100 years of mass production = 1,000,000,000 Bicycles [one billion]

The world's bicycle fleet reached the one billion mark some time around 1990, and annual bicycle production is more than double car production. But, as Alan Parker observes, sheer numbers are not enough to convince many western nations to promote the bicycle as transport. With many developing nations following the same transport trends, there is an urgent need to encourage bicycle planning on a global level, and who better to co-ordinate this task than the global bicycle industry?

It all began with the first industrial revolution and the need for a more efficient form of urban transport that did not rely upon the horse; a messy transport option which deposited between 7 and 13 kilograms of manure and many litres of urine on city streets each day. The growing use of bicycles reduced the numbers of horses ridden in urban areas and contributed towards cleaner, healthier cities.

In 1890 two important innovations in mechanical engineering coincided to made the bicycle lighter in weight, easier to use and, by the mid 1890s, a lot easier to build in large volumes. The first was the introduction of the Humber (diamond) pattern bicycle frame, which in time became an industry benchmark that made possible the standardisation of tubing, bottom bracket castings and wheel sizes, and also reduced the amount of steel required.

The second was the introduction of the pneumatic tyre. That great authority on bicycle design at the time, Archibald Sharp (1896) praised the invention highly: "Whether judged by speed performances on the road or racing track, or from additional comfort and ease of propulsion to the tourist, the greatest advance in cycle construction due to a single invention must be credited to Mr. James Dunlop, the inventor of the pneumatic tyre."

In the early 1890s bicycle sales soared, and the bicycle industry sailed through the economic recession of 1893 into the economic recovery of 1895. The industry went into 1897 with a cushion of back orders from retailers who ordered three times as many bicycles as were actually sold. The market was saturated, and a trade war ensued with the price of bicycles being halved and halved again. The bicycle boom of the 1890s was over. Raleigh, established in 1891, was one of the few bicycle companies to survive.

Britain exports bicycle factories

In 1950 bicycle manufacture was clearly concentrated in the developed countries. According to one estimate (Carter, 1962) in 1943 there were 66 million bicycles in the world, of which 22 million were in the USA and UK, 39 million were in Germany, Italy, Holland, Belgium, Austria, Switzerland and Scandinavia while the other 5 million were in the former Soviet Union. This was an under-estimate, however, because Japan also had a fleet of around 10 million bicycles. So the world's bicycle fleet was around 73 million in 1943.

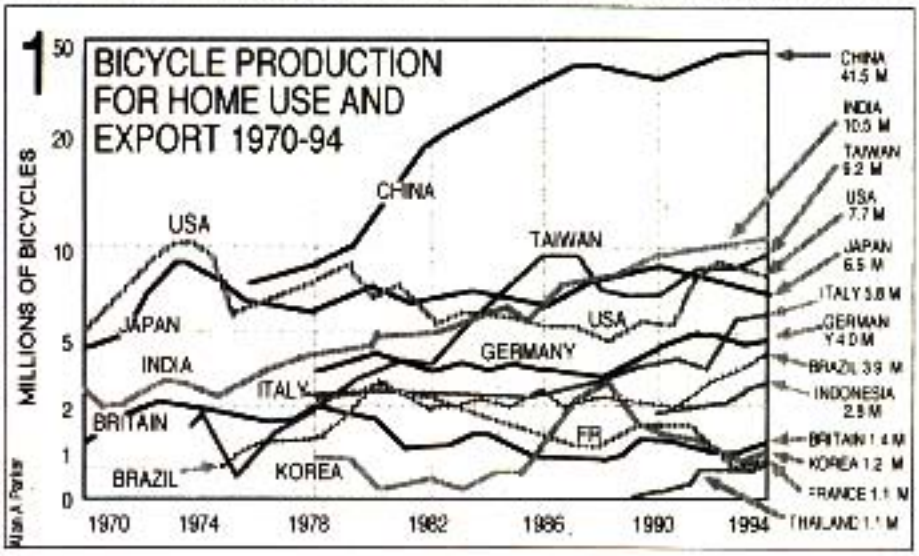
There was a need for developing countries to make their own bicycles, but making sturdy and reliable bicycles is no simple matter at an early stage of industrial development. Bicycle manufacture requires special skills in tool making, the design of press tools, jigs and fixtures and the provision of high quality raw materials. An independent bicycle parts industry is required for seam-welded bicycle tubes, high carbon steel wire, plastic mouldings, tyres, enamels, paints and various precision components. Equally important is a measure of protection for indigenous industries to ensure their survival in the difficult formative years.

Local industry can also acquire the necessary technology through licensing agreements or by imitating foreign products. After World War II Japan was devastated and Britain was the major spreader of new bicycle technology in the 1950s and '60s, until Japan had rebuilt its cities and manufacturing capacity by 1970.

Britain contributed manufacturing know-how and a quality product. Since 1918 bicycles and Sturmey Archer hub gears made by Raleigh have been exported to 140 countries. In the 1950s and 1960s Raleigh established factories in Germany, Ireland, South Africa, India, Nigeria and Malaysia, and licensing agreements in Mozambique, Congo, Dahomey, Sri Lanka and Peru. Another British company, Tube Investments, was involved in bicycle manufacturing all over South America and indigenous bicycle industries are now thriving in Brazil, Argentina, Colombia, Venezuela and Chile (Bowden 1975).

Japanese industrialisation

Wars, imperial administrations, and international trade have spread technology around the world in the past. Japan was the first Asian nation to industrialise, after the US government sent a fleet of seven warships there to negotiate a trade treaty from a position of military strength in 1854. The voyage from Japan to the west coast of America took 30 days through typhoon-prone seas, but the trade links grew. The Japanese were fascinated by products from foreign lands after more than 200 years of self imposed economic and political isolation.



Modern bicycles were first produced in quantity in Japan in 1931, with bicycle production reaching 600,000 a year by 1934 and one million by 1939. During World War II production dropped to around 100,000 units a year, but was built up to around one million per year between 1950 and 1956, then steadily increased until production peaked in 1973 at 9 million units (graph 2).

Bicycle exports hit the one million mark in 1968 and steadily increased to 3 million in 1988, but in 1985 Japan's bicycle imports also began to grow, and by 1994 there were twice as many whole bicycles imported than exported and that trend is likely to continue. The Japanese domestic demand for bicycles is around 9 million per year and will probably stay at that level as the working week is reduced from six to five days.

Japan leads the third wave

The influence of the old colonial powers in Asia has waned and over the last 25 years Asian industrial development has boomed. After 200 years of British, then American economic dominance, Japan is now the regional catalyst at the centre of the third great wave of industrial development. Japan was committed to a pragmatic program of nation building; protecting its industries until they were strong enough to win market share in other countries, and is now a technology pioneer second to none. For example, it was the Japanese who first perfected seam welding of chrome molybdenum alloy steel bicycle tubing that made light weight bicycles possible at much lower prices.

In 1990 there were 55 Japanese companies making whole bicycles and 306 makers of bicycle parts collectively serving 35,000 retail sales outlets. In 1993 the largest bicycle maker produced 1.3 million bicycles, while five other makers produced over 500,000 bikes a year. There are ten different trade organisations supporting the bicycle industry and there is a trade organisation supporting 11 manufacturers which produce 500,000 secure bicycle storage units annually. In addition JETRO, the international Japanese trade organisation, has offices in every country in the world and provides bicycle trade information. The bicycle industry funds the Bicycle Promotion Institute which also acts as a lobby to government and conducts research of benefit to bicycle users.

In 1982 the Japanese journal *Cyclist Press* accused Taiwan of stealing Japanese bicycle designs and fiddling patents. The Taiwanese bicycle industry has since built up a more cooperative relationship with Japan and developed a massive bicycle export industry of over eight million bicycles a year, one million of which are sold in Japan. Taiwan's 1980s marketing material looks surprisingly similar to 1970s Japanese materials.

In the late 1980s Japan's industrial development policy changed, shifting labour, raw material and energy intensive industries off shore to the dynamic Asian economies, and a network of Japanese or part Japanese companies making bicycles and bicycle parts is now spread all over Asia. Japan's bicycle industry is changing fast and will be concentrated more on the production of high-value-added, precision bicycle parts and niche markets for high quality bicycles. The long term impact on Asian bicycle production will come from exporting the technology to make better bicycles.

World bicycle and car production 1950 to 1995

Graph 3 shows the overall trends in human population, new cars and new bikes since the 1950s. In 1950 around 15 million bicycles were manufactured. In 1995 the world bicycle industry will produce around 100 million bicycles, mostly in developing economies, while the human population grows by around 87 million. Current world demand for bicycles is growing fast, because population growth has steadily increased in developing countries experiencing high levels of economic growth. The world's car fleet has grown from 50 million in 1950 to around 450 million in 1995, and the world's bicycle fleet has grown from around 66 million in 1950 to at least 1.1 billion in 1995 (graph 4). Meanwhile, the world's population increased by around 3.1 billion people.

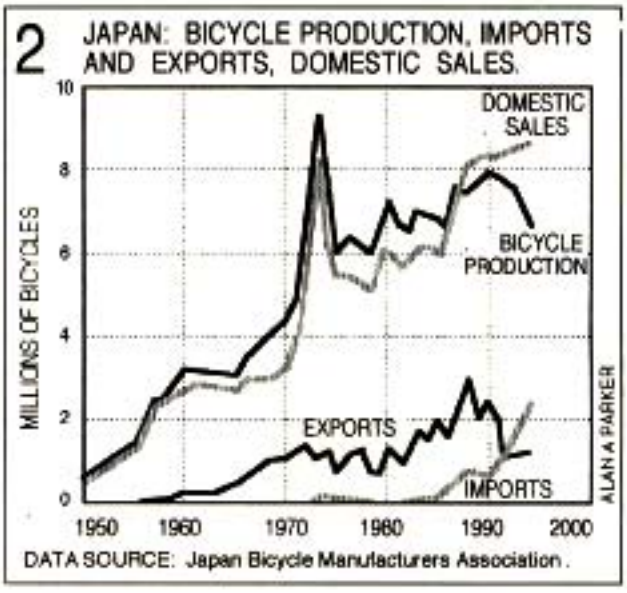
Graph 1 shows bicycle production data from 1970 to 1994 for the world's major bicycle makers. There are ten big industry groups making 40 million bicycles a year, which is more than the number of cars produced every year. The next eight biggest bicycle companies are producing between one and two million bicycles a year. The thousand or so other companies making bicycles, bicycle parts or assembling bicycles between them produce another 50 million bicycles each year.

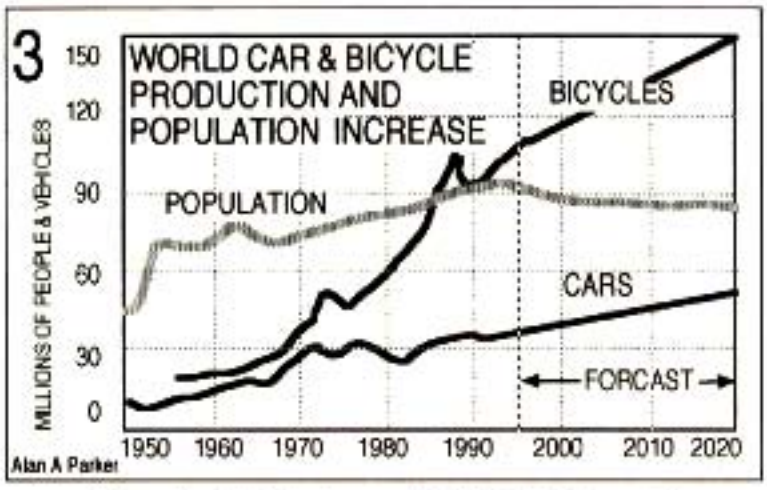
The largest bicycle manufacturer is the Chinese Shanghai Phoenix Group which makes just over 6 million bicycles a year. The Derby (UK) group of companies is now making over 5 million. Another Chinese company, Shanghai Forever, makes just over 4 million bicycles per year and Hero Cycles of India makes nearly 4 million a year. Two US groups, Huffy Bicycles and Murray Ohio make 6.5 billion bicycles between them.

Current industrial growth in China and much of Asia is comparable to the very high economic growth rate in the UK and USA during the latter part of the 19th Century. In all these developing countries bicycles are neither toys nor recreational vehicles but are used for all manner of transport and goods carriage. The tricycle substitutes for the use of taxis, light vans and lorries for moving all kinds of goods and people.

Future world bicycle demand

Recent population surveys of the European Union show an average population increase of only 0.1%. By the year 2025 the population of the European Union could be around 372 million and falling. There are 400 million bicycles in today's developed countries and this figure will increase by perhaps another 100 million, mainly in north America, but not much more. The world population is estimated to increase by 2.6 billion to 8.2 billion by the year 2025, with most of the increase in developing countries, where most future demand for bicycles will come from. Graph 4 shows my trend





projections for the increase in vehicle populations and the UN population projections.

Another reason why the future of the bicycle industry is almost guaranteed is that the non-renewable resources of the world may only stretch as far as providing access to a bicycle and a basic form of public transport for most people on earth. The high levels of multiple car ownership that exist in the developed world are totally unsustainable and can not happen in most developing countries except for elite minorities who have a real need or are wealthy enough to afford them.

If we assume four people per family household to the year 2020 we can conclude that household bicycle ownership is increasing, and that bicycles are getting to more people. Graph 4 shows that in 1994 the world's car fleet was around 450 million, the bicycle fleet was 1.1 billion, and the number of households was 1.4 billion. It is clear that the car fleet is not increasing as fast as the increase in the number of households, let alone the total population. The positive trend is that bicycle ownership is increasing faster than the annual increase in the number of households.

The world's car fleet has grown from 50 million in 1950 to around 450 million in 1995, and the world's bicycle fleet has grown from around 66 million in 1950 to at least 1.1 billion in 1995...

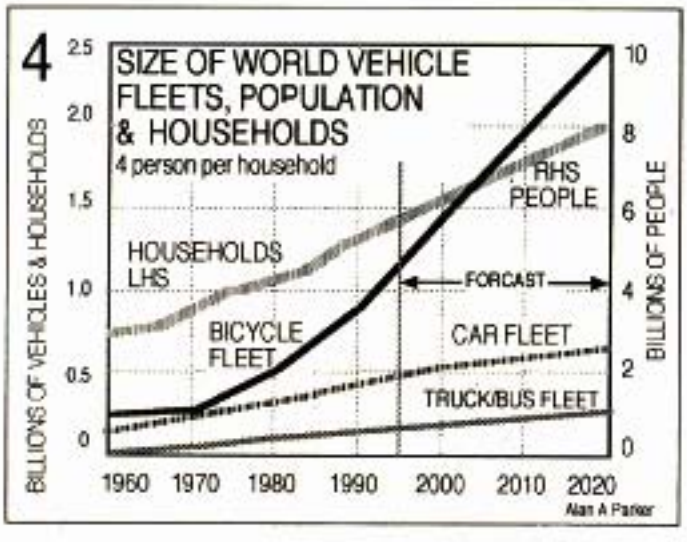
By the year 2025 there will be massive population growth in Asia, with 305 million more Chinese, 455 million more Indians, and 79 million more Indonesians. In Africa, where population growth was four times higher in 1995 than in Asia, there will be 800 million more people, while Latin America's population grows by 60 million. As bicycles last only one fifth of an average lifetime of 65 years (1995), in Asia the existing production of bicycles is not keeping up with demand generated by the sheer numbers of people born 15 to 20 years ago who are now adults. That will only happen after many years of zero population growth beyond the year 2030, when bicycle production reaches around 300 million units a year.

In the developing world per capita bicycle ownership is not the best way to measure the benefits of producing billions more bicycles. This is because most bicycles are household vehicles used by more than one family member.

Future constraints to bicycle use

In some developing countries today the bicycle plays an important part in reducing oil imports, transport infrastructure costs, and household transport costs. In a few countries the use of bicycles is planned for but in most cycling is discriminated against by a bureaucratic car-using elite which gives priority to cars in urban planning. Transport planning in India, Thailand, Indonesia and Malaysia is dominated by car enthusiasts, smitten by the status symbol of an alien culture. As the numbers of cars grow year by year, bicyclists have been literally run off the roads in Bangkok and in most large Indian and Taiwanese cities. In Vietnam local officials are infatuated with car culture and it is doubtful whether cyclists will be able to ride safely in a few years. Witness the banning of rickshaws in Jakarta, and the attempts to ban them in so many other cities in Asia.

In developing countries bicycles as transport are just as important as birth control and sound economic management. China, for instance, has experimented with some novel transport planning ideas in large cities that use bicycles and buses in an integrated system. Even in China, though, bicycles are not guaranteed an on-going transport role, as there is no long term national bicycle policy.



Car-dominated transport systems are not sustainable now and to hope that some solar powered car made with minimum resources will soon be available is gambling with the welfare of the human race. The fact is that half the cars produced this year throughout the world will still be in use in ten years time. It seems rather obvious that a world car fleet of above one billion using today's technology would be an environmental disaster. In a world of 8.2 billion people, the future transport role of the bicycle is far more important than that of the car.

Global bicycle advocacy

There is a need for a strong international bicycle organisation to promote the development of safe, user-friendly bicycle transport systems throughout the world so that cyclists are not driven off the roads as they have been in so many developed countries. The Asian bicycle industry is now rich enough to act as lobby for the cycling working class and farmers of Asia. The only motor vehicle with a guaranteed future is an electric-assisted bicycle or rickshaw powered by solar-charged batteries. Solar cells should be standard fittings on every house in the year 2050. Yamaha and Sanyo are already making these products.

A bicycle lobby is needed in all Asian countries to act with at least the vigour of the Japanese Bicycle Promotion Institute. However, it should be possible to do much better than that. The Asian bicycle industry needs to set up an Asian Bicycle Promotion Institute as a lobby to government and become a regional centre of excellence for bicycle planning expertise. The industry's long-term best interests would be served by such lobbying, as there is a potential trillion dollar bicycle market out there that needs to be secured. Besides, protecting cyclists is the equivalent of what car makers have done for their customers for many years.

The bicycle ranks as one of humanity's greatest inventions, and the technology for energy efficient power-assisted bicycles will also stand the test of time. This is why governments in all countries should provide bicycle facilities and plan cities in such a way as to give non-motorised transport and new more energy-efficient forms of transport greater priority.

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