike messenger service became scarce in the U.S. (Reilly 2000, p. 12). Like Postal Service use, bicycle couriers revitalized. This revitalization began in New York City with film can couriers, hauling film between production companies and developing labs. The first general on-demand bicycle courier service in New York City was Can Couriers in 1970. Bicycle services spread to other cities like San Francisco in the 1970s and Seattle in 1978. (Reilly 2000, p. 12). Increasing traffic congestion and fuel prices stimulated this business, so that bicycle messenger services peaked in the mid-1980s in the U.S. with New York boasting some 5,000-7,000 messengers at that time (Fisher 1997, p. 103; Raab 1994). The advent of fax machine in the mid-1980s is typically credited with the decline of messenger services. However, the recent recession in Japan has led to an increase in bicycle messenger usage so that about 100 messengers currently carrying about 1000 deliveries daily (www.jupiter.or.jp/english/b_news/news_3.html). In Tokyo, rates for bicycle couriers are 20-30% lower than for motorcycle services and bicycles cost less to acquire and operate and can travel either way on one way streets, unlike their motorized cousins. Currently there are probably between 1,000-2,000 messengers in New York (Raab 1994), 350 in San Francisco (Associated Press 1998), 225 licensed bicycle couriers in Boston (Wasserman 1996), and 140 cyclist messengers in Montreal (Coultre et al. 1998). Organizers of the Cycle Messenger World Championships, which began in 1992 in Berlin, estimate that in 1998, when Washington D.C. hosted the championships, there were roughly 10,000 bicycle couriers worldwide in nearly 100 cities, delivering more than 73 million packages annually and saving about 18 million gallons of gasoline daily (Shipley 1998).

While some bicycle messengers are employees with health care and other benefits, many are treated as independent contractors. They may earn as little as $3 per delivery, down from nearly twice that much during the 1980s and earning more than $15,000-$30,000 is difficult even with long hours. Not surprisingly, courier turnover can be quite high. The saying goes that there are old couriers and bold couriers, but no old bold couriers (Raab 1994). While many argue these practices are unfair, there is little doubt that they keep costs low making this method of delivery attractive for marketers.

Indeed, the latest innovation is urban bicycle delivery services are those accessible by the Internet such as Kozmo.com. Kozmo.com is the recognized leader in this industry having started in New York in 1997 and grown to eleven U.S. cities and over 300 full time employees and 300,000 customers. It delivers videos, DVDs, CDs, specialty foods, snacks, books magazines and over-the-counter items (Golab 2000).

In addition to messages and small items, some use bicycles to transport and deliver heavier items. Historically, McGurn (1999, p. 81) notes that milk was delivered by tricycle in the United Kingdom and Germany in the 1880s and figure five suggests by "Long John" bicycle in the Netherlands by the 1930s. He further notes that the heyday of delivery tricycles in Britain occurred in the 1930s. By 1939, London alone had 4,000 of Walls
"stop me and buy one" ice cream tricycles. As figure eight illustrates, Walls competitors had their own delivery trikes. McGurn (1999, p.155) concludes that carrier cycles became commonplace in Europe for delivering groceries, milk and newspapers as well as to serve various tradesmen.

In more modern times, even in the U.S. cycle-delivery still occurs. Santa Cruz, California boasts a landscape service, electrician, and delivery service, all distributed by human power. Terra Nova Landscaping in 1991 sold one truck and purchased two bicycles with trailers. By 1995, it serviced 70 accounts with 7 bikes with trailers, a carrier tricycle, and a modified side-by-side four-wheeled tandem. In 1994, Terra Nova was joined by Pedaler's Express, a delivery service that can haul up to 1000 pounds on its disk-brake equipped tricycle. Its riders regularly deliver 200 pounds of pasta to various local restaurants in a five-hour route. In November 1995, electrician Rick Longinotti, joined the group by giving his van to charity and traveling to various jobs by bicycle with a trailer hauling his equipment and supplies. He estimates that about one third of his calls are from people who wish to support his bike-only business (Mustelli 1995). This is just one town.

Another Ped-Ex started in Berkeley California in 1994, just before the Santa Cruz company. There is a similar company in New York City (Dinkelk also 1995). The original Pedaler’s Express started in Eugene Oregon in May 1992 (www.efn.org/~cat/c). Jim Gregory (2000) started Fresh Aire Delivery Service in Ames, Iowa in 1992 to deliver groceries. Today he has a partner and 15 part-time employees and also transports airline tickets, newspapers and recyclables, all by bicycle. The most recent addition is Bike-Cart Age, which started in Victoria B.C. with one cargo trailer and by 1999 had six cargo bikes and trailers and 10 employees. Among other things, it distributes 100,000 weekly newspapers and groceries for a food store (Litman & Cort 1999; www.bikecartage.com). A recent survey of Quebec found that 25% of all grocery and convenience stores still deliver by bicycle in that city (Couture et al. 1999, p. 30). In 1998, Velo Revolution sponsored the first, and perhaps only, Freight Bike World Championship to compare freight bike technologies by setting speed records carrying 100 kg cargo over 2 kms. (www.mondodesign.com/freightbikes.html).

Delivery of Emergency Services

In January 1995, when a 7.2 magnitude earthquake hit the 1.4 million people of Kobe Japan, buildings, highways and rail lines were destroyed. Residents and rescue personnel turned to the bicycle for transportation. 2,000 new bikes were donated by the industry and used bikes came from relief organizations. According to Bicycle News Japan, food bottled water and bicycle and parts were the three emergency necessities (Zukowski 1995). This success story has led the city of San Francisco to plan on its bicycle messengers in case of a similar emergency there. Bicycles have routinely been used to provide emergency services. The most common use is probably police services, followed by ambulance and emergency medical service. Occasionally the bicycle has even been used for firefighting services.

The earliest use of the bicycle by police may have occurred in 1869 when an Illinois sheriff reportedly supplied himself and his deputies with bone-shakers (Dunham 1956, p. 119). McCord notes that in the “1800s” British police used a police tricycle. Smith (1972, p. 49) reports that the first bicycle policemen in the U.S. were probably employed by the Boston Park Commission. Seymour (1895), appears to agree with the early Boston use, but describes it as suburban. He also notes that police in Chautauqua, N.Y. were early bicycle users. Seymour (1895, p. 704-05) says no other cities were using police on bicycles and specifically notes that Milwaukee and Chicago had considered it, but "voted the system down." However, Smith (1972, p. 49) claims that by 1894, Philadelphia, Brooklyn, Cincinnati, and Chicago all had active bicycle police patrols. Thus, 1894-95 appears to be the beginning of widespread police bicycle use in the U.S.

New York City started its unit in December 1895 with two bicycle policemen patrolling the streets most often used by cyclists. Within three months, the Chief of Police proposed making the bike squad permanent and extending it to three more precincts noting that bicycles increased police efficiency and were effective in patrolling and controlling scorchers (speeders on bicycles) as well as runaway horses. Police Commissioner Teddy Roosevelt, himself a cyclist approved this proposal and within its first year of service the 29 man bicycle squad was responsible for 1,366 arrests. Eventually, the squad grew to one hundred wheelers, including noted racer, "Mile-A-Minute Murphy", and had its own station house. In his autobiography, Roosevelt praised the squad: "any feat of daring which could be accomplished on the wheel they were certain to accomplish" (Jeffers 1994, pp. 207-209; McGurn 1999, p. 91).

This trend of bicycle police during the bicycle boom of the late 1890s seemed to spread to many cities in the U.S. and abroad. After experimenting with 25-citizen wheelmen to patrol the streets and apprehend scorchers (speeders on bicycles), in July 1896, the City of Denver began its two-man team of "scorcher herders." They arrested twenty scorcher during their first day. The Denver "wheel cops" refused to use the sling shot device then reportedly being used in Chicago to hurl small lead balls at bicycle wheels intended to break spokes and bring the bicycle to a sudden stop (Whitwad 119, pp 13-14). Similarly, in Grand Forks Minnesota, a bicycle patrol was started in the summer of 1896 to control scorchers and sidewalk cyclists (Sprung 1995, p. 281). In Wellington, New Zealand, the police bought bicycles in the mid-1890s. Bicycles also were used by police in Ottawa and Winnipeg Canada around this time (Babian 1998, p. 88). The Vancouver Police Department website notes that Constable Gordie Parket, whose picture is the symbol for the department, patrolled by bicycle in

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1899. Today, 60 of the 1100 police officers in Vancouver ride bicycles year round as their primary mode of transportation (www.city.vancouver.bc.ca/police/structure/operations/bike/bicycle.html). The International Police Mountain Bike Association website (www.ipmba.org/factsheet.htm) notes its archives contain a photo of the Dallas Police Department using bicycles as early as 1914.2

Eventually, most if not all police bikes were replaced by motor vehicles until the recent rebirth in police cycling. The Economist (1993) suggests that the first modern usage of bicycles to deliver police services occurred in San Jose, California in 1979 when a five-person bike squad was formed. Yet earlier use in shopping centers in Birmingham Alabama and Long Beach California started in 1968. According to the New York Times (1972, 1973, 1978), Baltimore Maryland started experimenting with bicycle patrols in March 1972 on four beats and Richmond Virginia re-instituted the bicycle patrol in the downtown area for the first time since 1934 in December 1973 to save fuel. Similarly, Madison Wisconsin started bike patrols of both downtown and the University of Wisconsin campus in 1978.

These limited uses of bicycles by police predated the general availability of the mountain bike in the 1980s. Thus, the limited early revitalization of police cycling was not influenced by product modification intended to prolong the bicycle product life cycle. Moreover, police bicycle use did not take off until the late 1980s, and police, unlike messengers, almost universally adopted mountain bikes for patrol use. The mountain bike appears to be responsible, at least in part, for the dramatic growth of police cycling at the end of the 20th Century.

1985 appears to be a banner year for new bicycle patrols. Fort Lauderdale and nearby Hollywood Florida both started bicycle units in that year (www.info.ci.flaud.fl.us/police/bicycle.html). In California, San Diego police patrolled the beach and other areas by bicycle since at least 1985 (Armer 1986) and police in the El Sereno part of Los Angeles began patrolling the business district by bike to reduce street crimes and robberies (Hernandez 1985). On the East coast, Englewood New Jersey also started a bicycle unit, the Radio Auto Theft or RAT squad, to combat car radio theft. The squad patrols near cars with valuable radios and waits for a thief to take the cheese (Singer 1985). Memphis Tennessee started its bike patrol in 1986 (Arkansas Democrat-Gazette 1986).

Despite these predecessors, the modern rebirth is generally credited to Sergeant Paul Grady and his partner Mike Miller who proposed the idea in Seattle in the spring of 1987. Bicycles were suggested as a means to get through traffic gridlock then being caused by downtown construction. Grady credits community policing with reducing crime in cities (Cuerdon 1997). By 1993, Seattle had 70 police on bicycles (Economist 1993).

In 1991-92, Seattle received over 600 requests for information (Economist 1993). The idea spread to many other police departments as well private security companies and college campus police. In 1990, the League of American Wheelmen surveyed police departments and discovered that 80 cities in 26 states had bicycle patrol units and others were planning units. Eighty percent of the units in existence in 1990 had been formed between 1988 and 1990. The L.A.W. organized the first annual Police on Bikes Conference, which was held in Phoenix Arizona in May 1991 (League of American Wheelmen 1991).

According to the International Police Mountain Bike Association website (www.ipmba.org), there are currently over 2,000 bicycle police units across the country with an average size of nine officers. Some departments have over 50 bike officers. The site also notes that military and college police, shopping malls, private security firms and even park and wildlife departments patrol by bicycle. The average daily mileage for a modern police bicycle office lies between 15-25 miles, with about 85% operating at night, but only 50% operating in the rain or throughout the year. The site lists numerous advantages for bike patrols: the ability to travel further and faster than foot patrols, and reach areas inaccessible by car, the stealth advantage – bicycles are both quiet and tend to blend in, the public relations benefits of greater approachability by members of the community. Finally, the cost is a large benefit. A bike costs about $1200, although often they are donated or obtained through federal grant funding for community policing, and annual maintenance is about $200. A patrol car costs between $23,000 and $28,000 and annual maintenance costs amount to between $3,000 and $4,000.

Like the police, other emergency service organizations have adopted the bicycle, at least experimentally. Carter (1999) documents several types of fire service bicycles including the BSA bicycle illustrated above. He notes that fire service bicycles of one sort or another were used in Australia, Britain and France. He also cites two short articles from the 1896 volume Scientific American showing various designs of human powered fire service vehicles and human powered ambulances. It is not known whether any of these were ever used in this country. In third world countries today, human powered ambulances are still used.

Modern paramedics, like police, have begun to use bicycles. In 1991, Grand Prix weekend in Denver provided the first major test of the city’s All-Terrain Medical Unit. This unit contains eight mountain bikes, obtained from unclaimed bicycles from the Denver Police Bicycle Bureau. Two bikes carry cardiac monitors and oxygen and others
medications and bandages. During Grand Prix weekend, the unit responded to 30 incidents with response time of one half of a motor vehicle. Paramedics on bikes can cover about twice the terrain as a paramedic on foot. The unit also has been used at Broncos football games where it takes only about one and one half minutes to cross the stadium by bike. The unit was intended for large events, but may eventually used for the downtown mall and city parks (Bicycle Network News 1991).

By Halloween 1995, Austin Texas became approximately the 20th U.S. city to offer emergency medical services by bike. Each paramedic carries about 35 pounds of equipment, including a heart monitor with defibrillator and oxygen tank (Kelly 1995). In Canada, Calgary, Vancouver, and Edmonton also have bicycle paramedic units (Holubitsky 1996) with Toronto’s unit established in 1996. Jamaica Hospital in Queens has been operating a similar unit since that year. It is one of the first to operate all year, not just on weekends and special events. The cost of the outfitting the unit of 25 patrolers was $70,000, about the cost on one unstocked ambulance. Each unit patrols an area of about four square miles (Cuerdon 1999).

CONCLUSION

Although much of the evidence is based on anecdote, artifact, or photograph, it seems clear that starting in the 1880s through at least the early 1900s, the bicycle and tricycle were extensively used to deliver messages, parcels and police services. While many of the documented examples involve delivery by government employees, such uses are consistent with the modern concept of the product life cycle and specifically modifying an existing product to appeal to a new market segment to prolong the growth or maturity stage of the life cycle. It seems likely that goods also were delivered extensively by bicycle by private merchants and delivery services. The fact that the bicycle was a vehicle offering competitive advantage in delivering goods and services at this time is best illustrated by the resolution of the Indianapolis Plumbers Union condemning bicycle use by plumbers because they could get to their jobs more quickly than necessary (Tripp 1951, p. 44).

This paper also suggests that despite delivery dominance by motorized means in the U.S., the bicycle has made a comeback since the 1970s. The gas crisis stimulated the Postal Service to increase bicycle use and bicycle messenger services grew rapidly once their advantages of lower cost and greater speed in delivery compared to motorized delivery services became known. To a small degree modern developments in carrier bicycles and tricycles have stimulated some interest in bicycle hauling of relatively heavy loads. However, the development of the mountain bike, intended for off-road recreational riding, seems to have stimulated extensive police bicycle use throughout the globe. The mountain bike was an effort to extend the product life cycle, but it appears police use evolved largely spontaneously and the marketing of police bicycles followed rather than stimulated this demand.

Contrary to concerns about pollution from other forms of transport, including horse "pollution" 100 years ago, the minimal environmental impact of bicycles does not appear to be an important reason for their use, with the possible exception of use inside large buildings. Rather low cost and relative speed seem to be as important today as a century ago as reasons for adopting bicycle use. One hundred years ago, bicycle relays competed favorably against horses and trains. Today, in urban areas, the bicycle is superior in traffic gridlock. Indeed, Kozmo.com, once a darling of the Internet is now planning to drop the ".com" suffix from its name as it develops other methods to interact with customers such as a 24-page catalog and telephone orders. It will continue to use bicycles for its one-hour urban delivery service (Weiss 2001). Thus it appears that the bicycle's long and significant history as a delivery vehicle should continue from the past and present into the future. While the bicycle is clearly in the maturity stage of its life cycle, growth of the use of the bicycle to deliver goods and services seems to have forestalled the decline stage, at least in this market segment. Marketers seeking a more efficient means of delivery (with ecological benefits as well) or those seeking to market bicycles for this use should take note.

NOTES

1. One important exception to the lack of history concerning bicycles as transport vehicles is the cyclist transport services of Eastern Nigeria in the 1930s. Prior to this time, palm oil was delivered by light truck from the interior to port for export. This became uneconomical as the price of palm oil fell. Cyclists took over this delivery task, carrying as many as three four-gallon containers to port and returning with kerosens and stockfish to be sold in local villages. By 1942, over 60,000 men were employed in this manner. By the 1950s, railways and trucks again reappeared, but bicycle transport of this type is still important today (McGurn 19999, pp 186-87).

2. Of course bicycle crime also began. By 1896 in Chicago, bikes were stolen from outside stores and factories and dismantled for shipment and sale elsewhere. This would appear to be the predecessor of the automobile chop shop. On May 14, 1896, Buffalo Illinois reported the first bank robbery by bicycles. The thieves rode off on their bicycles and made a clean getaway (Lindberg 1895, p. 77).

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