INTERNATIONAL COMPETITION AND THE EVOLUTION OF THE EUROPEAN BICYCLE INDUSTRY

by

JOHN FRANCIS HORRIDGE


Submitted to the Sloan School of Management in Partial Fulfillment of the Requirements of the Degree of Master of Science in Management at the

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ABSTRACT

This thesis describes the evolution of the European bicycle industry, over the period 1980 to the present day, in response to the increasing competition from the Far East. Two companies from that region, Shimano of Japan and Giant of Taiwan are taken as models of the threat that European manufacturers have had to face.

In Europe, the industry has developed with very little government support or intervention. Now the bicycle and the bicycle components industries are divided between those who regard the first line of defence against the Asian challenge as government protection of European markets, and those who see the only long-term defence as innovation. This thesis concentrates on this second aspect and examines three companies that have used innovation as their major base of competitive advantage: Mavic, Campagolo, and Raleigh -- one French, one Italian, and one British company; two components manufacturers and Europe’s leading final assembler.
ACKNOWLEDGEMENTS

I am very grateful to Mr. Howard Knight of Raleigh, Mr. Christian Baldessin of Mavic and Mr. Valentino Campagnolo for the time and trouble they took in permitting me to interview them and visit their companies. A special mention must also go to their various employees who kindly assisted me in many ways. The members of COLIBI and COLIPED have also been most courteous and helpful whenever I have disturbed them at the Bike Shows I have attended. The 'lads' in Harry Hall's bike shop have always been a source of help and inside information for which I thank them most warmly.

I am grateful to Professor John van Maanen for taking the time to supervise what, for most people, is a 'strange' topic for a thesis. It was a pleasure and an honour to have him as a Supervisor.

A final and very special thanks must go to my Reader, Professor D.E. Westney, to whom I am eternally indebted for her invaluable advice and support.
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1. Introduction

1.1 The end-user in Europe - a personal history

It had been more than 20 years since I had last ridden a bicycle but, in 1980, in the interests of keeping up a certain level of fitness, I decided to buy one for travelling to work and for recreation. There was also the attraction of its economical running costs, (largely, I naively imagined, a question of legs and leggings, in Manchester, UK, the world capital of the Wellington boot and pneumonia), so, all things considered, it seemed a good idea.

The bike was duly purchased. However, in contrast with my initial expectations, many things about my return to cycling have been quite surprising. In brief, I never imagined that it would result in a never-ending spiral of expense, fatigue, pleasure and technology-driven curiosity that shows no sign of abating.

Fatigue and pleasure, naturally, were the immediate consequences of my purchase. The expenses, however, soon began to rise, and this led to my introduction into the real world of cycling.

It was on the way home from work one day that I noticed that a dust-cap was missing from one of the cranks (the arms that hold the pedals). I therefore called into Harry Hall’s, then one of the smallest bike shops in the world, but one that had, and still has, at least in England, one of the finest reputations. I asked the young man behind the counter for a replacement and he said “Campag?”. Somewhat taken aback, since I was not sure whether I had heard him correctly or whether he was speaking a foreign language (he was) I nodded. He went out to look at my bike and, in one scornful phrase, made me realise that something was wrong with me and my bike. The part required wasn’t ‘Campag’ and I, by association, wasn’t
anything other than a 'punter' or, even worse, a 'poser'. 'Campag', it turned out, was the name of the Italian company Campagnolo which produced the most beautiful, functional, desirable and expensive bicycle components in the world. They had never been found on the bikes I had used as a kid, precisely because they were elite products produced for the elite rider and sold at prices that made you wince - if you were the buyer! They were simply the best, as testified by the fact that all the continental professional riders used them. Yet you didn't need such proof: you could see they were the best from their finish and beautiful lines -- and if that were not enough, the reverence with which the lads in the bike shop spoke about them and the pleasure you felt when handling them were so overwhelming as to make you realise that they were, well, 'Campag' - and that said it all.

By 1981 I was already the proud owner of certain Campagnolo parts, albeit as inexpensive (for them) OEM equipment on a Raleigh Rapide bicycle built, as its name suggests, by the still world-famous Raleigh Bicycle Company of Nottingham, England. As this frame gave way to my first real racing frame, an Italian thoroughbred out of the stable of 'maestro' Ernesto Colnago, the Campag bits I bought for it were of the "Record" series, surpassed in performance and price only by the titanium-featured "Super Record" series from the same company. Now, visiting Harry Hall's was even more of a pleasure, since I was at least welcomed as someone who knew the game, I was an "intenditore", a connoisseur of the best in cycling componentry and frames.

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1 In America "Campag" is known as "Campy".
2 Ernesto Colnago is arguably the most famous and respected artisan frame builder in Italy and probably the world. What is not in doubt is the extraordinary rate and level of innovation which have always distinguished his frames.
It was on one of these visits in 1984 that I was confronted by a contraption sitting on the shop-counter which displayed a cut-down version of a bicycle frame fitted with a drive chain and, in particular, a gear mechanism which the customer was invited to try. This 'jig' was the means by which Shimano, the Japanese component maker, was presenting its latest product to the consumer. I was sceptical, for everything I had seen of their components over the previous two or three years had not impressed me. Their products spent the best part of their lives languishing in the window, getting dusty, to be eventually sold-off at a discount in the January sales. They were bulky-looking, with a poor finish and with some clumsy attempt to express aerodynamicity. They were no match for the Campag stuff, even if their prices were lower. Did any one ever actually ask for Shimano parts? Well if it were a question of a lack of aesthetic appreciation on their part and, or, a lack of money, then someone might - for Campag was not for them on either count. But if neither of those things were true, then there simply was no choice. Shimano didn't exist.

With this in mind, I leant across the counter to try out the gear change on the Shimano 'model'. It didn't look too bad either. Gone was the pretentious aerodynamic styling and in its place was something that had Campagnolo's clean-looking lines. I gave it a try.

Moving the lever to change gear registered a sharp 'click' - and it changed gear in the twinkling of an eye - amazingly, without the slightest 'slap' or 'slither' of the chain across the intervening cogs. I tried several more times. The result was always the same - virtually instant changing, positive and precise. I had to have it!
Harry Hall, the owner of the shop, former mechanic to some of the world's best professional riders and himself a World veteran champion (as recently as the late 1980s) didn't share my enthusiasm. "They'll be able to hear you changing gear in the bunch" he said. I thought to myself that it didn't really matter, for with a gear change as quick and precise as this one, you'd be 'down the road' before anyone had time to react!

I bought the ensemble. The price was about half that of the Campag "Super Record". To the general disapproval of my brothers, I mounted it on the bike that I was going to use for some early-season training, in their company, on the Spanish island of Majorca. It was in the mountains of Majorca that the equipment proved its worth, performing faultlessly. My brothers, with their Campag-equipped machines, lost yards on me every time they had to change gear, especially going uphill, since this creates a high load on the chain and normally means that the gear change is more difficult. Not for the Shimano system, though! They were converted.

I believe I was the first person in Manchester to have purchased the SIS (Shimano Index System) as it was known. I did not realise at the time what a turning point the release of this product would prove to be for Shimano and, perhaps to an even greater extent, for Campagnolo. The truth was that the Japanese had not only stolen a technological march on the Italians, but, as if helped by fate, it turned out to be an advantage of enormous importance in its subsequent and successful application to the products of the embryonic mountain bike craze. In a way, it was as my

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3 The 'bunch' or 'peloton', in professional racing circles, is the name given to the whole group of riders contesting a particular race. Since escaping from the bunch is never an easy task, the element of surprise is often a key factor in a successful breakaway.
discussion had gone with Harry Hall when I was about to purchase the SIS system, but with a slight difference: Campagnolo hadn’t even heard the ‘click’ of the Shimano gear change - but it probably wouldn’t have mattered if they had. In racing terminology, Shimano was already ‘down the road’.\textsuperscript{4}

\textsuperscript{4} For a more extensive treatment of Shimano’s technologically driven rise to market dominance, see Appendix I
1.2 The European Bicycle Industry

From the earliest development of the bicycle through most of this century, Europe has been the “lead market” in bicycles and bicycle technology. The forerunners to the modern bicycle were all invented in Europe: the *celeripede* in France, the velocipede in Germany in 1816, and the “boneshaker” in France in the 1860s. What we would recognise as the modern bicycle, the ‘Safety’, was developed in Britain in the 1860s and quickly became the standard throughout the world. The modern bicycle, therefore, with its ‘diamond’ frame, was born and raised in Europe.

In Europe, cycling is both a basic means of transportation and a major sport for professionals as well as amateurs. Cycle racing is the world’s biggest spectator sport watched live, with as many as 300,000 people witnessing just one of the ascents of some of the more gruesome ‘cols’ in the French Alps and the Spanish Pyrenees during the ‘Tour de France’. This ‘stage’ race, covering over 2,500 miles in around 20 days, was first held in 1903, and is the most famous of the many professional road races. The ‘Tour’, or ‘Le Grand Boucle’, as it is known in French, is a multi-million dollar business (towns, cities and villages pay it to pass through their communities!) and is a huge media event, followed avidly throughout Europe and, indeed, much of the world.

The ‘Tour’, though, is only part of an even greater business, professional cycle racing as a whole. It is difficult to estimate the costs involved, but there are about 22 top flight professional teams with annual budgets in the region of $3-5 million, and many other lesser teams with significant budgets. When the marketing and publicity spin-offs are taken
into account, it is easy to accept that professional racing is a billion dollar industry.

European professional road-racing teams have throughout the century proved to be the most demanding of end-users. This has led to a stream of technological innovations from producers. These have been aimed at enhancing speed (lighter and more aerodynamic frames, wheels and components) reliability and functionality of parts (such as the Campagnolo quick release skewer, the ‘Look’ pedal etc.) as well as the more aesthetic, in terms of design and appearance. Many of these innovations in frames and componentry developed for the professional road racing scene have been passed directly on, or adapted, to the mass market. Virtually all of these innovations, until very recently, have come from Europe. European manufacturers have, for decades, benefited in terms of stimuli to innovation and the returns to reputation of being in what, in Michael Porter’s term, is the “Hollywood” -- the global centre -- of cycling, Europe itself.

Yet Europe is not just an elite, lead market. It is also a mass market of, perhaps, surprising dimensions. In 1990, in the four largest bicycle markets in Western Europe (Germany, France, Britain, and Holland) nearly 12 million bicycles alone were sold, roughly equal in size to the U.S. market (12 million). When the other major European markets -- Italy, Spain and Portugal, Austria, etc.) are taken into consideration, Europe is a much larger market for bicycles than the U.S. and certainly than Japan. And although a country like China dwarfs the European market in terms of numbers of units, the money value of each unit is much greater in Europe; therefore in overall market size measured in value, Europe constitutes the world’s largest bicycle market.
The market for bicycles means more than just the market for the complete, finished bicycle. Componentry for bicycles is big business. Professional and amateur racers and the serious recreational rider, of whom there are many in Europe, provide an enormous market for new and replacement components. Most of these cyclists assemble their own bicycles or have a bicycle fitted with the components of their choice in a bicycle shop. In Europe, more so than in any other market, users are very "brand conscious" -- aware of the reputations of the makers of frames and components and the differences between them, an awareness fed by a large popular literature of cycling magazines. At the high end, the customer base is genuinely European rather than national: a serious British cyclist and a serious Italian cyclist will know and value the same producers and "brands", even if, especially with the Italian, nationalism creeps in and he tends to buy only Italian!

European "brand-name" producers have traditionally operated on a relatively small-scale production base. The "high end" producers in frames and componentry have often preserved a craft approach to design and production, even as they have added advanced new technologies of computer-aided design and production to their facilities. Their products, therefore, have a strong aesthetic and craftsman's quality: beauty as well as functionality has been important to the European lead users and the high end producers have unstintingly sought to satisfy these requirements, with great success.

Distribution, however, remains nationally segmented. Serious cyclists and upper-middle level purchasers will purchase their bicycles and parts from a bicycle shop (what the American trade calls the IBD -- Independent
Bicycle dealer). In each country, the mass market will be served through a mix of local bicycle shops and large-scale retailers. Some bicycle shops will also sell nation-wide through mail order, using the national cycling magazines as advertising vehicles. This mix varies across countries. In bicycles, as in other consumer goods such as appliances, there has not yet emerged a European retailing 'empire’. The French hypermarkets and the German mass marketers, for instance, have not developed a truly regional strategy. Therefore the overwhelming role played in the United States bicycle mass market by national chains such as Toys 'R Us, Sears, Walmart, and the like, has no direct counterpart in the fragmented national markets within Europe (see Baden-Fuller and Stopford for a discussion of the analogous situation in household appliances).

The European industry provides a prime example of an industry for which being in the world’s largest and most demanding market has been a mixed blessing. Innovation has been constant, enhancing functionality as defined by professional road-racers, but never at the expense of beauty. Yet a certain complacency was evidenced by the European reaction to the development of the mountain bike in California. This, for too long, was not taken seriously by European producers of bicycles, and producers of componentry were even slower to respond. The ruggedness and ease of use of the mountain bike proved to be unexpectedly attractive to Europeans, and provided an opportunity for Asian producers of both cycles and componentry, who were quicker to respond to the American innovations, to enter the European market.

This complacency was manifest not only in Europe’s response to the mountain bike phenomenon, but in other segments, too. By the mid to late
1980s, European producers faced a number of challenges. In componentry, a Japanese producer, Shimano, had seized the technological initiative not only in mountain bikes componentry but also in road bikes. In assembled bicycles, Asian producers generally were making serious inroads into the mass markets and even into some segments of the high end market with Giant of Taiwan leading the way, especially in the production of carbon-fibre frames.

Throughout the 1980s and early 1990s the European components industry, led by the Italian company Campagnolo, has faced a grave challenge from Japan -- in particular, from a single company, Shimano. In finished bicycles, the challenge has come not from Japan, but from Taiwan, China, and production sites in South-East Asia. Low-cost production sites in China, Thailand and Malaysia have targeted the low end of the European market, while producers in Taiwan have mounted a challenge across the entire segment range. The advantage they have all had in bicycles is similar to their advantages in other industries such as consumer electronics, electronic components, and computers: a combination of lower production costs and higher productivity, and a capacity for rapid response to changing market conditions, combined with a capacity for innovation in product and process.

The nature and extent of the competitive challenge faced by the European producers will become clearer when two of the most successful Asian firms: Shimano in componentry and Giant in finished bicycles, are considered.
The challenge from Asia

1.3 Shimano

Shimano's history goes back to 1921, when the founder, Shimano Shozaburo, established an iron foundry in Sakai, the traditional centre of sword-making and metallurgy near Osaka. Sakai was then emerging as a centre for the production of bicycles, which Europeans had introduced into Japan in the nineteenth century and which in the 1920s were becoming extremely popular among the trendier young people of the urban centres. The young Shimano began producing freewheels for the Sakai Bicycle Company in 1922, and by 1930 his shop was the supplier of nearly half the freewheels used by the bicycle producers of Sakai. World War II led to a hiatus in the company's bicycle part production, as it, like many other Japanese manufacturers, was forced to convert to weapons production.

When the firm re-commenced after the war, in 1946, it produced bicycles rather than parts and in 1949, it resumed freewheel production. On the brink of bankruptcy in 1954 Shimano decided that parts production provided greater opportunity and profits than the production of bicycles and thereafter the company concentrated on producing bicycle parts. In 1956 it added derailleurs to its product line and in 1957 it began producing three-speed hubs. In that same year, the firm began research on cold-forging technology. This technology employs enormous presses which simply 'stamp' the raw material into the required shapes and is different from the hot forging used by the Italian company Campagnolo.

After the death of Shozaburo in 1958, Shimano Shozo, the eldest son, embarked on a strategy of orientation towards international markets: in 1961
the company presented its three-speed hub at the New York International Toy and Cycle Show, and began selling to U.S. bicycle assemblers in the following year. Although its cold-forging shop was completed in 1963, the company sought further technology development, and in 1964 it contracted with Brown Engineering of the United States to obtain technical support for the refinement of the cold forging technology that was to become the linchpin of its production system, in terms of its capacity, responsiveness and unit costs, in the decades that followed.

While Japan was not a lead market for bicycles, it had the advantage -- unrecognised by its Western competitors -- of being the leader in certain aspects of production technology, especially the management of quality. Shimano was an early participant in Japan's quality movement: as early as 1967, it adopted the "Zero Defects" approach to quality that was advocated by the Japanese Union of Scientists and Engineers and by many of Japan's leading companies. In the application of statistical and organisational quality control techniques it was probably two decades ahead of its European counterparts.

By 1971 the company had a commanding share of the domestic market: 80% of the Japanese market for freewheels, 100% of the market for three-speed hubs, and 70% of the market for derailleurs. Further growth was pursued by the expansion of its sales internationally. In 1972, it established Shimano Europe in Dusseldorf, the European counterpart of Shimano America, a sales subsidiary, which had been established in New York in 1965. In 1973, it initiated its sponsorship of professional racing, equipping the Flandria team with its new, high-end component groupset, the Dura-Ace.
Sponsorship was (and still is) a costly business but with Shimano engineers acting as mechanics for the team, Shimano could test and develop the components which were to give them enormous competitive advantage later. During the 1970s Shimano extended its sponsorship of European racing, often giving componentry and cash inducements to teams, and then, in the 1980s, with its reputation established and its products sought-after, by supplying componentry and technical support.

Appendix 1 details the key elements of Shimano’s product innovations in the decisive period of the mid-’70s to the early ’80s. These innovations left Shimano in the mid-1980s as the leader in componentry, particularly through its development of the SIS, an advanced ‘indexed’ gear-change system. They gave it a brand name that competed effectively with the market leader, Campagnolo, in the very high-end market, and allowed the company to extend its range into the mid- and low end, where Campagnolo had never been present. Furthermore, because in 1974 it had added a substantial operation, Shimano Sales Corporation, in Irvine, California, to its East Coast-based office, Shimano was well-positioned to recognise the significance of the emergence of the mountain bike in its birthplace, in the late 1970s. Shimano’s index system for gear-shifting, the SIS, which had won high praise in the racing and road bike markets, was the fundamental technology that turned out to be particularly well-suited to the mountain bike, where it was known as ‘Rapidfire’.

In racing and mountain bikes, SIS-type functionality is a critical competitive factor. On the racing scene, where winning is often a matter of a few seconds’ advantage, the key elements at the component level are
split-second speed and accuracy of gear-changing, and, of course, reliability. In mountain bikes, these factors are also important, but so are durability and ease of use. Shimano recognised that this called for changes in design of componentry for mountain bikes, especially for certain key components. For instance, the rear derailleur needed longer arms to allow the use of very large sprockets which were required to tackle ‘impossible’ gradients. Lightness was important too, since the mountain bike frame was necessarily robust and relatively heavy. Gear control had to be rapid, accurate and not require the user to take his hands from the handlebars, a risky action on a bike traversing very rough terrain. In 1982 Shimano met all these requirements and introduced its first mountain bike group set.

During the 1980s Shimano widened its range of group sets, targeting each one of the increasingly narrow segments of the market. By the early 1990s, Shimano had 16 group sets covering the whole range of mountain bikes and road and racing bikes. This made it possible for bike producers to meet varied customer needs on product specification and price and led to Shimano often being erroneously identified as a bicycle manufacturer by the younger generation, so ubiquitous was its brand name on the vast number of bikes on sale!5

The history of Shimano’s product development contains almost as many products that failed to win market acceptance as those that did. Shimano, by continuing to provide a wide choice for its customers, however, and with its ability to replace less successful products with “winners”,

5 On the other hand, the continued modifications and the large number of different group sets made it difficult for bike shops to get the parts they needed. In its 1994 line, Shimano has reduced the number of group sets from 16 to 13.
maintained its position of technical and market leader in the industry in the 1980s.

By the end of the 1980s, Shimano had established its brand name for quality, functionality and price, not only for the producers of bicycles, who were its principal customers, but also for the end-user. Indeed, the observation "To most buyers and most shops, one Shimano XT bike is fungible with another." demonstrated by how much Shimano componentry had become a key factor in marketing a bicycle. Shimano still has a virtual monopoly of the mountain bike componentry market: most estimates place it at 90% market share.

This has been achieved in part through a pricing strategy which, notwithstanding the increasingly strong yen, has maintained the company's products at very competitive levels, until very recently often lower than those of its major competitor, Campagnolo.

Shimano has been helped in controlling prices by its policy of setting up offshore production operations in lower wage-cost areas. In 1973, Shimano established Shimano Singapore. In 1989, Shimano Malaysia was set up to produce the more labour-intensive components, and in the following year Shimano entered the Indonesian enterprise zone of Batam Island. Shimano Singapore is the regional HQ and Shimano now has more employees in these three zones than it does in Japan. In 1992, Shimano joined the rush of several Asian manufacturers, most notably Giant and a number of other Taiwanese bicycle producers, and set up a factory in an industrial park near Shanghai.

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6 Tom Franges, Bicycle industry analyst, in Interbike World Market Report, April/May 1993. Here the speaker is referring to a bike equipped with Shimano XT components.
However, as we shall see, Shimano’s competitors are now trying to challenge its position. Campagnolo has introduced variations on nearly all of Shimano’s innovations and also introduced some of its own. In addition it, too, is expanding its range, with the introduction of mid-market and OEM-type group sets to compete with Shimano in the road bikes segment. Other European component producers, including Germany’s Fichtel-Sachs and France’s Mavic, are also trying to challenge Shimano, although in a much narrower, component-specific sense. For example, in the application of electronics, surprisingly enough, it is this latter company, Mavic, that has pioneered the electronic gear change. Sachs, for its part, has further developed the 3-speed hub system into a much-praised 3x7-speed version. As if not to be outdone, the Taiwanese bicycle industry now has a number of components producers who are currently supplying the low-end of the market but who will doubtless try to move up-market in the coming decade, as Giant has done in finished bicycles.

The success of Shimano’s strategy can be readily seen from the attached exhibits (Tables 1.1 and 1.2 and Figure 1.1) which show their performance over the period 1970-90 and their dominant presence on the professional scene. One observation has to be made, however, and that is that it is clear that the main preoccupation of the company has been to maximise market share, not profit. The almost exponential growth of sales, especially over the period 1980-90, is not matched by a similar pattern in their profits, which have remained at a modest 5.67% (as a % of sales) averaged over the 10 years 1980-90, and, if taken from 1982, when sales really started to climb, profits are even more modest at an average 4.3% of sales. Both of these figures are in stark contrast with the almost 10% achieved over the period 1970-79. The company puts this down to ‘sound management’:
"Having maintained a 10% profit margin before the yen reevaluation (note: 1985) Shimano was determined not to raise prices. The strategy was to cut costs by streamlining company operations. As a result, a profit margin of 4 to 5 percent was maintained during a period of extremely slow sales. Shimano had once again overcome adversity with sound management."7 From a competitor's point of view, however, this might seem to be 'buying market share'.

Over the last 18 months I have talked to many of the European companies represented at the major bike shows. When discussing Shimano with them and with members of the European Component and Bicycle Manufacturers Associations, COLIPED and COLIBI, I have heard the same story over and over again. The story is that Shimano is too powerful, has too much marketing muscle, has far more capacity, and so on. They seem to ignore or forget the fact that Shimano has all of these advantages because of the work it has put in to move from being a modest player in the early 70s to the colossus it is now. They seem to forget that many of Shimano's products have not been successful -- and others have been more successful than they deserved to be, precisely because there was no response from Europe. In other words, Shimano's apparent unassailability is also due, to a certain extent, to European inertia. This is no better evidenced than when one considers the mountain bike phenomenon. Shimano was the only company to pursue this market initially, because it was the only company with a technology it could implement almost immediately.

That technology was the above-mentioned SIS (see Appendix 1 for an explanation of its features) which had been developed from the company's experience of the European professional racing scene. Its application to

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7 'The History of Shimano' (English Language version), Shimano Inc. March 1991
mountain bikes (under the name *Rapidfire*) was ideal, since the rider needs even more control of the bike by virtue of the difficult, broken terrain he will come across. The straight handlebars of the MTB allowed this greater control since it was easy to mount the SIS-Rapidfire gear levers and have them operate in the same plane as the brake levers. The technology was then re-engineered to the racing bike, as Shimano worked out how to give the racing cyclist the same level of functionality via the curved handlebars of the racing bike. This was the STI, (see Appendix 1) which gave the company an enormous lead over its competitors.

Shimano *is* as powerful as the Europeans think, but it has achieved its position by a policy of continuous innovation and technological advance, from the very early days of its move into Europe. Shimano would say they deserve to be where they are, and it would be hard to disagree with them. Europe may take some solace from the fact that it appears, for the moment, that Shimano is suffering a little. The yen is extremely strong, and major competitors like Campagnolo are benefiting from a weak lira. Certain of Shimano’s products are being sold off at a discount through retailers and through the company’s new “Club”, whose members receive discount vouchers to be used in the purchase of specified products. These discounted products include top-end items such as the STI levers and the SPD (Shimano Pedaling Dynamics) road pedals. There is also a more intense publicity campaign now -- for the first time ever, at least as far as I am aware, Shimano has taken TV slots during this year’s “Classics”, the professional races held in Europe (mainly in Belgium) in the early part of the season.

These seem to be the actions of a company that has to get rid of some excess inventory in certain areas, and which, in the absence of anything significantly new to offer, wishes to maintain its image. I believe that STI is
now in need of a serious overhaul, (it is heavy and the levers have always been unattractive) and Mavic’s move into electronics has raised the ‘ante’. The SPD pedal for road bikes was folly, since they could not compete on performance, price nor compatibility with a number of the shoes, from other specialist makers, that cyclists had preferred for years. The levelling-off in MTB sales in major markets is another problem for a company that is so dependent on that segment. Finally, life is going to be harder in the future as more challengers emerge from the developing ASEAN countries and Taiwan.
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Employees</th>
<th>Total Sales in billions of ¥</th>
<th>% Change on prev. year</th>
<th>Operating Profits</th>
<th>Operating Profits as % of Sales</th>
<th>Exports</th>
<th>Exports as % of Sales</th>
<th>Nom. Exch. rates</th>
<th>$ Value in millions</th>
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<td>4,625</td>
<td>4,625</td>
<td>-</td>
<td>261</td>
<td>5.64%</td>
<td>2,265</td>
<td>48.97%</td>
<td>358.1</td>
<td>12.92</td>
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<tr>
<td>1971</td>
<td>9,131</td>
<td>9,131</td>
<td>97.43%</td>
<td>775</td>
<td>8.49%</td>
<td>6,154</td>
<td>74.40%</td>
<td>349.3</td>
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<tr>
<td>1972</td>
<td>19,226</td>
<td>19,226</td>
<td>110.56%</td>
<td>3051</td>
<td>15.87%</td>
<td>14,885</td>
<td>77.42%</td>
<td>303.2</td>
<td>63.41</td>
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<tr>
<td>1973</td>
<td>28,601</td>
<td>28,601</td>
<td>48.76%</td>
<td>5034</td>
<td>17.60%</td>
<td>21,662</td>
<td>75.74%</td>
<td>271.7</td>
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<td>1974</td>
<td>32,513</td>
<td>32,513</td>
<td>13.68%</td>
<td>3830</td>
<td>11.78%</td>
<td>24,626</td>
<td>75.74%</td>
<td>292.1</td>
<td>111.31</td>
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<tr>
<td>1975</td>
<td>17,612</td>
<td>17,612</td>
<td>-50.83%</td>
<td>209</td>
<td>1.19%</td>
<td>8,972</td>
<td>50.94%</td>
<td>296.8</td>
<td>59.34</td>
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<td>1976</td>
<td>26,827</td>
<td>26,827</td>
<td>52.32%</td>
<td>1823</td>
<td>6.80%</td>
<td>16,426</td>
<td>61.23%</td>
<td>296.6</td>
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<td>1977</td>
<td>32,298</td>
<td>32,298</td>
<td>20.39%</td>
<td>3034</td>
<td>9.39%</td>
<td>20,235</td>
<td>62.65%</td>
<td>268.5</td>
<td>120.29</td>
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<tr>
<td>1978</td>
<td>29,852</td>
<td>29,852</td>
<td>-7.57%</td>
<td>2070</td>
<td>6.93%</td>
<td>17,512</td>
<td>58.66%</td>
<td>210.4</td>
<td>141.88</td>
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<tr>
<td>1979</td>
<td>31,975</td>
<td>31,975</td>
<td>7.11%</td>
<td>2861</td>
<td>8.95%</td>
<td>17,893</td>
<td>55.96%</td>
<td>219.1</td>
<td>145.94</td>
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<tr>
<td>1980</td>
<td>744</td>
<td>47,136</td>
<td>47.42%</td>
<td>5042</td>
<td>10.70%</td>
<td>31,434</td>
<td>66.69%</td>
<td>226.7</td>
<td>207.92</td>
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<td>1981</td>
<td>747</td>
<td>48,640</td>
<td>3.19%</td>
<td>4226</td>
<td>8.69%</td>
<td>31,575</td>
<td>64.92%</td>
<td>220.5</td>
<td>220.59</td>
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<td>756</td>
<td>33,676</td>
<td>-30.76%</td>
<td>1656</td>
<td>4.92%</td>
<td>18,245</td>
<td>54.18%</td>
<td>249.1</td>
<td>135.19</td>
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<td>1983</td>
<td>743</td>
<td>44,059</td>
<td>30.83%</td>
<td>2138</td>
<td>4.85%</td>
<td>24,594</td>
<td>55.82%</td>
<td>237.5</td>
<td>185.51</td>
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<td>1984</td>
<td>745</td>
<td>46,294</td>
<td>5.07%</td>
<td>1802</td>
<td>3.89%</td>
<td>27,150</td>
<td>58.65%</td>
<td>237.5</td>
<td>194.92</td>
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<td>1985</td>
<td>735</td>
<td>50,168</td>
<td>8.37%</td>
<td>1829</td>
<td>3.65%</td>
<td>29,368</td>
<td>58.54%</td>
<td>238.5</td>
<td>210.35</td>
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<td>740</td>
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<td>2186</td>
<td>4.03%</td>
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<td>168.5</td>
<td>321.58</td>
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<td>1987</td>
<td>813</td>
<td>60,089</td>
<td>10.89%</td>
<td>2943</td>
<td>4.90%</td>
<td>35,861</td>
<td>59.68%</td>
<td>144.6</td>
<td>415.55</td>
<td>$511,136</td>
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<td>1988</td>
<td>820</td>
<td>71,117</td>
<td>18.35%</td>
<td>3512</td>
<td>4.94%</td>
<td>45,316</td>
<td>63.72%</td>
<td>128.2</td>
<td>554.73</td>
<td>$676,506</td>
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<td>1989</td>
<td>818</td>
<td>87,790</td>
<td>23.44%</td>
<td>4219</td>
<td>4.81%</td>
<td>60,279</td>
<td>68.66%</td>
<td>138.0</td>
<td>636.16</td>
<td>$777,701</td>
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<tr>
<td>1990</td>
<td>851</td>
<td>139,045</td>
<td>58.38%</td>
<td>9127</td>
<td>6.56%</td>
<td>106,605</td>
<td>76.67%</td>
<td>144.8</td>
<td>960.26</td>
<td>$1,128,385</td>
</tr>
</tbody>
</table>

**Operating profit as % of sales**

- 1970-79: 9.86%
- 1980-90: 5.67%
- 1982-90: 4.31%

All data taken from Shimano's brochure celebrating the company's 70th anniversary
Shimano's Sales and Profits as a % of Sales 1970-1990

Figure 1.1

Sales ¥ in billions

Profits

Sales

### Table 1.2: What the '93 Tour Teams Rode

<table>
<thead>
<tr>
<th>TEAM</th>
<th>FRAME</th>
<th>TUBING</th>
<th>GROUPSET</th>
<th>PEDALS</th>
<th>STEERING</th>
<th>RIMS</th>
<th>TYRES</th>
<th>TT WHEELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banesto</td>
<td>Pinarello</td>
<td>Oria</td>
<td>Campagnolo-Record</td>
<td>Time</td>
<td>ITM</td>
<td>Campagnolo</td>
<td>Vittoria</td>
<td>Campagnolo</td>
</tr>
<tr>
<td>Carrera</td>
<td>Carrera</td>
<td>Columbus</td>
<td>Campagnolo-Record</td>
<td>Look</td>
<td>Cinelli</td>
<td>Mavic</td>
<td>Michelin*</td>
<td>Mavic</td>
</tr>
<tr>
<td>Gatorade</td>
<td>Bianchi</td>
<td>Oria</td>
<td>Shimano Dura-Ace</td>
<td>Look</td>
<td>ITM</td>
<td>FIR</td>
<td>Michelin*</td>
<td>FIR</td>
</tr>
<tr>
<td>Motorola</td>
<td>Eddy Merckx</td>
<td>Columbus</td>
<td>Shimano Dura-Ace</td>
<td>Shimano</td>
<td>Cinelli</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Specialized</td>
</tr>
<tr>
<td>Festina</td>
<td>Rossin</td>
<td>TVT Carbon</td>
<td>Shimano Dura-Ace</td>
<td>Shimano</td>
<td>3T, Modolo, Mavic</td>
<td>Mavic</td>
<td>Vittoria</td>
<td>Mavic</td>
</tr>
<tr>
<td>ONCE</td>
<td>Look</td>
<td>Look Carbon</td>
<td>Mavic Competition</td>
<td>Look</td>
<td>Mavic, Look</td>
<td>Mavic</td>
<td>Clement</td>
<td>Mavic</td>
</tr>
<tr>
<td>ZG Mobili</td>
<td>Bottecchia</td>
<td>Columbus</td>
<td>Shimano Dura-Ace</td>
<td>Shimano, Time</td>
<td>ITM</td>
<td>Galli</td>
<td>Michelin*</td>
<td>Corima</td>
</tr>
<tr>
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<td>Eddy Merckx</td>
<td>Columbus</td>
<td>Campagnolo-Record</td>
<td>Time</td>
<td>3T</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Campagnolo</td>
</tr>
<tr>
<td>GB-MG Bianchi</td>
<td>Bianchi</td>
<td>Columbus</td>
<td>Campagnolo-Record</td>
<td>Diadora</td>
<td>3T</td>
<td>FIR</td>
<td>Vittoria</td>
<td>FIR</td>
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<td>GAN</td>
<td>Greg Lemond</td>
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<td>Mavic Competition</td>
<td>Time</td>
<td>Cinelli</td>
<td>Mavic</td>
<td>Vittoria</td>
<td>Mavic</td>
</tr>
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<td>TVM</td>
<td>Gazelle</td>
<td>Reynolds 753</td>
<td>Shimano Dura-Ace</td>
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<td>Cinelli</td>
<td>Mavic</td>
<td>Paribas*</td>
<td>Mavic</td>
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<td>Histor</td>
<td>Look</td>
<td>Look Carbon</td>
<td>Shimano Dura-Ace</td>
<td>Look</td>
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<td>Mavic</td>
<td>Clement</td>
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<td>3T</td>
<td>Mavic</td>
<td>Michelin*</td>
<td>Mavic</td>
</tr>
<tr>
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<td>Colnago</td>
<td>Colnago Carbon</td>
<td>Mavic Competition</td>
<td>Mavic</td>
<td>3T</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Corima</td>
</tr>
<tr>
<td>WordPerfect</td>
<td>Colnago</td>
<td>Columbus</td>
<td>Suntour Superbe Pro</td>
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<td>3T</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Ambrosio</td>
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<td>Razesa</td>
<td>Oria</td>
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<td>Time</td>
<td>Cinelli</td>
<td>Mavic</td>
<td>Clement</td>
<td>Mavic</td>
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<td>Aristotea</td>
<td>Colnago</td>
<td>Colnago Carbon</td>
<td>Shimano Dura-Ace</td>
<td>Shimano</td>
<td>ITM</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Ambrosio</td>
</tr>
<tr>
<td>Lotto</td>
<td>Eddy Merckx</td>
<td>Columbus</td>
<td>Mavic, Shimano</td>
<td>Mavic</td>
<td>Vittoria</td>
<td>Mavic</td>
<td>Vittoria</td>
<td>Mavic</td>
</tr>
<tr>
<td>Lampre-Polti</td>
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<td>Colnago Carbon</td>
<td>Shimano Dura-Ace</td>
<td>Shimano</td>
<td>ITM</td>
<td>Ambrosio</td>
<td>Vittoria</td>
<td>Ambrosio</td>
</tr>
<tr>
<td>Chazal-Vetta</td>
<td>MBK</td>
<td>Vitus Carbon</td>
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<td>Time</td>
<td>ITM</td>
<td>Mavic</td>
<td>Hutchinson</td>
<td>Mavic</td>
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</table>

* = HP tyres

Source: VeloNews Aug. 9, 1993, p.85
<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1921</td>
<td>February: establishment of Shimano Tekkojo (Shimano Ironworks), in midst of post-war recession. Founder Shimano Shosaburo was 28. Only staff himself and his friend Koizumi. The shop had one lathe.</td>
<td>To reduce costs, improved forging, adopted new method of producing freewheels. Added spokes and frames to product line.</td>
</tr>
<tr>
<td>1922</td>
<td>4 lathes and 2 additional machines, 6 workers; adopted 3-3-3 trademark. Began producing free-wheel: as sub-contractor for Sakai Bicycles (about 3,000 per mth).</td>
<td></td>
</tr>
<tr>
<td>1924</td>
<td>Expanded factory, opened business offices in Tokyo and Nagoya.</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>In face of worldwide Depression, temporarily closed down.</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>Sought out new markets offshore: China, Korea, S-E Asia.</td>
<td></td>
</tr>
<tr>
<td>1931</td>
<td>Began export activities.</td>
<td></td>
</tr>
<tr>
<td>1936</td>
<td>Moved to current site in Oimatsucho.</td>
<td></td>
</tr>
<tr>
<td>1937</td>
<td>Received orders for military production. Freewheel production falls. Visit to factory from imperial Prince.</td>
<td></td>
</tr>
<tr>
<td>1940</td>
<td>Reorganised as a joint stock company capitalised at Y1,500,000, KK Shimano Tekkojo, Shozaburo as President.</td>
<td></td>
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<tr>
<td>1945</td>
<td>July: 30% of factory equipment destroyed by bombing; August ceases operations, resumes in November.</td>
<td></td>
</tr>
<tr>
<td>1950</td>
<td>Visit from Prince Takamatsu.</td>
<td></td>
</tr>
<tr>
<td>1954</td>
<td>At year's end, danger of bankruptcy; stopped production of complete bicycles and frames.</td>
<td></td>
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</tbody>
</table>
SHIMANO CHRONOLOGY

1956  Crash of the cycling "boom";
      Began producing three speed hubs;
      production of external hubs reached
      20,000 per month

1957  Began production of derailleurs

1958  Death of Shozaburo

1960  Began research on cold-forging
      Development work on cold-forging
      process Developed Japan's first twist
      grip control three speed hub

1963  Completed cold-forging shop

1964  Tie-up with US firm Brown
      Engineering for technical support on
      cold forging;

1965  Set up Shimano America
      Completed cold forging technology;
      consolidated mass production system
      Announced Dura-Ace series, high-end
      racing components;

1972  Aug. set up Shimano Europe in
      Dusseldorf
      Sept. set up Advertising Section
      (Senden-ka), unified corporate image,
      created new logo planned and
      broadcast a TV programme on cycling;
      rise of "Bike-ology" movement in
      Santa Barbara.

1973  Began publishing Shimano World
      quarterly for bike shops in US;
      Creation of European pro team
      Shimano Flandria

1974  May: completion of Shimano
      Singapore factory Opening of KCSC
      (Kansai Cycle Sports Centre)
      Developed Positron System, world's
      first index system

1975  Due to Oil Shock, massive decline in
      sales; set up sales agency in France

1976  President himself took on job of
      business division head (eigyo honbucho) -- "a commander personally
      leading his troops into battle"
SHIMANO CHRONOLOGY

1977  Established sales agency in Italy
1978  Yen quickly strengthens from 233 per $ to 199; as counter-measure, Shimano plans for ¥180 per $
1983  New products: "New Shimano 600Ex Series"
1984  Birth of revolutionary SIS "New Dura-Ace Series", announced "New Positron System"
1985  Contract to sponsor Toshiba Team, world's strongest
1988  Announced Shimano Cycling Footwear (shoes); Introduced "Racing Shoe SH-R100"; "Sante" took West German Design Innovation top prize; "Shimano 600 Ultegra" won Nikkei Sangyo Shimbun prize
1989  Visit from Crown Prince; July: Began to receive "dispatched employees"; Sept. began to receive trainees from Shimano Malaysia.
1990  Set up Shimano Component Malaysia; Set up JV company with Thun (Italy)

Data taken from “The History of Shimano”, Shimano Inc. March 1991
1.4 Giant

Giant was founded in 1972 and is, therefore, a newcomer to the industry in comparison with the other illustrious companies treated in this thesis. Nevertheless it has a record of growth that is the envy of many, and is now one of the most respected and advanced complete-bicycle producers in the world.

The company originally set out to be an OEM supplier for more famous brands. As they improved their quality and increased their capacity, the company gradually embarked on a strategy of combining its OEM operations with a more growth-oriented strategy of own brand-name manufacturing. This required additional investment and the establishment of sales and marketing outlets in major markets world-wide.

By 1980 the company had intensified its research in pursuit of technological capabilities which would give it competitive advantage. Moving from the development of the traditional steel frame, where its focus had been on the development of frames using Cro-moly tubing, the company made its decisive entry into the fabrication of high-tech composite frames, constructed largely from carbon-fibre. These frames were ‘bonded’ using materials developed in the aerospace industry, and the company was able to produce them at highly-competitive prices.

This marked Giant’s transition into becoming one of the world’s top producers of frames, and the company’s current success is testament to the competitive advantage it has carved out for itself. The extent to which Giant has moved from being an OEM producer to being an ‘own brand’ manufacturer is shown in Table 1.4 and Figure 1.2 at the end of this chapter.

Confirmation of the importance of the company’s positioning in the market comes from its recent agreement with Campagnolo for the supply of
OEM componentry from that company. Certainly, Campagnolo is delighted to be collaborating with this ‘newcomer’, and this arrangement between the two is indicative of the approach that Europe may have to take in the future.  

Giant has an extensive network of sales and market research which channels information about customer preferences back to R&D, where, with the aid of CAD, these are transformed into models which cater to the various markets. This is part and parcel of the Giant Production System, which is aimed at the harmonious interaction of sales and production. The principle behind this is the company motto “Quality is job No 1” and its implementation is assured by a mix of management information systems and policies including Total Quality Control, Point of Production and Point of Sale, and Cost Reduction programmes. These systems have been integrated so as to give Giant the infrastructure it needs to guarantee the quality of its products and responsiveness to the market, which it sees as the force behind the company’s development. All this is probably not much different from the approach in other companies, but it is clear that Giant, in its brief existence, has learned how to make its approach provide it with a competitive edge.

Through its Supplier Quality Assurance engineers, the company assists its suppliers in the achievement of quality standards the company has set. This is done even at the level of raw materials, which are tested on arrival at the factory to ensure they are of the prescribed standard. The quality of parts and materials is no more important than the quality of the human resources involved in the production process. To this end, Giant has created an environment in which promotion is open to all. Individual

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8 See p.80 for a summary of Campagnolo’s view of Giant as a partner.
performance is evaluated by a committee, which considers the employee's educational training record, participation in job rotation and other factors. The company feels that this encourages people to develop their talents, contribute more, and thus grow with the company. All this is espoused as policy in the company's history -- and in far more detail than the mere reference to an "enlightened human resources policy" on page 131 of Shimano's history!

There is no doubt that Giant will continue to play a growing role in the bicycle industry world-wide. Its determination to pursue a strategy of low cost manufacturing led it, in early 1993 to set up a large production facility in mainland China. The ultimate success of this move will depend on two factors: Giant's ability to transplant its production system (the GPS) into the Chinese facility and whether China's low cost advantages will be outweighed by its political and social instability, together with the protectionist stance taken against it by the European Community.
Table 1.4

Percentage of Own Brand and OEM

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<th>Year</th>
<th>Own brand</th>
<th>OEM</th>
<th>OEM Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>10%</td>
<td>90%</td>
<td>12</td>
</tr>
<tr>
<td>1988</td>
<td>18%</td>
<td>82%</td>
<td>10</td>
</tr>
<tr>
<td>1989</td>
<td>32%</td>
<td>68%</td>
<td>9</td>
</tr>
<tr>
<td>1990</td>
<td>43%</td>
<td>57%</td>
<td>8</td>
</tr>
<tr>
<td>1991</td>
<td>56%</td>
<td>44%</td>
<td>8</td>
</tr>
<tr>
<td>1992</td>
<td>65%</td>
<td>35%</td>
<td>6</td>
</tr>
<tr>
<td>1993</td>
<td>62%</td>
<td>38%</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Cycle Press No. 69, July 1992 p.33

Figure 1.2

Giant's OEM to own brand transition

- Own brand
- OEM
- OEM Customers
## GIANT CHRONOLOGY

<table>
<thead>
<tr>
<th>Year</th>
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<th>Technology</th>
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</thead>
<tbody>
<tr>
<td>1972</td>
<td>Giant Manufacturing Company founded</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>Setting of company mission to‘offer customers high-quality products at reasonable prices</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>Built current factory at Jih Nan, Tachia</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>‘Giant Sales Company’, an affiliate, established for the promotion and distribution of Giant brand products in Taiwan market</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>Giant Europe B.V. established in the Netherlands for the promotion and distribution of Giant brand products in the European market</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>‘Giant Bicycle Inc.’ established in the United States</td>
<td>Successfully developed high-tech carbon-fibre composite frame set</td>
</tr>
<tr>
<td>1989</td>
<td>Giant Global Group office and Giant Sports Foundation established. ‘Giant Company Ltd’ established in Japan</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>Sales of NT$ 5.5 billion achieved</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>‘Giant Bicycle Co. Pty. Ltd’ established in Australia</td>
<td>Successfully developed indoor computerised fitness equipment</td>
</tr>
</tbody>
</table>

Source: Giant publicity material
1.5 Asia at large

Leading Asian producers have developed access to European markets on the basis of a variety of factors. The People’s Republic of China and some of the South-East Asian countries have produced primarily for the low end of the mass market, primarily on the basis of price. Yet some of the bicycles that are entering Europe from those regions are produced by Asian companies from the higher labour-cost countries (especially Taiwan) who have built international production networks to take advantage of lower cost sites and favourable conditions of access to the European market. In componentry, Japan’s Shimano has manoeuvred to overcome its growing cost disadvantage, due to the high value of the yen, by a combination of technical innovation, aggressive market positioning, and offshore production to become the world’s dominant supplier of bicycle componentry.

The attached exhibits give a good idea of the extent of the presence that Asian producers have managed to achieve in the European market. The data presented covers the important years of 1992 and 1993, in which there was a political reaction in Europe to the massive increases in the import of low-price bicycles from Asia. The European Bicycle Manufacturers’ Association brought an anti-dumping suit against certain countries, which resulted in the imposition of tariffs of 34% on products originating from China and the potential loss of GSP status (the Generalised System of Preferences), which would effectively raise the duty to 51%. The ASEAN producers were put under a cloud by the imposition of the 17% duty, normally waived under GSP, when their combined exports to the EC exceeded the agreed quota in early December of 1993. Taiwanese producers, too, have been under scrutiny by the EC’s investigating body and have stepped down exports to avoid retaliation. These EC measures have also had
the effect of lowering the attractiveness of China as an investment region for the main Asian producers. As far as componentry alone is concerned, so far there has been no action brought against Asian component makers, probably because it is much harder to demonstrate that dumping is taking place at the level of 'parts'. Nevertheless, most Asian suppliers must now be despondent about their future in Europe, at least when compared to the "pre-dumping days".
<table>
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<td>Others</td>
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<td>77,778</td>
<td>Others</td>
<td>107,355</td>
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<td><strong>Total</strong></td>
<td>2451637</td>
<td>2,162,642</td>
<td><strong>Total</strong></td>
<td>2,397,484</td>
<td>1,714,278</td>
<td><strong>Total</strong></td>
<td>1,588,598</td>
<td>1,795,716</td>
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<td>122,802</td>
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<td>France</td>
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<td><strong>Total</strong></td>
<td>758051</td>
<td>725,648</td>
<td><strong>Total</strong></td>
<td>448,772</td>
<td>465,012</td>
<td><strong>Total</strong></td>
<td>211,417</td>
<td>209,237</td>
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### ASEAN bicycle exports to Europe 1988 - 1993

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<tr>
<td>Thailand</td>
<td>103,000</td>
<td>141,000</td>
<td>37%</td>
<td>194,474</td>
<td>38%</td>
<td>289,000</td>
<td>49%</td>
<td>521,000</td>
<td>80%</td>
<td>51,423</td>
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<td>Indonesia</td>
<td>29,000</td>
<td>76,000</td>
<td>162%</td>
<td>150,138</td>
<td>98%</td>
<td>190,000</td>
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<td>359,000</td>
<td>89%</td>
<td>64,653</td>
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<td>3,000</td>
<td>28,000</td>
<td>833%</td>
<td>74,000</td>
<td>164%</td>
<td>118,000</td>
<td>59%</td>
<td>344,000</td>
<td>192%</td>
<td>67,269</td>
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</tbody>
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Overall % change 1988-92 (1988 = 100)

- Thailand: 406%
- Indonesia: 1138%
- Malaysia: 11367%

* projected based on Jan-April 1993 figures

Source: Cycle Press No 86 December 1993

### Figure 1.3

ASEAN bicycle exports to the EC 1988-93

Effect of anti-dumping suit
Taiwan bike exports by destination

<table>
<thead>
<tr>
<th>Year</th>
<th>N.America</th>
<th>Europe</th>
<th>Oceania</th>
<th>Asia</th>
<th>Middle East</th>
<th>Others</th>
<th>Total</th>
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<tbody>
<tr>
<td>1989</td>
<td>55.6</td>
<td>25.1</td>
<td>9.8</td>
<td>5.9</td>
<td>1.5</td>
<td>2.1</td>
<td>100</td>
</tr>
<tr>
<td>1990</td>
<td>46.5</td>
<td>33.1</td>
<td>6.5</td>
<td>6.8</td>
<td>3.4</td>
<td>3.7</td>
<td>100</td>
</tr>
<tr>
<td>1991</td>
<td>41.2</td>
<td>37.1</td>
<td>3.9</td>
<td>7.8</td>
<td>4</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>1992</td>
<td>28</td>
<td>30.8</td>
<td>5.2</td>
<td>14.2</td>
<td>8.6</td>
<td>13.2</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1.8

Figure 1.4

Taiwan's bicycle exports by destination

Source: Cycle Press N° 78 April 1993
### Table 1.9

China's bike production & exports 1990-94

<table>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>28.1</td>
<td>28.9</td>
<td>30.2</td>
<td>32</td>
<td>32.5</td>
</tr>
<tr>
<td>Export</td>
<td>3.8</td>
<td>7.3</td>
<td>10.3</td>
<td>9</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31.9</td>
<td>36.2</td>
<td>40.5</td>
<td>41</td>
<td>43</td>
</tr>
<tr>
<td>Export %</td>
<td>14%</td>
<td>25%</td>
<td>34%</td>
<td>28%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Source: Cycle Press No 84 October 1995

### Figure 1.5

China's bike production & exports 1990-94

Source: Cycle Press No 84 October 1995
Figure 1.6

EC market share of China and Taiwan

Source: Cycle Press No 79 May 1993 p.28
Notwithstanding the recent political complications for the Asian manufacturers, they remain a threat to the European bicycle industry as a whole. How well-positioned are European firms to respond to this threat? What technical innovations have they developed in their core businesses, and how have they turned to innovation to expand their product range? How well are they using the market advantages given them by their “lead market” at home, and how aggressively have they moved to turn the globalisation of markets into expanded business opportunities? How are they managing their production processes, including the need to apply new techniques of quality control and supplier management, to improve their productivity and their competitiveness? The following chapters look at how three firms that, traditionally, have been the leaders in the European bicycle industry, are dealing with these challenges.
The response from Europe

2. Mavic

2.1 History

Mavic ("Manufacture d’Articles Vélocipédiques Idoux et Chanel") was founded in 1890 as a company that specialised in the production of children’s pedal cars and mudguards. By 1920 it had been acquired by Henri Gormand, and remained under the control of the Gormand family until 1990. Under the direction of Henri Gormand the company moved into the fabrication of bicycle rims, launching its first aluminium rim in 1926. The consecration of Mavic’s role as a leading manufacturer came with the utilisation of their rims in the Tour de France of 1931. In 1964 the reins of the company were handed to Bruno Gormand, son of Henri, and under his management the company became more focused on innovation and performance, translating these into the manufacture of the ‘blue-anodised’ “SSC” (Speciale Service des Courses) - a rim destined for the exclusive use of the professional rider.

This identification with the world of professional racing has turned out to be the hallmark of the company ever since. In 1973 came the creation of the Mavic Race Service unit, and this initiative has proved to be the most distinctive element of the company’s presence in the market. Wherever there is a major professional road race, there is Mavic, swinging into action with its service car and technicians.

Since that time the progress of the company has been marked by its constant stream of innovations and its gradual move into becoming a component maker at the top end of the market. Its leadership in the area of rims has only recently been challenged by the likes of Campagnolo and FIR.
(another Italian company) but Mavic can still boast 30 professional teams around the world that use at least Mavic rims if not other components as well.

The 1980s, therefore, have seen an expansion of Mavic’s markets as well as its product range. The company rightly prides itself on its innovation record and the quality of its products, coming, as they do from an organisation that, even after a phase of major expansion, still counts no more than 150 employees.

2.2 Core business

Mavic’s core business is essentially that of the manufacture of bicycle rims. Recently, however, the company has successfully diversified its product range into componentry, albeit gradually, to arrive at the latest offering, the ZMS groupset.

Rim manufacturing is an industry with low entry barriers and requires relatively little capital investment. However, for aspiring world class producers the hard part is the leap in process and materials technology required to produce a top flight product. The rim itself is constructed of aluminium, at times of different grade, depending on the use it is to be put and the quality of rim it is desired to produce. Specialist suppliers provide Mavic with long strips of pre-formed aluminium which is then shaped into the circular rim by purpose-built machinery. Rims may be classified as Road and MTB. The Road category is sub-divided into two segments, the tubular rim profile ⁹ and the ‘High Pressure’ profile. The HP rim is technically more difficult to produce, given the extensive working of the material, including extrusion, which is required. It is also increasingly in vogue, as the

⁹ The tubular tyre is described in more detail in footnote N° 14

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professionals move away from the high-performing but expensive and relatively unreliable tubular tyre.

Depending on the application of the rim, it is subsequently passed through a number of treatment processes which give it its particular performance characteristics.

The most common one of these processes is that of 'hard-anodising'. This is a low temperature electrolytic process in which the rims are connected to an anode (+) submerged in a sulphur bath and submitted to a voltage which ranges between 0 and 120v. The length of the whole immersion depends on the particular alloy used and the anodising thickness required. The resulting finish is usually anthracite grey, which comes from the transformation of aluminium into aluminium oxide. Anodising hardens the surface of the rim usually by a factor of 10 over that of the alloy used. It is not merely a surface deposit however, since 50% is actually absorbed by the alloy with the remainder being accounted for in the extra thickness of the rim. The value of anodising lies in the rim’s subsequent high resistance to corrosion, its increased rigidity and the thermal shield properties it acquires, enabling it to minimise and rapidly dissipate friction-induced heat.

Another surface treatment that Mavic uses is the 'ceramic' finish. A high speed gas flame forms a plasma jet above the surface of the rim. Ceramic powders such as aluminium and titanium oxides are fed into the jet stream where, in melting, they are sprayed onto the sides of the rim. This forms an extremely hard surface which is more than 3 times the hardness of an anodised one, and which is substantially thicker. The advantages that result from this treatment are the virtual elimination of wear caused by friction when braking and the reduction in the abrasive effects of grit and
sand caught in the brake pads. This improves the braking effect, especially in wet conditions, and the rims remain much cooler under extreme heat generation as when braking on long descents. Finally, the surface of the rim retains its finish and appearance for much longer.

A third and most recent process is the Mavic-patented S.U.P (Soudé. Usiné. Process) which stands for Welded Machined Process. Here, the strips of supplied aluminium are manufactured oversized. The strip is then roll-bent into the rim shape and arc-welded at the joint. High precision machine cutters then reduce the thickness of the rim surface down to normal dimensions, to very exact tolerances. The result is a braking area that looks like glass and which is flawless, providing a truly flat 'disk brake' surface. This rim may then be further anodised and ceramic-treated. Wheel building is consequently facilitated, since wheels can be built which are truer, and the braking effect is enhanced by the precision of the braking surface.

At the very top of the range Mavic produces 'composite' wheels for racing, mainly Time Trials. These wheels are made from low density woven carbon fibre, with a core of rigid polymethacrylic foam, which are bonded together onto a special aluminium alloy hub via an injection moulding process. The resulting 3-spoke wheel is highly aerodynamic, extremely light and rigid and is used as the wheel of choice by many professional riders in their efforts against the clock or in track races such as the pursuit.

Mavic's main business, then, is rims, but the knowledge gained in rim manufacture has been applied to other products where they have also demonstrated their innovative abilities.

Mr. Christian Baldessin, Mavic's International sales and Marketing Director, kindly arranged for me to visit their factory at St. Trivier sur Moignans, near Lyon. Most of my time was spent interviewing Mr.
Baldessin, but I was also able to speak with the Production Manager, who gave me a tour of the facility, and the Sponsorship Manager.

Although Mavic's core business is rims, the balance between rim production and components is now about 70%-30%. Mr. Baldessin pointed out to me that the profit deriving from the sales of rims allows them to invest in innovative products in the component range.

The latest offering from Mavic in componentry is the acclaimed ZMS groupset (Zap Mavic System). The distinguishing feature of this high-end product is the electronic brain that controls the gear change mechanism, which is actuated by push-buttons located on the handlebars. The power source is a long-life lithium battery located in the end of the handlebar tube itself. The speed and precision of the change are already legendary and there is no doubt that it will be a commercial success.

This is Mavic's first complete groupset and it is hailed as an outstanding achievement, both technologically and strategically. It is strange to think of Mavic producing its first groupset (the ZMS) only recently, for I had felt for many years that they were, in fact, producers of a full range of componentry. This conviction was supported by the knowledge that a number of professional teams had, for a long time, used their equipment and Mavic itself had promoted the concept of "Tout Mavic". However, Mr. Baldessin assured me that this had merely been a combination of parts, not a truly integrated system, as is the electronic ZMS groupset.

Typically, in the case of rims, Mavic takes about 3 months to conceive a new product and then get it to the market. The diversification into ZMS, however, took between 3 and 4 years and was based on a pre-existing

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10 See the Mavic chronology at the end of this chapter
technology developed by a company called Browning, who then sold the patent to the Japanese company Sun Tour.

The diversification into the production of truly advanced, high level componentry is appropriate given the company's excellent reputation, its expertise in the working of aluminium alloys and its long tradition of delivering high-quality innovative products. The company's extremely close links with the world of professional cycling provide it with not only a high, credible, profile but also enables it to be at the forefront in user-driven technologies.

The really surprising aspect of Mavic's launch of this particular product is that whilst Japan is well-known for its innovations in micro-electronics, it is a French company that is the first to introduce the electronic gear change.

I raised this with Mr. Baldessin who acknowledged that there had been attempts by the Browning company some years previously and that the patent had been sold to Sun Tour. He also told me that he thought that Shimano had some projects in the pipeline. So the idea was clearly not Mavic's, but being the first to commercialise the product was an important advantage and indicative of the company's eye for innovation, even if the original concept belonged to others. The ZMS was a source of great satisfaction to the company. Out of interest I asked him why other, larger companies specialised in component manufacture, such as Sun Tour, had failed to capitalise on this technology. Indeed, Sun Tour, rather than advancing, has been on the brink of going out of business. His reply was illustrative of the company's ethos:

"Maybe they were not innovative enough, maybe they were overwhelmed by Shimano. Innovation is clearly important. We do not
want to face Shimano, we are not competitors for Shimano. We are a small innovative company -- creative, but we are not their competitors. They have 95% of the market, we have 1%.”

He went on to say that although Mavic posed no great threat to Shimano, Mavic’s presence in the market was a good thing for the industry as a whole. “Shimano need people like Mavic, even if they do not have such a high market share.” By this I am sure he meant that when a small non-specialised (in componentry) company like Mavic was able to lead the way in creativity and innovation it kept the larger, more recognised companies like Shimano and Campagnolo on their toes.

Talking about keeping people on their toes, I asked if the recent advance of Campagnolo into the rims business (which is described in Chapter 3) had had a major impact on Mavic’s share of the market. Mr. Baldessin acknowledged that the Italian company had made great strides, adding that even some of Mavic’s customers mentioned Campagnolo as a major producer of rims. However he seemed unperturbed by what should surely have been taken as a major threat. He felt that there was room enough for both, and that their strategies were different. In any event, this reaction confirmed for me the validity of his earlier statement. In essence, successful companies need successful competitors if they are to thrive and constantly seek out new capabilities.

2.3 Marketing

I asked Mr. Baldessin to describe what he regarded as the traditional way in sales, marketing and distribution in the industry and then how he expected to improve on it.
He gave me a thorough, if brief, analysis of the situation as he had found it when he joined the bike industry. He felt that the commercial network of distribution was old-fashioned, not only in France, and decided to change it. The Mavic subsidiary in the US is now distributing direct to the retailers. Thus they have a direct connection with the customer, whereas when they employed distributors in the past it was like "having a barrier, a smoke screen", which prevented them from knowing what was happening in the market. Since Mavic’s products “need a lot of explanation, a lot of support and promotion, people need help to sell the product”.

In this respect Mavic does not feel itself different from anyone else who manufactures and markets a technical product. Mavic’s rationale is that technical products need to be explained and promoted to the final user, instead of going through the normal commercial channels which are not really supportive and lack brand loyalty and product knowledge. Although the wholesaler network is good for the coverage of the market, it is not a good means of getting people to know the product. It is merely an efficient way of distributing the product, not an acceptable way of being intimate with the market. Mavic receives many requests from end-users asking for after-sales information regarding their products. This is because they cannot find the products in the market, which is proof that the wholesalers mostly sell what they are asked for; they do not actually promote the products. Furthermore, since these distributors also carry other companies’ products they cannot be promoters of all the products they handle, and therefore Mavic sees this as weakness of the system, which they are now side-stepping through their direct marketing approach.

To this end the company has spent, traditionally, up to between 12 and 15% of its turnover, mainly on PR. They expect the division of this sum will
be somewhat different in the future, more oriented to the real end-user, promoting the product and providing technical assistance to the retailers. They are seeking a true after-sales service, including the holding of ‘clinics’, and using as wide a range of promotional tools as possible to get information to the end-user.

On the commercial side, Mavic is now adopting a more analytical approach, more planning of sales. This means more and better use of forecasts and related organisation of the distribution. They use statistics and feedback from the market supplied through agents. Companies in the bicycle world are not used to using forecasts, and, according to Mavic, this will have to change.

2.4 Sponsorship

Mavic promotes amateur teams at regional and national level through their retail outlets, reaching their customers through the commercial network. They define their customer as the end-user, the man in the street, although there can be no doubt that the company’s focus on the professional scene is the source of its market leadership.

Mavic’s approach with regard to sponsorship is to seek out those teams and elite riders which it knows, or expects, will have continuing success. If things go as planned, then the aim is to prolong the relationship and exploit it to the maximum.

These days sponsorship for most companies usually means technical assistance and the provision of componentry, whereas in the heady days of the late 70s early 80s, cash also used to be given. The return for the company, apart from user-input in the development of products, can be substantial, given the international nature of most teams. These teams may be based in a
particular country, but their best riders are often of different nationalities -- and their success is registered in different markets, with Mavic thus benefiting from this 'knock-on' effect. In 1994 Mavic will sponsor two international teams, the Spanish 'Once' team and the French 'Gan', both of whom will be 'Tout Mavic'. Both teams will be followed closely to permit further development and fine-tuning of the ZMS groupset. Another five teams will use Mavic wheels and rims only.

2.5 Suppliers

Mavic buys-in everything. They have their own moulds for the rims which they give to their suppliers be they finished goods contractors or the aluminium material manufacturers. They have 3 main suppliers in Europe, in France, Belgium and Switzerland, on whom they are very dependent.

Mavic chooses suppliers on the basis of their technical capacity, response capacity, size and geographical proximity. All suppliers are involved in even the conceptual stage of a product and on to its design. This has always been the Mavic way of working.

What Mavic would like are even faster reaction times from their suppliers. When asked if it was ever likely that a supplier become a partner, I was told that this is more and more the case. This led naturally to the question of alliances, to combat the increasing strength of the Far East manufacturers. The possibility of Mavic allying with someone in Europe was discussed and the general conclusion was that it could make good sense -- in the field of componentry!

This is because Mavic wants to be N° 1 in rim production. Componentry for them is a kind of shop-window on their capacity to be innovative but it is not their main business, even if they regard it as a good
business to be in, since their products are good products, with a recognised name. However, if Mavic had to depend on components, it would not be viable, whereas with rims, it would. As Mr. Baldessin remarked: “It’s the rims that allow us to invest in componentry”.

Returning to the discussion of supplier relationships, Mavic’s R&D department is constantly looking at possible new developments and suggestions which may involve the consideration of new technologies, new relationships and new suppliers. In fact, the ZMS is an example of the success of their efforts in this regard. Mavic collaborates with Michelin and Vittoria, (both tyre manufacturers) with whom they have some projects and this is an example of how they are not only following the demand but seeking to create it.

I was curious to know if a manufacturer like Michelin came to Mavic with an idea, to seek collaboration, or did it go ahead and then bring it to Mavic asking for a rim to be made. The reply I received showed just what is possible when companies learn that technologies can be shared and exchanged for the good of both. Michelin, until 1993, had its own rim manufacturer, Wolber, which it then sold off to Mavic. There is a dual use of the name now. Michelin continues to use ‘Wolber’ as a brand name for some of the tyres they make, but Mavic also uses the name for certain of their rims. Thus Mavic has acquired the machinery, the technology and the customers that once belonged to Michelin. The result is that the collaboration with Michelin is even closer, because now they are no longer a competing rim manufacturer. Michelin, for its part, has gained open access to the lead manufacturer in rims and benefits from the marketing of the undoubtedly high quality ‘Mavic Wolber’ rims, which, clearly, should be accompanied by their ‘Michelin Wolber’ tyres! This is besides the many
technological insights to which they will be privy. Here is a classic case of where 'comparative advantage' has been transformed into competitive advantage for both companies.

2.6 Challenges and Responses

As with other companies in the industry Mavic has had to face certain challenges over the last decade or so. For some companies, like Campagnolo, these have been clearly more direct, given that Shimano's line of business is exactly the same. For Mavic, though, I felt that things were far less of a head-to-head confrontation, more a question of responsiveness.

In fact, from Mavic's point of view, the biggest challenge has been with the arrival of the 'mountain bike' (MTB), since Europe's traditional emphasis has been on the racing bike. Mavic manufactures many rims but no componentry for the MTB. Rims for MTBs now account for at least 50% of their production, so it seems that, at least for Mavic, the transition to producing for the MTB market was not too difficult. Mr. Baldessin commented:

"The big increase in the market with the arrival of the mountain bike has been to the benefit of the Japanese, or the Far East, not Europe. European manufacturers were late, maybe they didn't believe in it. Mavic was quick to respond because of our flexibility and speed of response. In our manufacturing process it is quite easy to react to the market. This is not possible with componentry."

It is hard to judge whether the company has actually changed its stance over the years, since it has always been marked by a strong creative instinct and desire to seek out the technologies it needs to satisfy that instinct. According to Mr. Baldessin, however, the company is keen to promote even
further this feature, and new people coming in will help to continue Mavic’s success, bringing with them new ideas, helping to promote change. The company recognises that change must take place, that new ideas must continue to be at least proposed, if not agreed upon.

The company has recently established a ‘product range committee’ which is indicative of their new emphasis on working in teams. Most of the decisions on new products are based on the work and recommendations of this committee. It involves the Marketing, Manufacturing, Quality and R&D functions, and a minimum of 90% consensus is required for a decision to be made. Everyone comes with their own ideas -- top management is also present and a decision is sought that is to everyone’s satisfaction, as far as possible.

This process also serves Mavic, which is still a small company, in other ways, too. For new members of staff, participating in this process is part of the their integration into the ‘family’, as Mr. Baldessin called it. Altogether, it takes about a year for new employees to become “Mavic’ employees, something which the company feels contributes to the performance of the individual and, therefore, that of the company.

Operationally, Mavic is trying new ways of doing things, working with forecasts and using these to fix inventory levels in anticipation of customer orders -- ready for immediate delivery -- especially for the after market. It is different for the OEM market since they have to be more flexible to requests, especially from the Taiwanese. Mavic’s largest OEM markets are Taiwan and America. All of their orders from Taiwan are OEM orders and the company collaborates closely with the Taiwanese, also through their OEM representative based in the States. Other major manufacturers in France and Germany are important customers and Italy is expected to be an expanding
market for them in the near future, notwithstanding the revival of Campagnolo and the direct competition that company offers to Mavic in its core business of rim manufacturing.

As International sales Manager, Mr. Baldessin’s job has been to develop the sales force and try to adapt it to the market -- heading for a situation where it will have at least 50% direct distribution. This is already the case in the United States, in Switzerland, and Italy but it will still require many changes in the sales force, in logistics and financial planning.

Mavic’s financial performance has exploded over the last 5 years for a number of reasons- they have kept their image and reputation strong. They have kept in their mid-high end niche and with investment in R&D for both rims and components, have come out with products like the ZMS, which is the height of innovation.

The future for Mavic is to seek out more innovations like the ZMS across the range of its products -- both for rims and other components. They think about the long-term issues of technology and innovation which are, for them, where the competitive difference is going to be established. They also recognise that, in several cases, the leeway for further technological development and innovation is limited by the level that certain components have already reached.

Mavic is an organisation that is constantly seeking new ways, new capacities. My abiding impression of the company is that it is one that enjoys what it is doing! It is almost as if the ZMS were invented for its own sake, so that the company could flex its innovative muscle at the rest and prove to itself that, in whatever it does, it is truly “Haut de Gamme”.
### MAVIC CHRONOLOGY

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Technology</th>
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<tbody>
<tr>
<td>1890</td>
<td>Founding of “Manufacture d’Articles Velocipedique Idoux et Chanel” (MAVIC) specialising in the production of mud-guards and children’s pedal toys.</td>
<td>Begins research into the aluminium rim</td>
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<tr>
<td>1920</td>
<td>Henri Gormand buys MAVIC and continues the making of mud-guards</td>
<td>Production of first aluminium rim in ‘Dural’</td>
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<td>1926</td>
<td></td>
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<tr>
<td>1931</td>
<td>MAVIC aluminium rims are used for the first time in the Tour de France. Gradually these will come to replace the wooden rim</td>
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<tr>
<td>1964</td>
<td>Bruno Gormand, self-taught engineer, succeeds his father and builds a dynamic team dedicated to innovation and performance</td>
<td></td>
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<tr>
<td>1971</td>
<td>Appearance of the ‘blue-anodised’ “Speciale Service Des Courses” rim (SSC) reserved for use by professionals</td>
<td>World’s first application of a hard-anodising treatment to a bicycle rim. After this innovation no professional racing bicycle is ever built without a rim of this type.</td>
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<tr>
<td>1973</td>
<td>Establishment of the “Assistance MAVIC”, mobile service unit for professional races</td>
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<td>1975</td>
<td>Production of the Paris-Roubaix SSC.</td>
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<tr>
<td>1977</td>
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<tr>
<td>1978</td>
<td>Construction of 1000 sq. metre facility next to the main building. Total production area passes to 3500 sq. metres.</td>
<td>Production of derailleur and bottom bracket</td>
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<tr>
<td>1979</td>
<td>The concept ‘Tout MAVIC’ is born, where the company harnesses its know-how to produce what it calls an ‘ensemble’ - virtually a group set - to be fitted to professional racing bikes.</td>
<td>Creation of an annular bearing hub and world’s first cartridge bottom bracket which are entirely dismountable</td>
</tr>
</tbody>
</table>
MAVIC CHRONOLOGY

1980  First professional team to use the “Tout MAVIC’ ensemble: Boston Mavic

1981  Factory area increased to 6000 sq. metres. Debut of the commercialised “Tout MAVIC”

1982  COOP-MERCIER-MAVIC is the first French professional team to use “Tout MAVIC”

1985  Accidental death of Bruno Gormand. His wife, Cecile is named head of the company and continues in the spirit established by her husband. 9 professional teams now using “Tout MAVIC”, with a further 27 using rims only.

1987  Factory grows to 7000 sq. metres.

1988  Introduction of new range of components for both race and MTB

1989  The american Greg Lemond riding “Tout MAVIC” wins both the Tour de France and the World Championship. International confirmation of the company’s advances in research and production

Installation of Statistical Process Control in order to achieve zero-defect Total Quality

1990  Management buy-out of company together with venture capital to create a holding company “MAVIC Financing”

1993  Introduction of company’s first groupset, “MAVIC ZMS”


Source: Mavic publicity material
3. Campagnolo

3.1 History

The most famous name in cycling belongs to a company located in Vicenza, northern Italy, Campagnolo, makers of componentry, founded by Tullio Campagnolo 60 years ago. As befits all legends, the story of the creation of the company is now part of cycling folk-lore, handed down from generation to generation with, however, surprisingly little variation in its telling. Campagnolo, in his youth, was a well-regarded bike racer who, on a snowy ascent of the Croce d’Aune col in the Dolomites in 1927, lost the race leadership, after puncturing, through being unable to undo the bolts holding his rear wheel. Back in his father’s workshop, his inventiveness led to the creation of the ‘quick-release’ skewer for wheels. This was the first in nearly 200 subsequent patents granted for products and processes covering an enormously varied output, in such diverse applications as cars (even Ferraris!), motorcycles, spaceships, helicopters and many others.

By 1933, Tullio Campagnolo was in the business of manufacturing components, and champions of that era began to use his early attempts at a rear gear change mechanism. From these beginnings the company grew into being the foremost supplier of componentry to the bicycling elite, driven along by the unfailing intuition and genius of its founder in all matters, both technical and commercial. Over the years its supremacy has been unchallenged. Since 1968, when its first complete groupset was introduced, Campagnolo-equipped riders have won 20 World Championships, 21 Tours de France, 24 Tours of Italy and innumerable other one-day and stage races. It is this emphasis on meeting the requirements of the elite end-user that has given the company its competitive advantage, and notwithstanding the
period of difficulty it has recently been through, this remains the inspiration for its vision. In the words of the company itself:

“Competitive cycling has always been our final target and is intrinsically interwoven with our operative (sic) philosophy and our tireless determination. Only through continuous confrontation with the extreme demands of international professional cycling and the achievement of splendid victories, we have (sic) succeeded in maintaining the quality of our products ....to project ourselves towards increasingly brilliant results in the future.” 11

In many respects the story of Campagnolo is emblematic of a culture that has given the world the richest concentration of art and artists and it is this patrimony that the company’s products have always managed to express. Quite simply, Campagnolo parts are works of art, with a distinctive “Italian-ness” that sets them apart from others: ..(their) “components have for decades been the best of the best, so much so that sporting them has become a sport itself”. 12

3.2 Core business

Campagnolo’s core business is the manufacture of high quality componentry for bicycles, aimed mainly at the top end of the market. The components are produced in what is known as a ‘groupset’, a ‘family’ of parts for a given level of price and functionality. Although it is true to say that the basic design of the components is virtually identical from one groupset to the next, there are substantial differences between the various groupsets. These

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11 From Campagnolo’s 1994 product catalogue
12 Coles Phinizy in “La crema della crema”, Sports Illustrated, February 18, 1980
differences are in the materials used, the finish applied to the surfaces, the level of functionality offered and the technology embodied.

The components are almost entirely made of the finest aluminium alloys available on the market, and many of them are formed through a process of hot-forging, unlike Shimano’s products, which go through a cold-forging process. Campagnolo maintains that hot-forging provides a higher quality product, and in this they are supported by the expert view of metallurgists. Shimano’s process is quicker, less expensive, and components so made require little or no subsequent machining. This difference in manufacturing is not something the un-trained eye can actually see in the finished products. However, as one who prides himself on being an ‘intenditore’, (I refrain from using the French term ‘connoisseur’, for political reasons!) I have to say that there is a noticeable difference in the look and feel of Campagnolo parts compared to those of Shimano.

Seven years ago Campagnolo started manufacturing rims. Although the company recognised that, technically, rim manufacturing was one of the most difficult things to do, they thought that their long history and expertise in the areas of technology process and materials would give them a flying start. The intention was to then market the rims through their long-established distribution channels.

From the planning phase to first production took four years, two years more than the company had expected. Valentino Campagnolo\textsuperscript{13} admitted to me that they were over-optimistic in the planning phase, and, even though they had sought collaboration with other Italian manufacturers, these other Italian firms, perhaps through fear of giving away expertise to a famous

\textsuperscript{13} All quotations are from the interview held with Valentino Campagnolo in January 1994, unless otherwise stated
rival, did not want to share resources. Thus the weight of the initiative fell solely to Campagnolo, and amounted to a heavy financial investment, many trials and re-trials of the prototypes, and considerable input from the racing professionals. Overall, the set-up costs (the new factory unit, R&D, training, etc.) were somewhere between 10 and 12 billion lire ($8-9 million).

Nevertheless, after a lengthy and difficult gestation, the first rims rolled into commercialisation. However, whether through bad luck or bad management, a new development was to set them back again. This was related to the fact that the production of rims had only been envisaged for tubulars.\footnote{Tubular tyres, or 'tubs' are manufactured so that the tyre is a completely enclosed structure containing a very lightweight inner-tube. The enclosure is achieved by stitching together the walls of the tyre creating a seam on the underneath, that is, on the side opposite the tread. This seam is then covered by a canvas-like tape, which is the contact point with the rim. The tubular is then glued onto the rim. Normally, tubulars are faster, more expensive, more puncture-prone and more difficult to maintain than tyres with a separate inner-tube.} It was during the first year of marketing their tubular rims that the tyre (that is, with a separate inner tube) technology developed by Michelin brought about a revolution in the racing tyres used by the professionals. The subsequent demand for tyre, not tubular, rims caught the company un-prepared in more ways than one. ‘High Pressure’ ('HP') rims, as they are called, are more complex to build, undergoing an extrusion process to achieve the required profile. Michelin’s tyre technology innovation required the use of new suppliers and the application of even newer skills by Campagnolo in its rim production. Valentino Campagnolo had no difficulty in confessing that this was a time of great difficulty for the company.

As if these production and technology problems were not enough to cope with, it also proved to be difficult for Campagnolo to insert itself into the market, not only because of the above factors but because the name
Campagnolo was associated with componentry, not rims. This factor, together with others, had been underestimated and they realised that they would have to counter it with innovation. However, the innovation you can introduce in rims is quite limited, especially when you have a formidable challenger and innovator such as Mavic to contend with.

Hence Campagnolo set out to produce a product that contained features that would differentiate it from what was already on the market. Given that each rim was already designed for a combination of the least weight and maximum strength and functionality, other attributes would have to be brought out and emphasised. To achieve the right balance, extensive use was made of CAD, in which Campagnolo is a world leader, and this certainly helped in their efforts to create the rim which would define the company as a state-of-the-art manufacturer in a field in which it had no history.

One of the results of this search for a differentiating innovation was the patented “boccole inclinate” or inclined nipple seating, which allows every spoke to enter the rim at the same angle it leaves the hub, which reduces the possibility of spoke breakage, since the spokes are no longer “kinked” at the point where they engage the nipple.

Another example of the fruits of this investment in research and design is the patented polycentric profile of their MTB rim - this is ‘design for use’ in a true sense since the ‘travel’ of an MTB cantilever brake, describing, as it does, an arc, requires a rim profile which maximises the braking effect when the brake block makes contact.

When, finally, the company brought out the range of products it had struggled to create, they were as instant a success as they could have wished.
for. Their efforts rewarded by the market, the company continued to invest and innovate in what had now become a new ‘core competence’.

The first in a series of “special” wheels - the Ghibli, arrived in 1990. Built in carbon fibre, with high structural and lateral rigidity, it represented the combined efforts of planning, design and materials engineering. Unlike its less advanced forebears, however, its time-to-market was a mere 6 months, and it was a great success, often being the wheel of choice for professionals engaged in ‘against-the-clock’ time trials.

By 1992 the ‘Shamal’ road wheel had been introduced and proved immediately to be a winning product, its use by Miguel Indurain \(^\text{15}\) that year in one the best-ever Tour de France time trial stages confirming both its and the company’s world class. This particular rim has been followed by two other versions - the ‘Bora’, in carbon fibre, at the top of the range - and the ‘Vento’ at the entry-level in this type of wheel.

The production of MTB rims started only in 1990, the company lagging far behind the growth in the MTB segment, as had many other European producers. In mitigation, however, it has to be acknowledged that Campagnolo has made giant strides in a field that has not been an easy one to enter and they have done so in such a way as to become identified as a world-leader in rim production. Not resting on their laurels, in 1994 they are to produce hybrid \(^\text{16}\) rims for the first time, resulting in a range of rims for all purposes that are the equal of, or superior to, any others.

Looking back over the last 7 years and the whole development process of this strategic differentiation, Valentino Campagnolo’s first criticism of his company is that they employed too few resources and placed too much

\(^{15}\) Winner of three successive Tours de France (1991-1993) and rightly regarded as one of the greatest riders of all time.

\(^{16}\) A ‘hybrid’ is a Road bike-cum-MTB, a kind of ‘city’ version of the MTB.
reliance on the name Campagnolo. His only regret, though, should be the
time it took his company to respond to the burgeoning MTB market, for in
all other respects, the success the company has enjoyed from the
introduction of its rims is something of which he can be proud. It is no
small achievement to become a world leader in an area where there are
already well-established specialist producers. The fact that Campagnolo
managed this is, once again, eloquent testimony to the appropriateness of the
company's strategy of being competitive by being where competition takes
place.

3.3 Suppliers

Campagnolo’s suppliers include those of some 30 years standing, and
the traditional role of client predominates. There are some new suppliers.
Suppliers are considered by Valentino Campagnolo to be both a strong point
and a weak point. At the time of writing, the company is in the process of
substituting a number of its suppliers.

I raised the question with Campagnolo of how he expected to effect the
required changes in his suppliers, given that many of them were of such
long-standing, some presumably going back to agreements that had been
struck with his father. His response was frank and straight to the point:

"We believe that every day we must find new and increasing
competitive capacities - and so must our suppliers."

This response came from a man who had realised that the serious
business of competing had begun, and who, now that his company was once
more on the crest of a wave of commercial success, was not going to allow
sentiment or the mistakes of the past to come back and undo the enormous
efforts that had helped the company survive. He went on to elaborate that
even if the present state of the Italian economy and the weakness of the lira had helped his company, many of his suppliers were still suffering the effects of the world-wide recession, so Campagnolo represented for them a source of new and interesting possibilities. This being so, the contractual power of Campagnolo is superior to that of their suppliers and the fact that the suppliers are still feeling the recession, the stagnation of their markets, continued to augment Campagnolo’s contractual power. This was not to imply a sense of exploitation, however, for the company was trying, in a positive, collaborative sense, to help improve the average quality of their suppliers.

When I pointed out to him that this in itself would be a great achievement since one of the things Campagnolo has always been famous for is its quality, he concurred but re-defined what ‘quality’ means for Campagnolo:

“Quality has always been one of the foundations of Campagnolo - but let us understand or consider “Quality” in a more modern sense - not as a tired “end”, thanks to a “choking” control carried out by an unwieldy, heavy structure - but as a management of quality carried out with an agile structure and as upstream as possible. We aim at having a product that, from its birth, has its quality guaranteed.”

He went on to admit that there is, in this, an element of difficulty, due to the transition phase -- moving from where the perception of quality, traditionally, was exactly that, one of control, to reaching the objective of the assurance of quality right from the start with his suppliers. However he seemed intent on going as far down the road as necessary. Indeed, with some suppliers he feels that he has already reached the objective, whereas with
others the road is still a long one, he is only halfway there. Although he spoke of some suppliers as excellent, people he regards as strengths of Campagnolo, others are, if not weaknesses, at least a source of constant worry, and must be constantly supported. I asked him at what point and with what criteria did he decide to ‘call it a day’ with suppliers and he replied quite straightforwardly that it was a judgement based on 2 or 3 factors: cost, quality, and possibility of future growth.

Before that day arrives however, and in the normal course of events organizational and technological structures within the company furnish suppliers with statistical data - for example on the trend of their quality - and since Campagnolo has the means to determine, for every type of product or process, the requisite level of quality, schedules and specifications based on these requirements are passed on to the suppliers.

I remarked that this was a very Japanese approach and asked if this was something they had learned from them:

“To tell the truth we have never studied what, or how, the Japanese do. We have always invested heavily in equipment to enable us to control quality. We have made important investment decisions to acquire advanced machinery to enable us to check quality. We have developed the capacity, internally, to build our own test equipment, too. We have two areas in the factory which, organisationally, come under the area of Quality. One in the area of metallurgical and chemical testing and the other is the Test-bed - where we test individual pieces or components or sub-assemblies - a single screw of the gear mechanism or the whole mechanism - and where we test our own and our competitors products. We test production units and prototypes.”
Whether this "ignorance" of Japanese methods is entirely true is impossible to say. Personally, I feel that it may be, even bearing in mind what he was to tell me subsequently, which appeared to contradict his comments above.

I recalled for Signor Campagnolo my own thoughts of about 5 years ago regarding his company, which it seemed to me, would, have to insert itself into an even smaller niche, in order to survive the severity of the assault by Shimano. There was no real acknowledgement of my point, which I followed up by saying that now, however, the company seemed well on the way to recovery and was doing well enough to expand its range. Did he agree?

He warmed to the task of replying. It was clear that my initial comments had either been an unhappy memory for him, or perhaps he didn’t agree and had refrained from giving a response. With a largely undisguised pleasure he told me that Campagnolo srl had recorded an increase of 85% in its turnover in fiscal 1993, going on to add, with that typical Italian nonchalance that can sometimes irritate non-Italians but which never leaves them indifferent, that he “didn’t know” what market share his company had. Hardly concealing his pride he went on to say that he expected that 1994 would also prove to be a year of growth, running out at something in the order of a further 75% increase.

These are impressive figures by anybody’s standards, and I wondered if the company was going to take the opportunity to invest even more heavily in R&D to maintain its impetus and provide a hedge against possible leaner market conditions in the future.

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17 A "srl" (societa' di responsabilita' limitata) is a limited company.
The answer I received, although logical, somewhat surprised me. Although there would be an increase in R&D expenditure it would not be more than a nominal increase. This is because even in those years when they were obviously suffering the great pressure of the competition, they had continued to invest heavily. This had created a situation where their level of investment was considerably out of line with their returns—but now the fruits of those investments in the hard times were beginning to pay off, and thus the situation was normalising itself.

I had an uneasy feeling that, while this was a perfectly plausible or even common-sense view of things, it wasn't really far-sighted and strategic. I wondered if Shimano would have acted in a similar fashion. Or would they have thought that their prior investments, regardless of the returns, were all ‘sunk’ costs and carried on investing? For if you can invest in the hard times, as Campagnolo had so laudably done, didn’t it make more sense to invest in the good times? Were there signs that the company was inadvertently creating its own ‘boom-and-bust’ cycles due to a lack of a truly long-term strategy? Time will tell.

Certainly, Campagnolo made it clear that their period of real crisis, between 1989 and 1991 had been a salutary experience for his organisation, and in discussing this we returned to the question of the Japanese. Although he had stated that they had never studied the Japanese way of doing things, when asked in a somewhat more oblique fashion what, if anything, he had learned from the competition over recent years, he confessed that he and his company had learned several things:

"...to appreciate and respect our competitor. I can assure you that whenever we want to measure the “goodness” of our company, or even personal actions, we measure ourselves against what our competitor is
doing. I would dare to say that every day we evaluate our moves in relation
to the results of our competitors. Not with the intention of importing into
Campagnolo their way of doing things - I believe that in the first place this
would not be possible- and even if it were, in whole or in part, - it would be a
negative thing to do - we must have our own, Campagnolo, way of
developing the company - whilst still watching out for the good, or bad,
moves of our competitors, whilst trying to respect our own culture. Italian
culture is significantly different from the Japanese one, so Campagnolo’s
approach reflects that.

Another thing we have learned is to lose our arrogance or sense of
“superiority” with regard to the market or even at the level of internal
company problems. We must have the capacity to want to understand the
“why” of things. In the past we sinned of arrogance. For 50 years we have
had infinite sporting success - and we have rested on our laurels. Only, one
day, we woke up to the fact that the market was changing dramatically.

Another thing learned is that even an Italian company, albeit
operating in a social economic and political context indubitably more
penalising, with regard especially to the situation that my Japanese
competitor operates in - where everything is efficient - can however, not
only be in the market place but can expand, have success and I must say, not
by way of forecast but on the basis of fact, succeed in challenging the
competitor in market segments which are favourable to him.”

This, to my mind, was, if not exactly ‘studying’ the Japanese, an
indication of the level of competitive benchmarking that Campagnolo had
reached in its determination to stem the tide. Indeed, it supported my belief
that, of late, Campagnolo’s being second mover in certain areas of
innovation and product introduction, in several cases had proved to be
fortuitously appropriate. This is easy to confirm, since a quick glance at the ‘Campagnolo version’ of certain Japanese components shows how well the Italians have learned to take ideas and improve on them. This improvement is noticeable in terms of quality (which is to be expected), an equal functionality, and surprisingly, a substantially lower price, notwithstanding the use of hi-tech materials such as in the carbon-fibre bodies of the “Ergopower” brake levers.

For 50 years or more, Campagnolo has operated in the race/top-end sector, with 2 products which historically have been the pillars of the company - the Super Record and Nuovo Record components. In the 80’s they expanded their range of products and sub-divided them into 3 groups - the Record, Chorus and Athena groupsets, this latter one being the most economical. In the ’93 range the Veloce groupset was added. The Veloce has been positioned to compete with the 105 groupset of Shimano. For the 1994 range, the Stratos groupset has been added and this is defined as an OEM set, to be offered at an extremely attractive price. This groupset allows Campagnolo to equip bikes retailing at even lower price points and is another step in the expansion of their range, further widening the base of their product pyramid.

For many years, therefore, Campagnolo had a very narrow range of products - but is now offering a wider choice, at prices that are, frankly, not usually associated with their image. This is a clear challenge to Shimano, even if not across the whole range of price points and is in line with the company’s new tactics.

The strategy of Campagnolo, which the company regards as very successful, is that of a “step-by-step” approach. They believe they do not have the size and therefore the resources, both technological and financial, of
Shimano, to permit them to make great changes, launching brand-new groupsets from one season to the next. However, they believe that their "step-by-step" policy will provide significant growth and success in the market.

I made the comment that, all things being equal - design, functionality, price (although design would be a little difficult for the Japanese to equal) - the customer would choose Campagnolo. I asked Sig. Campagnolo if he agreed and, if so, why?

He readily concurred and added that in the Road segment, the only one his company really operates in, Campagnolo has a superior image to that of Shimano. He felt sure that this was due, primarily, to Campagnolo's superior quality, followed closely by the design, functionality and performance. He also regarded his company's association with the racing scene to be more established.

3.4 Sponsorship

Following-up on this I wondered how much the competition aspect contributed to the company's performance. The association of say, Indurain, the greatest rider of today's generation with Campagnolo products was of inestimable value, or not?

"It has a value - what has more value is the association of Campagnolo with the world of competition - independent of who the star is. Campagnolo is identified much more than our competitor in those segments
that we aim at. If we are talking about the lower segments, probably the dealer who sells this type of bike perhaps only knows us by name - but doesn't really know our products - or perhaps doesn't even know us!" (note: this is highly unlikely, unless it is a supermarket chain!)

Campagnolo's traditional involvement in the world of professional racing has never shown signs of diminishing, even if the strength of Shimano now means that the Italian company no longer rules the roost as it once did. As with other companies involved in the top-end of the market, Campagnolo sees sponsorship as a vital part of its whole operation, and not just as a means of marketing, (although there can be no denying that it is also that). Valentino Campagnolo has gone on record as saying:

“Sponsorship is the long arm of our R&D...we get technical feedback, we can test new solutions, ideas, materials and concepts”

3.5 Marketing

Campagnolo sells in 2 sectors - initial suppliers and the after-market, which accounts for 80% of their sales. They go through non-exclusive distributor networks in the different countries, and have always found these channels already set-up. What they have done, with certain markets, is to try and get closer to the market itself. In particular, with the USA, given its size and complexity, they have tried to really focus on the customer.

Campagnolo has had a subsidiary in the US for the last 15 years. Until 3 years ago it was in New Jersey, but they then decided to move it to Carlsbad

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18 See Table 1.2 on page 26 for a breakdown of the teams, and the componentry they used, in the 1993 Tour de France. It would appear that this view, of Campagnolo's higher profile on the racing scene, is at odds with the facts!

19 Cycle Press N° 75 January 1993. It is interesting to compare this view with that of the Marketing Director of Raleigh on p.94, section 4.5 of this thesis.
in California, to be even closer to the area most representative of the US cycling scene. Previously they had thought that New Jersey, as an entry port, was adequate, but then they realised that they had to be in closer contact with the real ‘hot-bed’ of cycling in the US, and with those who promote the evolution of the bicycle.

This is a little along the lines of Porter’s ‘Hollywood’ theory -- and it seems to find concurrence from both Shimano and Mavic, who are both represented in California! Campagnolo chose Carlsbad in California to be in what, for them, represents the heart of cycling in America - between San Diego and Los Angeles. This was their first step. Then, 2 years ago, they set up a subsidiary in France, near to Lyon -- right in the heart of the French bike industry, and on Mavic’s door-step! This ‘getting nearer to the market’ has also been tried in Germany with the setting-up, 18 months ago, of a subsidiary near Cologne. The policy, therefore is to be “behind the market” as much as possible.

These subsidiaries carry out marketing and sales promotion. This is an activity that the company intends to increase, realising that as a market develops in terms of turnover it as vital to the strategy of the company to have men on the spot. As their Advertising Manager says:

“In Vicenza we are developing people who can oversee marketing and after-market sales activity. We’re willing to provide a better service and a wider range of activities, better promotion and marketing -- not only to sell, but to increase sales. Service is the key.”

20 Luisa Rubin, Campagnolo’s Advertising Manager in Cycle Press Nº 75 January 1993
In 1993 the company embarked on a programme of acquiring extra capacity by setting up several local joint ventures with workshops in close proximity to the main factory. These workshops may have already been in existence in some cases, and may have previously done work for Campagnolo. In other cases they were set up by ex-employees, or ex-employees may have joined them, bringing with them some of the skills and knowledge they had acquired working for Campagnolo. Machinery was supplied by Campagnolo, as was training, where necessary. By and large each ‘cell’ carries out a specific activity, especially in the area of the assembly of components. For its part, Campagnolo guarantees work to these ‘cells’ and is responsible for the delivery and collection of work, the supervision of their activities, including quality, and the on-going training. The co-ordination is carried out by a mobile team that is almost permanently ‘in the field’.

The company is extremely happy with these arrangements, claiming that they now have not only increased capacity at little cost, but have also gained increased flexibility and an even higher level of output and quality than before. These two latter points are due, they say, to the fact that the cells have a vested interest in keeping the work coming their way and are not restricted to standard factory timetables, since they are private enterprises. Furthermore, they have a strong entrepreneurial instinct and desire to succeed. The cells number more than 10 and employ 100+ people.

3.6 Challenges and Responses

For Valentino Campagnolo the real challenge of the last decade has been, and still is, managing a company that owed everything to its founder, his father, who died in 1982.
"My father created, developed and managed this company until the day he died. My father was not only the creator but also the planner, the ideas man, the innovator, the strategist - both market and product. When my father left us\(^\text{21}\) he took with him the planning function of the company. He personified it. In other words there wasn’t within the company a creative capacity apart from his.”

This challenge, as mentioned, is extant. Another was the introduction of new technology. Campagnolo marketed a high quality product, whose quality was obtained through traditional methods. Numeric control of machinery became part of their way of doing things only in 1984. Prior to this the quality of the product was entrusted to the accumulated knowledge and know-how of the individual craftsmen who carried out the work - it was entrusted to their experience. Hence there was no real acquisition of knowledge by the company itself.

Without doubt, by the early 1980s the company had fallen way behind its competitor technologically, even though they continued to produce and sell high quality products. Thus Valentino Campagnolo has had to face several major challenges. On the one hand, the need to create, almost from zero, a planning and design office to cover, somehow, the role his father had so ably filled. On the other hand, the need to equip the company with production technologies in step with the times. Technologies that would guarantee quality and flexibility - to move the company away from the very rigid, traditional production process that had been in place for so long.

\(^{21}\) This verb has been deliberately translated literally. It is a very common Italian usage when referring to the death of a dear one, and poignantly evokes the continuing sense of loss.
Given that Campagnolo is not a major conglomerate it could not benefit from State assistance as does a Fiat, or an IRI\textsuperscript{22}. So what the company has done it has done alone. As Campagnolo puts it:

"With our own resources, we had to begin developing our capabilities in order to guarantee the evolution of our products, as well as, subsequently, exploiting new ideas. We modified our technologies. Here, money isn’t enough. First you need the people able to manage the evolution of the technology. Therefore, change is required in the organisational structure of the company through the hiring of new people. We initiated a first phase of change, cap in hand with the evolution of the technology. Bear in mind that between 1984 and 1990 we changed 85\% of the machinery in the factory. This took a financial effort of dramatic proportions. Right in the middle of these enormous changes the ‘tornado’ of the mountain bike arrived on the scene, which we didn’t know anything about it and, like virtually the rest of Europe, we then snubbed. This was the challenge: from a market situation in which the road bike accounted for 30\% of the market, we found ourselves, in the space of a few seasons, with the same market down to only 4\% of the total. We sweated blood."

I asked him to talk a little about the people he brought into the company. With his father being such a ‘master-of-all-trades’ they had never had to look for people before. How did he go about it?

"It wasn’t easy. I committed a few errors. I did some things well, others I didn’t. He who “does” can make mistakes - and in making them, he learns. He who doesn’t “do” never makes mistakes, but he never achieves anything."

\textsuperscript{22} IRI is the Italian state holding company, one of the largest in the world.
This whole sequence of challenges lasted about 10 years. Today Campagnolo has already begun to realise the fruits of those investments, which for a company of its size were enormous. It has to be remembered that while all this was going on they also built the present main factory and a second one, for rims. Campagnolo himself feels that the level of commitment shown was exceptional. He admits to being "tripped-up somewhat" by the advent of the mountain bike, but there has been a fundamental belief in the brand name and their work. "We have made mistakes along the way - in all senses, product, organisation and so on. The important thing is that the errors have less weight than the positive things we have done."

I was interested to hear whether this philosophy of his held also for his employees.

"I believe that it is essential to appreciate that he who 'does' may make mistakes. Obviously in times of flux and change you must accept a higher level of errors and risks than when things are stable and consolidated. In these latter conditions errors are more preventable, but must not be tolerated beyond a certain level. I think this is an approach (note: that of tolerating mistakes) that we have had in the past and which we have changed. The market is more competitive and thus our competitiveness is also a function of making fewer errors than our competitor. This, too, is an element in the evaluation of our performance. If we make more errors than our competitor, having fewer organisational, structural and financial resources we obviously expose our company to an almost exponential risk. If our management results in fewer errors than our competitor, obviously we end up being ahead."
Valentino Campagnolo is rightly proud of being part of a company that has succeeded in challenging a dominant competitor in areas new to his company but traditional for them - with the market welcoming and rewarding his company’s efforts. He expressed regret and dissatisfaction that certain strategies are constrained by the amount of time they take to implement, which is always longer than desired.

I pointed out to him that his “times” were getting shorter, so the company was obviously learning

“We are learning rapidly. We are losing a whole range of negative approaches that we had in the past. The arrogance, the traditional way of doing things - now we work more in teams. Now there’s not only a sensitivity but also a commitment to the optimisation of our resources, minimising waste - both production and financial. An example would be the slashing of inventory, which in the space of 2 years has been reduced by more than half, albeit in a phase of explosive growth in the segments in which we operate. Another example would be that, before, we had 620 employees, now we have 340, and our output has increased 4-fold - at least! All this in the space of 3 years!”

The company does not underestimate the value of the contribution that new managers have made to this evolution. Campagnolo himself admits they have been a driving force. Nevertheless, what the company is achieving today is not only thanks to the work done over the last 3 years, but is also due to the work that was done prior to the arrival of these new managers. Campagnolo had no intention of making comparisons, which wouldn’t in any case reflect the true importance of things. He believed that both things had combined to give the company great optimism looking to the future.
Just as I had with Mavic, I asked about the possibility of alliances developing in the industry. In recent times, Campagnolo had set up a deal as an OEM supplier for Giant. There was also the ‘arrangement’ that they had with Sachs 23, and I asked about developments in this area. What I heard in reply was a similar story to one I was to hear later from the Managing Director of Raleigh.

Giant is strategically important to Campagnolo, since they regard them as a leader in the industry and, therefore, it is a collaboration which can help Campagnolo’s growth. They offer the same products to Giant that they offer to others and equal collaboration, although there is perhaps a little closer dialogue with Giant than with others, in view of their greater needs. Giant is seen as a company that can help not only Campagnolo but the evolution of the whole industry, thanks to their competencies, professionalism and the objectives that their management has set for itself. I was left wondering why the same could not be said for Raleigh. Was an alliance with Giant, a major competitor to Europe’s bike industry as a whole, preferable or easier to set-up than one with Raleigh, Europe’s flagship producer? Perhaps I would find out when I visited them.

With regard to the Sachs-Campagnolo ‘mini-alliance’ it seems that this was an arrangement sought by Sachs. After due consideration, Campagnolo felt it appropriate to provide certain components of theirs which were important products for Sachs’ commercial success. Sachs, for their part, allowed Campagnolo access to certain of their products, especially their chain, which is now used in all Campagnolo groupsets.

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23 Sachs is part of the Mannesman AG group based in Dusseldorf, Germany. It has a long history of producing parts for bicycles and is a leading producer of ‘hub’ systems.
In this relationship of 'parts exchange' there is also a dialogue between the 2 companies, so they are somewhat closer to each other than before. But the alliance is limited to this exchange of products, to their mutual advantage for now. Campagnolo did not rule out any kind of ulterior step. However he did not sound as enthusiastic about the possibilities as the Commercial Director of Sachs, who has declared:

"I believe Sachs can become strong in the future ....a partner for industry....but we have to work closely together. We’re interested in talking with everyone. We talk with Campagnolo, Shimano and many others. We don’t want to waste time re-inventing the wheel." 24

Moving on, I asked Signor Campagnolo if the recent success of both his company and Mavic meant that Europe had found the answer to the threat from the Far East, and was now stronger. His observation was that the strength of the yen and the dollar, compared to European currencies, had favoured the development of the European industry as a whole, not just Campagnolo’s. This had not been the only reason however:

"... a company’s success is determined by what it offers the market, in terms of performance, innovation and service. It’s up to European industry to get on with the job and benefit from this present favourable moment, which will not last, and capitalize on this fact."

I asked him if the decision recently made against Shimano in the US courts, regarding the right of a bicycle retailer to ‘mix ‘n’ match’ componentry from various suppliers, might not be considered another ‘favourable moment’ -- an opportunity for Campagnolo to supply even individual parts or half-groupsets to the lower end of the market.

24 Cycle Press N° 75 January 1993
"We feel our 'step-by-step' policy is the strategy to follow - until such time as the company is able to offer the market products which provide revenue and do not have a negative effect on the brand name. However, low price is not necessarily an indicator of poor quality or performance. Our latest gear change mechanism, Stratos, of low price, changes gear much, much better than our one-time top product, the Super Record. - it is absolutely superior."

I pointed out that it was clear that Campagnolo can produce better and cheaper products than Shimano - witness the Ergopower and other products such as the Stratos groupset. Why didn’t it do so on a grander scale?

He repeated what he had said before, that their policy is one of expansion - even if they have to compete against a competitor who is bigger and has greater technological and financial resources. He had great belief that their step-by-step approach was the way to provide a challenge. Taking two steps at once meant risking not having, not the financial but the organisational, resources adequate to manage the growth. Therefore they preferred a more modest and stable growth, even if their recent growth had been anything but modest! He felt they would not be moved from this basic strategy: "Today we want to do this. It would be nice to do that as well, but, for today, we’ll concentrate on this. Tomorrow, when this is consolidated - good - what’s next?"

I wondered if he could see why I was a little confused. Seeing that Campagnolo could produce these very competitively-priced products, and given the recent, substantial widening of their product range it seemed to me that, with the Giant alliance, Campagnolo was about to offer a very direct challenge to Shimano at multiple price points. He re-asserted his position:
"We don’t want to challenge Shimano. We want to follow a certain road and grow this company."

This was similar to what I had heard from Mavic, although it is somewhat different since Mavic’s core business is not, and never will be, componentry. Confusion still reigned in my mind, however. I had heard Valentino Campagnolo talk, many times, of Shimano as his competitor, of how he judged his actions in relation to theirs, and so on. Now I was hearing, again, the other version that represented the company as a small fish in a big pool. The truth is that Campagnolo was once the big fish and had allowed a predator to all but swallow it. Whether the present strategy was one of complaisance or complacence is not for me to judge. My only worry would be that you cannot go at your ‘step-by-step’ speed if the predator is travelling faster. Campagnolo is not in a niche market, it is in Shimano’s market. It will have to learn to accelerate.
4. Raleigh

4.1 History

"Raleigh is cycling's most famous name"

(Cycle Press No. 82 August 1993)

The above quotation may well be true. For if Campagnolo is a name that dominates the cycling componentry business in terms of reputation and prestige, based on the unequalled quality of its products, then Raleigh must be its counterpart in finished bicycles, not least in terms of its history.

The company was established by Frank Bowden as long ago as 1887, which fact alone is an indication of the deep-rooted strengths that the name possesses. Through the acquisition of other famous brands such as component-makers Sturmey Archer (the inventors of the innovative three-speed hub) and classic English frame builders such as Rudge Whitworth and Humber, the company prospered and came to dominate the market through the 1950s, absorbing, along the way, other famous names such as Triumph, Carlton and BSA. The rise of consumerism in the late 1950s, bringing with it the increased use of motorised transport, led to increasingly difficult market conditions for the company, and it was acquired by Tube Investments, an industrial conglomerate, in 1960. This brought other illustrious companies under its banner. Names like Hercules, Phillips and Sun and, in 1967, Moulton (the inventor of the original small wheel bicycle) added to the prestige of the Raleigh brand.

This heralded an era in which the company, notwithstanding the wealth of expertise and enormous capacity it had developed, was unable to control its own destiny to any great extent. Many of the former British colonies became independent over the following two decades and this in
some cases led to certain important export markets being lost. This and the declining home and American markets, the relative strength of the pound sterling and Raleigh's management being hampered by its parent company brought the company close to the edge of failure.

One hundred years after its founding Raleigh's fortunes changed for the better, when in 1987, TI decided to sell the company to Derby International, an investment group with many interests.

Since then the company has been turned into a profitable one - standards and productivity have been improved and the image is once more that of a world leader in the industry. Derby has invested heavily in Raleigh and the results show: laser equipment for the accurate cutting of tube mitres, robot plasma and MIG welding equipment that turns out everyday frames as well as the hi-tech titanium models, and one of the most modern paint plants anywhere in the world. Anywhere. Including those in the great car plants in the USA!

Raleigh is one of the very few international bike companies. It has many licensing agreements around the world. These were created either with traditional clients who, when the colonies became independent and set up tariff barriers in order to help promote their own industries, arranged a licensing agreement to continue their long-standing ties with Raleigh. In other cases it is quite simply because Raleigh did not want to invest in all geographic regions. Whatever the reason it is true to say that the company regards these arrangements as a strength. Operating or having even a licensing presence in many countries has given it a wealth of experience -

25 The reaction to this was to set-up licensing agreements in many cases, which are mentioned below on this page.
and this experience can be, and is, pooled, according to Raleigh’s Managing Director.

4.2 Core business

Raleigh’s core business is the manufacture and assembly of complete bicycles. Their main expertise lies in the building of a wide range of frames using various forms of tubing and jointing processes.

A frame undergoes a number of operations prior to becoming the finished product. The Tube shop is where the frame begins its life. Here, tubes are cut with the latest laser technology, which is rapid and highly-accurate, and which reduces subsequent swarf removal. The precision of the cut also provides the best ‘mitre’ (a ‘mitre’ is an angled cut of the material, common also in woodworking) which is important when joining two edges, as when the tube ends are aligned with each other at the moment of jointing.

The tubes are then passed to the builders, and will either be welded or brazed.

Welded frames are constructed in sub-assemblies. Certain tubes are joined prior to them all being mounted on one of two jigs, which form part of a robot welding unit. As one frame is being welded by the robot, the operator sees to the unloading of an already-welded frame and the mounting of the next on the jig. Forks (which hold the front wheel) are created in a similar fashion.

After welding the frame is ‘trimmed’, with the reaming-out of the seat tube and the head tube, which houses the steering column.

Brazed frames are manufactured in a different manner. The ‘lug’ joining the seat tube is spot-welded into place. A sub-assembly of the rear triangle of the frame is tack-welded to the bottom bracket shell (where the
axle for the pedals passes through the frame). The remaining tubes with their respective lugs are brought together on a jig and are pressed into the classic frame profile. All the joints are drilled at the lugs and pegged in order to hold them in position for brazing. Flux is liberally applied to the joints to keep them clean during the brazing process, aiding at the same time, the capillary action of the brazing medium through the joints. After brazing, the frames are passed through baths of acidic cleaning solutions which remove excess flux, brass and oxides. The factory’s effluent plant treats all the solutions used and extracts any heavy metals and other toxic substances harmful to the environment.

All frames, in batches of either 500 or 570, depending on the season, then go for painting. This is an extensive process, requiring a thorough preparation of the surfaces to be painted. The frames are degreased, dipped into demineralised water to remove any impurities, and then are ‘primed’ electrolytically. Excess paint is removed and the frame is then stoved. The final paint finish is applied either wet, or powder-coated. The whole process is completely automatic, and Raleigh’s ultra-modern painting plant is one of the most advanced in the world.

Final assembly is performed by eight ‘cells’ which turn out at least one batch of 500 bicycles per day.

With the market demanding MTB models or variants thereof, the company has found it more profitable and efficient to move towards the welding of frames in their production process. Traditionally, bicycle frames were all ‘lugged’ and brazed. The advances in welding technology and materials have, however, promoted the welded joint as an extremely viable
alternative and, in fact, Raleigh is running down the whole brazing operation in favour of welding.

Raleigh over recent years has been at the forefront in the innovative use of different types of frame material and has pioneered the use of bonding techniques, particularly where the materials to be used were not able to be otherwise welded or brazed together. These innovations led to the range of ‘Dyna-Tech’ frames and the special bonding process allows the mixing of Cro-Moly steel tubes with either Metal Matrix or titanium tubes.

Much of the credit for Raleigh’s innovations must go to its Special Products division which is constantly seeking ways to gain new competitive advantage from the application of up-to-date technologies and designs. It is a small unit with a staff of no more than 30, and every craftsman is able and encouraged to get involved in as wide a range of activities as possible. This is the unit that also builds the custom-made frames for the professionals and is probably the key to the company’s on-going and future success.

Whether it will be or not is the question.
4.3 Politics

The Managing Director of Raleigh is also Chairman of COLIBI, the European Association of Bicycle Manufacturers. In recent years the Association has successfully brought several “anti-dumping” suits against a number of Far Eastern suppliers, in particular China and the ASEAN countries. In China’s case, the tariff imposed was a massive 34%, and restrictions on other suppliers from the region include their loss of GSP status and a requirement that the bicycles supplied must be at least 40% home-produced. The process that sets the ball rolling in these cases is a mixture of discreet and not-so-discreet lobbying of the European Commission in Brussels, as well as at local and central government level in the UK. In essence, establishing a dialogue with the Commission, together with the ‘personal approach’ is vital. Little recourse is had to lawyers (even though COLIBI’s Chairman pointed out that the Chinese had engaged ‘legions of lawyers from the top legal company in Brussels’ when contesting the “anti-dumping” suit).

Hence it is a combination of persuasion and pressure on politicians -- "it’s the squeaky wheel that gets the oil!" claims Raleigh’s Managing Director who confesses to being “a bit of a thorn in their side”. He goes on to give an example of the kind of question he poses to politicians, illustrating how he applies such pressure:

"How do you expect to increase employment and GDP in the UK ....... the consumer isn't the only important person, if we destroy our industries which we have been busy doing, we won't have any consumers, because they won't have any bloody money in their pockets".
However there is a certain ambiguity in this political lobbying if one considers that Raleigh is a major importer of componentry from the Japanese company Shimano, much of which is produced in low-cost ASEAN countries, and substantially more of which will soon be produced in the even lower-cost Chinese mainland. When asked if there was not some contradiction in their ‘bashing’ of the Far East on the one hand with regard to bicycles and the almost unique sourcing of parts from the same region on the other, the reply I received was that “we do not have a choice ... because we cannot pay our people less than they pay them in the Far East.....(and)..we cannot dump garbage down the drain like they do”.

The advantage of sourcing their componentry in Europe would be in the consequent increase in flexibility and responsiveness to the market and lowering of inventories. Given the above comments, however, it is clear that the company feels that it has to create advantage in areas such as technology, speed to market, innovative ability and capacity for change. This latter aspect is seen as a real source of competitiveness by Raleigh’s MD:

“Change keeps you ahead - changing the paint finish, the decals - it's a new product, it's not just Shimano strapped on something else - you give identity. We do that - we keep a step ahead all the time - we lay down product development plans for 5 years. This is part of change. We have to plan ahead. Things like lasers will give us tremendous flexibility - we will no longer have to change tooling all the time to match our, or the market's, product requirements. Hence, lasers and robotics, great flexibility”.
4.4 Marketing.

Over the last five years Raleigh has made an important switch from producing brazed race bikes to welded mountain bikes. In product management terms this has brought about the need to understand the difference between the two types. In marketing terms, keeping up with what the mountain biker wants - and then gaining credibility for Raleigh as a foremost supplier of the product has also been a great challenge. Initially, this latter point proved to be especially difficult, since the MTB came from America and the attitude was that the only good MTB was one that came from the US and had an American name - even if it had been built in the Far East! So the Raleigh’s reputation as a dependable British bike never quite seemed up-market, or fashionable enough.

Another initial challenge with MTB’s was that Raleigh had a customer profile for race bikes and one for city bikes - but not for MTBs. Eventually, the lead-users were identified as teenagers, style-setters, yuppies, “people who lived in renovated warehouses in London's docklands”. That has changed now - the profile is "Everybody".

With the MTB accounting for fifty percent of the market the credibility problem is now virtually non-existent, since it is being bought by everybody, for every reason. It is no longer just for elite types who wanted (or purported) to use it for racing or strenuous ‘man-and machine-versus-Nature’ treks. It is still that, but now it is also bought for keeping fit, riding to work, and outings with the family. Initially, Raleigh’s problem arose trying to sell to racers, mountain-bikers and ‘poseurs’, who, as mentioned above, were fixated on the US scene. This is no longer the case - the MTB has
become the ‘Volkswagen’ of the bicycle world. It is the bike for the people - it is seen as "the modern bike".

At the start of the MTB craze the then Marketing Director said no one would ride an MTB in the United Kingdom - because there were no mountains! Yet MTB is to the bike as, say, Range Rover is to the car - it's stylish in its own way and Raleigh has profited from its appeal and universality.

Identifying the customer has been a preoccupation of Raleigh's, even more so given the growth in competitiveness of foreign-based competition. However it seems at times that the approach has been one of extrapolation of data or simple demographic trends in order to find a segment to target. In answer to a question regarding the basis on which they had chosen to target a particular segment with a particular model, the immediate response from the Marketing Director was: “on the basis they weren’t buying anything at the moment”! This was later amplified as follows: “We knew from research that in the "desert years" - age 16-30 - people didn't buy bikes - neither did the over-30's, apart from MTB's. So we designed a ‘Pioneer’ for the over 35’s and we were successful - it was a traditional/MTB mix. Then we got greedy - we knew we had the teenagers up until the time they started "courting" and then we lost them - so we thought we could come up with a hybrid that would suit them (a ‘flashier’ Pioneer) and we tried it, but it didn’t work. We have sold enough to cover our costs and we'll get out, next year.”

A major feature of the company’s marketing strategy has been to attach a card to all the bikes they sell. The cards that are returned are then analysed by an independent company called National Data Ltd. The return of approximately 15% of all cards issued gives Raleigh all the information they need to know on why people buy Raleigh. The only thing they do not know
is why people do not buy Raleigh. They know that of those who do, 56% do so because it's a Raleigh, it's the name, followed by, in equal measure, factors such as "It's British made, the design, the style, etc."

In the not-too-distant future Raleigh will be faced once more with the kind of marketing dilemma that confronted it at the beginning of the MTB craze. Just as has already happened in the US, the market for MTBs in the UK - in the teenage segment - has plateaued. In fact, this key market actually declined in 1993. In the UK, however, Raleigh feels that it still has untapped potential in other segments, especially the adult one, where they still do not sell many bikes. Traditionally, in contrast with the US, 80% of all their sales had been to people under 16 - until 5 years ago. Now it is down to 65% - and there has been a concomitant rise (to 35%) in the number of adults buying bikes. This has been one of the beneficial side-effects of the MTB scene. This return of adults to biking for fitness, ecological and family reasons is actually now supporting the MTB market - and it is these people who are also driving the sales of hybrids. Raleigh feels it has more potential for sales to adults than any other country - because historically they have never sold to them!

As far as distribution is concerned, Raleigh's wholesale division is responsible for supplying the 1,000 dealers and 600 national outlets. There are the 5-Star dealerships which provide a Raleigh-approved and (where necessary) Raleigh-trained level of service. Formerly the company had supplied parts and accessories through wholesalers, but eighteen months ago they decided to supply directly to the dealers. This has provided higher profits and a better level of service.

Although the company has a 5 year plan - which includes the possible production of electric bikes - there is no discernible trend in the market at the moment, in terms of new product development. In the meantime, the
application of hydraulic suspension has given a "fillip" to MTB sales - and Raleigh were the first to offer it at really low price levels.

4.5 Sponsorship

With regard to sponsorship Raleigh considers it vital to have a connection with a winning team. To this end it sponsors its own UK-based professional team, which competes almost exclusively in the MTB race circuit, where it has enjoyed substantial success. Raleigh is seen as solid, dependable - but 'not very sexy', according to the Marketing Director, so this connection with a winning team gives the company credibility at the top end of the market - which also makes selling at the bottom end easier. Strange as it may seem however, the Marketing Director referred to the sponsorship of professional continental-based racing teams as "a waste of time and money"\textsuperscript{26}. This is surprising because Raleigh has a long history, albeit discontinuous, of sponsoring such teams and is perhaps short-sighted, since it now no longer has that direct feedback from the real test-bed of new product development. Furthermore, the Managing Director of Raleigh has gone on record as saying that he would very much like to see "...the focus of innovation and implementation come back to Europe. This was the birthplace of the bicycle"\textsuperscript{27}. I have to say that there is a certain ambiguity between this statement and the unwillingness to sponsor the continental professional scene, which is where the innovation will come from.

Raleigh's UK image may well be served by the home-based pro team's performances, but the lack of a presence in the European scene will do

\textsuperscript{26} This is because, unlike the motivation of Mavic, Campagnolo or Shimano, Raleigh perhaps sees sponsorship as publicity, not as a means of acquiring new inputs that will lead to subsequent innovations. Cf. footnote 19, p.73

\textsuperscript{27} Cycle Press N\^o 82, p.8, August 1993
nothing to promote their image across Europe or internationally. This apparent lack of appreciation of the value of international sponsorship was confirmed when a comment was made regarding the possibilities in the American market where the ‘return of the racing bike’ is heralded by many, and where, with the latest world road race champion being an American, Lance Armstrong, marketing possibilities are likely to increase. This time the reaction was “why do I want to go and sell bikes to the Americans?

4.6 Suppliers

A number of Raleigh’s suppliers are well-established UK and Far East-based. At times it is these suppliers who alert Raleigh to the latest technological innovations. The validation of the suppliers is done via stringent testing of their products and their ability to meet delivery deadlines. If a contract to be awarded is a major one, then a visit is always made to the suppliers’ facility and statistical analysis of their quality is performed. Raleigh feels it has a reasonable amount of power in its dealings with suppliers, but the key to the success of the collaboration is the establishment of good communications. Hence relationships are close but not ‘cosy’. It is understood that both parties have an obligation to meet the other’s requirements. With regard to the bringing-on of new suppliers, this is done within the limits of established arrangements but is never done if the product, for which supplies are required, is a new one for Raleigh.

4.7 Challenges and Responses

The main challenges that the management of the company have had to face are not only those of dealing with the onslaught low-cost producers
from the Far East, but also living up to the expectations that the Derby company has for its investment in them. Financial backing has not been a problem, but the answer to the company's ills were not just to be found in injections of cash. What was required was a break with the past and a new outlook and approach from management to move the company forward.

Raleigh decided that the concept of Continuous Improvement, in some form, was the approach that served their needs. They called it Success Through Quality - and the object was "to get everyone in the place with the right attitude of mind towards making the company a success."

The company sees quality not so much as a system but more a way of life. It is not just looking at the quality of the product or the process, but using the people, developing their abilities to improve continuously themselves and the processes they are employed in.

Raleigh's Success Through Quality programme started in 1990 - and was considered to be a vital step in the company's future. The Board at the time spent a lot of time discussing the meaning and application of the programme. Although they describe it as, fundamentally, a "common sense" approach, it also proved to be quite radical, in terms of the management structure that it required and getting the commitment of the people to perform their self-analysis.

In terms of the evaluation of the programme and its contribution to the company, management naturally views its impact on the 'bottom line' as a clear indicator of its usefulness. However, when pressed, the Quality Manager also talked of other indicators that are used, such as product quality, customer satisfaction, market share measures, absenteeism. None of these, however, are sufficient to fully satisfy oneself that the contribution has been
significant. Underlying factors such as strength or weakness of competitors’ currencies, superior technology (even if only a temporary advantage), political manoeuvres designed to close down markets to outsiders, and even a coincidental mix of such factors, could be the real reason why the bottom line improves. In fact the parting shot of the Quality Manager was “you have to have a belief that this is the way forward”. Hardly a well-directed tool of management if that is what is fundamentally required. Although Raleigh’s management has a weekly meeting to discuss Continuous Improvement, and although the Board, with the STQ manager as Facilitator, meets to discuss strategy and especially CI, the basic remit is to discover ways to “make the company more successful”, and it does not seem that there is a determined attempt to pin down if, and where, CI really makes a contribution.

This emphasis on CI may seem inappropriate in a context where the bulk of the work-force is really casual manual labour - not craftsmen who might inherently take pride in their work and company. When asked how Raleigh goes about impressing on a labourer the need for commitment to quality and Continuous Improvement, the Managing Director replied “it’s bloody hard!”-- going on to add that the philosophy of CI was much more a self-management programme, where people look after their work place and do not let production drop.

There is a certain irony in all this is. When touring the factory, the gentleman who showed me round, an employee of about 40 years standing, pointed out how in the in the middle of the Fabrication area (mainly welding) they had set up their own rest-room, reasonably furnished and with a large fish tank, which was their pride and joy. In the assembly area,
however, they had absenteeism as high as 15% and none of the same sense of belonging to the company or even ‘pulling together’, even though they were organised in small work teams.

It appeared to me that at least one of the company’s measures for evaluating the success of STQ, absenteeism, was already flashing a big red light over the Assembly area - and indeed the programme of STQ.

Around all this attention to CI the company, naturally, wraps its overall strategy. When elucidating this to me, however, the only reference to what I might consider a bona-fide unification of management and worker in pursuit of Success Through Quality was the reference made to “cascading down into the people”(sic) the intention to reduce lead times, batch sizes and the ‘kanban’ just-in-time system adopted in the Tube shop where people were organised in cells. This had proved to be very successful, as lead times were down from 3 days to less than half a day in the welded frame area where two ‘cells’ are in operation.

This way of looking at things has also led to a better utilisation of space -- as I saw. Raleigh has now integrated the Tube Shop to the Frame Shop and Paint Shop, providing a much better layout and finally, after all the years of having dispersed production units, bringing together in a real flow system their whole operation.

Curious to know how seasoned managers such as the MD and his colleagues could, after years of running a company that had for a long time been in the doldrums, suddenly (almost) turn it around, and not being really convinced of the CI recipe, I asked about the influence of their holding company, Derby International Corporation. It is worthwhile quoting verbatim the reply that Raleigh’s MD gave me:
“Derby is a very positive organization. It demands profitability and professionalism - it insists on results but gives you the freedom to get those results. Before, T. I. was a very large, amorphous bureaucratic organization, which stifled a lot of things. It didn't encourage CI, and it accepted poor performance without doing much about it. If you want to invest, with Derby, as long as you put forward a good case, i.e., a good pay-back period or a good reason for making the investment, the money is forthcoming. That's not just Derby - so many of the people were here before Derby arrived - the abilities were there, it was a question of letting them flourish.”

The STQ Manager added his view:

“There was a very autocratic management structure before Derby. We were over-staffed, inventory was very high, lead time was 40 days - then we needed authoritarian, management-driven lines of improvement. Howard (Raleigh's MD) is now more a team player, he lets go of the reins more than he did 3 years ago. People now are enabled to make decisions. And now they look to go beyond the "standard" - they ask "what can we do to improve?"

So there is a real sense of the contribution that the 'new broom' of Derby has made. Whether this is a direct influence or not is difficult to gauge, but there is no doubt that Raleigh has been far more successful, under Derby's watchful eye.

One of the changes resulting from Derby's takeover was that formerly Raleigh Nottingham - which used to be the "mother" company - had all its other companies reporting to it, whereas under Derby, they all, including Raleigh, report to Derby. The companies within the group are run as SBUs or autonomous Companies in their own market. The concept being that if you are operating in a market you should, preferably, be manufacturing in that market and you should be operating a company within that market.
reporting to the centre. This is, according to Raleigh, better, because you
don't have a bureaucratic structure, since each company is relatively
autonomous. When they all reported to Raleigh Nottingham - which itself
was "highly political, bureaucratic and inefficient", this inefficiency was
reflected in the performance of the group as a whole.

So there has been a real turn-around in the fortunes of Raleigh. The
company has an energetic Managing Director who is determined to keep up
the momentum and who, quite rightly sees that being possible only through
the development of technology and continuous innovation. Yet I am left
with certain misgivings about the present strategy. These include the
question of sponsorship, which has been discussed earlier. When I add this
concern to the absentee rate in the assembly shop, and when I think about
certain aspects of the marketing, I feel that Raleigh is like a novice cyclist
who has finally managed to maintain equilibrium, but is still likely to 'fall
off' at any time.

My view is that the company should actively seek 'alliances' especially
in Europe, precisely for the reasons that their MD espoused in his pursuing
of the Euro-lobby -- "if we destroy our industries which we have been busy
doing, we won't have any consumers, because they won't have any bloody
money in their pockets". Then he was talking about jobs in the UK -- but
surely given the present and future socio-economic development of the
European Union, his message is relevant to Europe as a whole? And how is
he going to see "...the focus of innovation and implementation come back to
Europe" if investment falls and unemployment rises in the industry?

28 Previously quoted on p.89
29 Previously quoted on p.94
There is also the consideration of the Special Products Division. The division has developed, over the years, extensive capabilities in product and process improvement. Yet I am convinced that the man in the street, and indeed some racing cyclists, do not know of its existence, nor do they see tangible evidence of its output on the roads. There are indeed frames with "Dyna-Tech" decals -- but what does that tell you? In the catalogues for 1994 which the company kindly supplied, there is one 5-word reference to the existence of the division -- and no product shown as coming from it. In the general catalogue, 'race' frames are inserted between mountain bikes and kiddies bikes -- and are not really race frames at all! In the Dyna-Tech catalogue, only advanced MTBs are shown -- but again with no reference to their pedigree. The division deserves a far higher profile, and if marketed correctly would, perhaps, wipe out overnight Raleigh's lack of a 'sexy' image, as the Marketing Director had put it to me.

If I were to take as emblematic one example that illustrates my misgivings about the future of the company it would be the following: the newcomer, Giant, pound for pound, dollar for dollar, in my opinion, produces a bicycle that looks more the part. It looks more worthy, so to speak, to sport professional-level components. Raleigh has made a move to close that gap with its launching of two top-of-the range race frames in titanium, equipped with Campagnolo parts. These are undoubtedly the best road frames the company has produced for the niche market they are aimed at -- but the positioning and marketing of them will have to be first-class.

I am not sure that Raleigh can do this, for I have never associated the company and its otherwise excellent products with frames of such quality for public, as opposed to professional, use. As an ex-owner of two Raleigh 'race' frames, I always felt that their technical specification was inferior to that of
other manufacturers'. They did not 'exude' technology, and were certainly not as eye-catching. This impression has been fed by a lack of product communication, which other manufacturers achieve through sponsorship that gets noticed and marketing. Because of this, I feel that there has been a missed opportunity with the output of the Special Products Division. Their top frames should be marketed separately, with a different name, even if it is only 'Raleigh Racing', and they should be as well-spec'd as anybody else's top frames. Show the market that you are a technology leader, get 'sexy', make the sort of products that clients drool over at bike shows -- because they do over others, but never over a Raleigh!

Raleigh will have to bridge this communication gap. If they do not, I cannot see the reason for maintaining a Special Products Division. It follows that the innovations that the company needs for it to grow will always be someone else's -- and closing gaps in a bike race, as any competitor will tell you, is one of the hardest things to do.
<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Technology</th>
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<tbody>
<tr>
<td>1887</td>
<td>Frank Bowden buys share in bicycle workshop in Nottingham (capacity 3 bicycles a week)</td>
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<tr>
<td>1896</td>
<td>Raleigh builds largest cycle factory in the world (7 1/2 acres on Faraday Road)</td>
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<td>1900 (c)</td>
<td></td>
<td>Introduced world’s first “all-steel” bicycle</td>
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<td>1902</td>
<td>Raleigh approached by Henry Sturmey &amp; James Archer. Bowden set up new department to manufacture Sturmey-Archer gears</td>
<td>First practical 3-speed gear hub.</td>
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<td>1906</td>
<td>Acquired Robin Hood Company</td>
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<tr>
<td>1914</td>
<td>Producing 50,000 cycles per year.</td>
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<tr>
<td>1914-18</td>
<td>Turned 50% of capacity over to munitions</td>
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<tr>
<td>1917</td>
<td>Acquired Nottingham Factoring</td>
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<tr>
<td>1920</td>
<td>Acquired Nottingham Pressworks</td>
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<tr>
<td>1921</td>
<td>Death of Sir Frank, succeeded by son, Sir Harold Bowden</td>
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<tr>
<td>1932</td>
<td>Acquired Humber</td>
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<tr>
<td>1935</td>
<td></td>
<td>Dyno Lighting Unit (generated its own electricity to power lights)</td>
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<tr>
<td>1939-45</td>
<td>Raleigh becomes England's largest manufacturer of artillery fuses &amp; 20mm cartridge cases</td>
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<tr>
<td>Year</td>
<td>Event</td>
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<tr>
<td>1943</td>
<td>Acquired Rudge Whitworth</td>
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<tr>
<td>1952</td>
<td>10-acre expansion of factory site</td>
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<tr>
<td>1954</td>
<td>Acquired Triumph Cycle company</td>
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<tr>
<td>1955</td>
<td>Specialised tube factory built</td>
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<tr>
<td>1957</td>
<td>Acquired BSA Cycles Ltd. Opened third factory to produce S-A hubs; exporting 70% of production to 140 overseas markets</td>
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<tr>
<td>1960</td>
<td>Acquired Carlton Cycles Ltd. Raleigh Industries merged with TI Group (including Phillips, Hercules, Norman, Sun brands: made Raleigh world's largest producers of &quot;personal two-wheeled transport&quot;)</td>
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<td>1965</td>
<td></td>
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<tr>
<td>1967</td>
<td>Moulton Bicycles merged with Raleigh</td>
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<tr>
<td>1974</td>
<td>European pro team sponsored by TI and Raleigh</td>
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<tr>
<td>1985</td>
<td>Raleigh built its first mountain bike</td>
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<tr>
<td>1986</td>
<td>Special Products division moved to main Nottingham site</td>
<td></td>
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<tr>
<td>1987</td>
<td>Raleigh acquired by Derby International</td>
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<tr>
<td>1989</td>
<td>Dyna-Tech: Bonded frame technology using steel, titanium and metal matrix composites</td>
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5. Conclusion

This thesis has described the evolution of the European bicycle industry over the last 10-15 years as experienced by three of the most significant companies in the whole industry. Two major competitors from the Far East, Shimano and Giant, have been presented as models of the threat that the European producers have had to face. The challenge itself has been around factors such as technology, cost and quality. All three European companies have undergone major change along these dimensions to such good effect that their present position seems far more secure than it did in the late 1980s.

It would be dangerous for the European industry, however, to believe that the challenge has been overcome. There is continued investment in Asia, with that region's major players determined to maximise the benefits from operating in low-wage areas such as mainland China. The ASEAN countries, in particular, are poised to become formidable competitors, notwithstanding the recent set-backs arising from the imposition of "anti-dumping" tariffs by the EC.

The protectionist stance adopted by the EC has proved to be timely for companies such as Raleigh and Campagnolo (in the case of Campagnolo one wonders if the alliance with Giant is also a device that Giant is using to avert any possible anti-dumping tariffs being levied on their products!). However, this is a state of affairs that cannot last. An additional, temporary advantage for these two companies is the relative weakening of the pound and the lira, which has given them a price competitiveness that even the ASEAN countries find hard to match, as Cycle Press pointed out recently:
“In our talks with producers in the region, all lamented that they were unable to match prices quoted by Italian producers at the European trade shows.”

Thus Europe is riding along, cushioned for now, on a slowly deflating advantage. When the divisions in the industry (between the component makers who cry out for a more united approach, and the bike makers who go their merry way sourcing parts and frames in the Far East) are put into the equation, it would seem that there is cause for concern. Europe has to recognise the need for a collective response to the threat.

A recent article by William Lazonick pointed out the importance of cooperation in meeting the challenges of global competition. In a critique of Michael Porter, whose immensely influential book *The Competitive Advantage of Nations* (1990) stressed the importance of domestic rivalry as a source of competitive advantage, Lazonick offers the view that Porter’s own argument really demonstrates the need for domestic cooperation:

“The balance between domestic rivalry and domestic cooperation that yields global competitive advantage will change when a domestic industry faces a new competitive challenge from abroad. ...It seems that the appearance of formidable new competitors creates the need for the domestic industry to lessen domestic rivalry and build domestic cooperation in order to respond effectively.” (p. 8)

The European bicycle industry’s long-term survival may well depend on its acceptance of alliances throughout the industry. Given the increasing investment in infrastructure in Europe, resulting from policies designed to promote the use of the bicycle as the acceptable, environmentally-friendly

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30 Cycle Press N° 87 January 1994, p. 9
alternative to the motor car, now is the time for a political lobbying of a different kind. This lobbying should be aimed at furthering the ‘green’ policies and promoting an intra-European web of suppliers and manufacturers that would sustain the industry as a whole and, in a commercial rather than political sense, guard it against overseas competition. The aim would be to establish a European ‘keiretsu’ which would manufacture a “European bicycle made of European parts” to give “not only a guarantee of quality, but ... also offer a sort of emotional added-value for the customer, reflected by the use of the newest technologies and materials.”

It makes no sense for Europe to allow its bicycle industry to decline in the face of foreign competition. The loss of jobs that would result is too high a price to pay economically, socially and politically. A united front, presented by a consortium of Europe’s key players, would have a level of capacity, technological know-how and innovative skills that would make it a threat to any other region in the world. The family-owned businesses of Europe will be reluctant to collaborate with their erstwhile competitors, but alliances may be the only long-term solution to maintaining any control of their companies. The present favourable circumstances will not last and the threat from abroad is still strong. The time for a serious consideration of this strategy is now. As perhaps Harry Hall might say, the message to the European industry is: “Get on your bike!”

32 Mr. Jules Pekelharing, President of COLIPED, the Association of European Bicycle Component Makers, at the Bike Trends conference in Milan, 26th March 1993
Shimano’s rise to becoming the world’s leading manufacturer of bicycle componentry for mountain, road and professional racing bikes is due, in large part, to the adoption of a policy of technological innovation that was without equal over the period 1978-90. The story of Shimano’s success is the story of the Dura-Ace groupset and the many other technologically advanced components that were subsequently developed from it.

Shimano initiated this era of technological and commercial supremacy by its sponsorship, in the early 1970s, of the Flandria professional racing team in Europe. This gave the company direct contact with the most influential and demanding user body in the bicycling world - the continental professionals, who, almost to a man, preferred to ride the componentry manufactured by the then undisputed market leader, the Italian company Campagnolo.

Nakamura, Shimano’s Chief Engineer, looking back on this period, commented that Shimano was supplying parts which, while valued highly by bikemakers, were not a complete ‘system’ of components. From America came the request for parts that complemented the rider and “…Dura-Ace was our response”. The name was apt: the material was to be Duralumin, with connotations of durability; Ace signifying “number one”.

Campagnolo had invented several major items of componentry over the years and their products were vastly superior to those of their competitors in terms of finish, functionality and aesthetics. Since they were

33 All diagrams and associated text are © Shimano Inc.
recognised as the Rolls-Royce of the cycle world, and their prices reflected this, taking them on in the professional components market required from Shimano the establishment of a competitive advantage, not merely on price, that could be sustained even if Campagnolo were to attempt a reaction. This was vital since Campagnolo's standing was so high that, all things being equal, the elite end-user would probably still have chosen their products. Through their exposure to the demands of the professional bike riders, Shimano learned to understand the requirements of the pro rider and marry to them the innovations in materials and mechanical engineering necessary to meet such needs.

In 1973 the Dura-Ace groupset underwent its first real test in the Paris-Nice stage race. Problems abounded and the rear mechanism had to be changed.

The period 1972-1979, then, saw the first fruits of the continental experience. It has to be said, however, that whilst a discernible improvement in component performance was obtained, aesthetically the Campagnolo products were still far and away superior, whilst at the very top of their range, the Super Record groupset remained without equal on every count. Indeed, it was often the case that un-sold Shimano stock (and that of other manufacturers) finished up in annual stock-clearing sales, a fate which was unheard-of for Campagnolo parts.

By 1979 Shimano's EX groupset, the prototype for the later AX, represented the accumulation of the know-how which had been acquired, and received praise from mechanics for its innovations. These included:
• an Allen-key release system for the chainwheels (subsequently dropped by Shimano, but, curiously enough, adopted by Campagnolo fairly recently!).
• a hatch-plate for the easy removal of the rear mechanism without splitting the chain.
• a cassette ‘free-hub’, which is now a universal offering from all the major manufacturers.

However, by the end of 1980 Shimano's Dura-Ace AX groupset was under a cloud due to the realisation that the much-vaunted Dynadrive pedal system had proved to be somewhat unreliable and had to be discontinued.

1984 saw the arrival of the Dura-Ace 7400 groupset, a real revolution in the components world. This was the SIS system - Shimano Index System, and it was bristling with new features.

The Shimano Index System

Materials

A new plastic was employed, Delrin, which brought lightness and no loss of strength to the rear derailleur, the front derailleur and the gear levers. Ceramic sleeves, requiring no lubrication, served as inner bushing for the jockey wheels of the rear mechanism. Teflon-type inner sheaths for the brakes and rear mech gear cables were introduced.

The system

The dominant feature of the SIS was in the gear levers themselves. These were “indexed”, meaning that for each of the fixed “click” positions of the right hand gear lever, the chain moved an appropriate distance which corresponded to the space between one sprocket and another at the rear. This ensured a rapid and precise gear change even under conditions of extreme chain load, as when climbing. The levers could also be returned to the normal “friction” mode if non-compatible sprockets had to be used, for
example when a racer receives a replacement rear wheel (which may not be compatible with SIS) following a puncture.

**The indexed shifting system that continues to define the state of the art.**

**Just what is the Shimano Index System?**
The Shimano Index System takes the guesswork out of derailleur shifting by using a shift lever that guides you to the next gear with a built-in indent action. Once the shift lever is moved by the rider, it automatically falls into the next indexed position to complete the shift. There is no need to "adjust" or "trim" the derailleur. SIS does it all for you.

**How does SIS work?**
SIS utilizes a ratchet action indexing unit installed inside the lever body. One indent movement of the shift lever moves the cable a specified amount and operates the derailleur to shift the chain to the next sprocket. While simple in concept, the mechanical design of SIS is more complex.

For example, the cable must travel a different amount for each shift due to the changing relationship between lever angle ($a_1 - a_7$), guide pulley position ($b_1 - b_7$), and sprocket position ($L_1 - L_8$).

Cable travel is not constant due to the pivotal action of the dual-pivot parallelogram derailleur which converts a diminishing arc into constant linear intervals. Further complicating the matter are different sprocket sizes and the need to keep the guide pulley as close as possible to each sprocket as it traverses the cluster. The heart of SIS is the indexing unit in the shift lever which must compensate for the changing geometry of the rear derailleur at each shift point.

**What are the benefits to the rider?**
With SIS, shifting performance no longer depends on the skill of the rider to manipulating the shift lever. SIS makes derailleur shifting just like using pushbuttons to select a pre-programmed station on the radio. Compare this to conventional shifting systems which are like tuning that same radio using a rotating tuning knob.

SIS is a significant advantage for competitive cyclists because it frees you to shift without diverting attention from the race and without slowing you down.

While SIS is a great performance aid for racing cyclists, it also helps all cyclists. Freed from the inconvenience of searching for gears and adjusting the derailleur, casual and sport cyclists alike find that SIS makes cycling a lot safer and more enjoyable.
A real innovation in the rear mechanism (derailleur) was the introduction of the "Centeron" pulley. This was the upper of the two small plastic-composite wheels ("jockey wheels" as they are known) around which the chain wraps as it runs through the derailleur body. These wheels, or guide pulleys, maintain the chain's tension and alignment, positioning it perpendicular to the sprocket cluster immediately above.

The Centeron pulley consists of an indented alloy outer wheel mounted on a composite inner 'hub'. This 'hub' rotated on an inner ceramic sleeve, with a degree of side-to-side play, which provided a form of automatic self-centering of the pulley, and hence alignment of the chain with the sprocket on which it was riding:

Not only did this arrangement provide for a quieter transmission, it was also fundamental to the adjusting bolt's function in the tuning of the system. The side-to-side movement was the 'play' in the set-up which the adjusting bolt utilised to obtain an accurate setting for the smoothest and most rapid change. For even smoother changing, the gear cable ran through an outer cable that was lined with a Teflon-like inner sheath, which obviated the need for lubrication.
The front derailleur, although not "indexed" was innovative in its tension-loaded lever and its inner blade was re-profiled to provide a better lift onto the large chainwheel. The teeth of the chainwheel, machined into the so-called ‘W’ cut facilitated the chain pick-up. The whole system was immediately upgraded from 6-speed to 7 speed, and other refinements came along rapidly.

“Shimano Linear Response” provided a stronger, more progressive braking system which was easier to mount and adjust and which had several features in plastic. The brake lever hoods were manufactured with an inner ‘lip’ which seated itself in a small recess in the aluminium body of the brake lever mounting. This prevented hood-slip due to the ingress of perspiration and/or the stretching of the hood rubber which often resulted with extensive use.

Increased braking power with a more sensitive feeling of control.

- **Just what is the “Shimano Linear Response?”**
  SLR utilizes special designs which eliminate a significant amount of friction from the levers, cables, and calipers of the brake system. The result is upgraded braking performance through a highly responsive lever feeling and strong, easily modulate stopping power.

- **How does SLR work?**
  SLR uses a return helper spring in the brake lever itself. Because the return movement of the lever action is not completely dependent on the strength of the spring at the caliper, a weaker caliper spring can be used. A thrust bearing and coated washer are used between the caliper arms, and a brake cable with a low-friction liner are also utilized to further reduce friction in the system. The result is a lighter and lively lever feeling and a more balanced system. Braking power is more efficiently transmitted to the wheel with greater feedback returned to the lever.

- **What are the benefits of SLR to the rider?**
  Balanced braking performance means a lot more than just strong braking power. If braking power cannot be effectively applied with optimum control, the brake system is inefficient and potentially dangerous. SLR delivers a higher level of braking control through a highly sensitive "linear response" feeling at the lever. Power input at the lever is efficiently converted into bike stopping power. You get improved stopping performance and a greater feeling of confidence in your ability to control the brakes. Racing cyclists use SLR to dive deeper into turns before braking and to finely control descending speeds. Sport and casual cyclists ride with more confidence and enjoyment knowing that the brakes will always respond predictably.
Subsequent developments on the drive train included the introduction of the “B-tension” bolt on the rear derailleur:

This provided even greater chainwrap by lifting the derailleur jockey wheels closer to the sprockets. Special, braided cables came to be insisted on for the correct functioning of the whole system and rendered the gear change even more smooth and precise.

Other refinements were made to the drive system. These included the reduction of chain dimensions, profiling of links and pins, and the relative angling/offset and profile of sprocket teeth and chainwheel teeth in the search for the ultimate drive/changing system.

Shimano went even further. Attention was paid to the headset and bottom bracket. In order to minimise the wearing effects of sweat and water corrosion, both were equipped with sealing rings. Seat-pins with micro-adjusting screws provided the finest of adjustments in an important area, that of personal preference in saddle position. New compounds were adopted for the brake pads which greatly improved braking performance and low-profile platform pedals were introduced which allowed greater cornering angles through their cut-away ‘cage’.
Shimano Total Integration

In 1990 Shimano came out with their most ambitious and advanced product ever, the STI - Shimano Total Integration. In the pursuit of their expressed ideal of maximizing man-machine harmony and thereby increasing functionality, Shimano had identified the need for the integration of what, hitherto, had been two distinct and separate functions on the racing bicycle: braking and gear-changing.

To a certain degree (and with resounding commercial success) Shimano had already brought these functions closer together in the SIS system. Since SIS was such a rapid, positive and almost fool-proof system the riders' hands spent more time on the handle-bars and less time "looking" for a gear via the gear levers on the down-tube. This was a small improvement, admittedly, but vital to professional racers who can win or lose important races through split-second margins.

The engineering challenge facing Shimano was considerable: how to provide complete control of the bike through the brake levers. This meant using the same levers for gear-changing, without compromising either the SLR braking or the SIS gear-change level of functionality, cluttering-up the handlebars or unduly adding weight. It should be recalled that the SIS index gear system was a "click" mechanism, whereas the braking system was progressive.

The first problem was how to 'integrate' two sets of levers that, whilst travelling in the same plane, have two completely different types and rates of progression? It should be borne in mind that the brake levers, being spring-loaded, return to their former position once released. Traditional gear levers do not! They have to be manually moved back into position. Under STI this would have to change.
The second problem followed from the first. If integration of the brake and gear levers was possible, how could you route the, now much longer, cabling required for the operation of the rear mechanism?

This in turn led to the third problem: If the cabling can be routed, how could you maintain appropriate cable tension across what is now a much longer 'run'?

Shimano resolved these problems with great engineering innovation and skill, albeit leaving a little to be desired at the aesthetic level.

Obviously, the position and operation of the brake levers could not be changed in any way. Shimano avoided any possible cluttering of the handlebar by accepting this brake lever limitation and, instead, added to it the capacity to move laterally, from outside to in. With this lateral movement, together with a ratchet/indexing feature built into the lever, they were able to reproduce the original SIS 'click' function. Thus changing-down a gear (moving the chain on to a larger rear sprocket) was carried out by moving the right hand brake lever inwards. The longer brake lever provided the extra leverage necessary to change gear, given the extended cable length and the generally "heavier" change normally required in the change-down.

Lying behind the main lever a secondary, 'release' lever, in Delrin, was located to move in the same (outside-in) lateral direction, independently of the brake lever. This lever controlled the change-up (moving the chain onto a smaller rear sprocket).

Thus, summarising, the right-hand brake lever allowed the rider to change down gear by moving the lever laterally (inward). The lever incorporated a double fulcrum, and an index mechanism/ratchet, as in SIS. Behind the brake lever, a smaller, independent, 'release' lever permitted the
change-up. No ratchet was required because this lever simply relieved the cable tension created by the change-down ratchet.

**Shimano Total Integration redefines the racing bicycle.**

- **Just what is the "dual control lever?"**
  The dual control lever is used for road bike to combine the braking and shifting functions. The brake lever actually has two functions. You apply the brakes in the conventional manner by pulling the lever back. But when you push the brake lever (or main shifting lever) toward the center of the bicycle, you shift the rear derailleur to larger sprocket, or shift the front derailleur to the large chaining.

- **How does the dual control lever work?**
  Just push the dual control lever sideways, toward the center of the bike, to downshift one gear. There's a smaller lever behind it called the "release lever." Push the right side release lever and it "releases" the shift cable, allowing the derailleur to "upshift" to the next higher gear. Push the left side release lever to downshift the front derailleur to the small chaining. Furthermore, the main lever upshifts with a ratchet action, so it always returns to the same position for the next shift.

- **What are the benefits for the rider?**
  The ability to shift quickly and accurately has always been an important factor in bicycle racing. Being in the wrong gear at the wrong time has caused many a rider to lose a race or finish poorly. Shimano Total Integration has eliminated the adverse effect that shifting can have on the performance of a competitive cyclist. With Shimano Total Integration you can...
  - shift fast and precisely under maximum pedal loads without letting go of the handlebar and without giving up hard-won speed.
  - punch in the best gear to exit a turn while still cornering in order to save valuable seconds accelerating.
  - instantly get the best gear when climbing, in or out of the saddle, without releasing the bars and without letting up on pedal speed.
  - quickly shift into the best gear without letting go of the bars when riding on bad roads.

For the first time, Shimano Total Integration gives the racing cyclist total freedom in gear selection regardless of maneuver, road, or race conditions. Furthermore, it reduces rider indecision, lessens fatigue, and provides a significant competitive advantage for the racing cyclist.

The main lever lets you downshift up to 3 gears simultaneously with a single stroke.
The left hand brake-lever was necessarily of the same design but of more limited function since its only job was to lift the chain from the front inner (smaller) chainwheel to the large outer chainwheel. This was done in one ratchet movement, (outside to in) with a certain amount of override ("trimming") to enable the rider to clear the front derailleur from the chain, should the chain 'scuff' against it. The return of the chain to the small chainwheel was effected by a secondary 'release' lever, similar to the right hand one. This operation was also carried out in one movement (lever outside to in) with the override as above.

A pleasing if minor refinement was introduced in the way the brake levers themselves were mounted on the handlebars. A hexagon-headed ring bolt (the installation bolt) was now reached very easily from the side of, and underneath, the rubber brake lever hood. Its previous siting had always proved extremely inaccessible (as had those of other manufacturers too!). Prior to Shimano's innovation, the bolt had been in a central position, behind the cable, and could be reached with difficulty only by pressing the brake lever down and forcing an Allen-key past the cable. The new arrangement was in keeping with Shimano's, by now famous, policy of maximising functionality and user-friendliness.
Shimano's innovations were not limited to the gear-changing brake levers. The brakes themselves were now "Super Linear Response" and were worthy of the name. The brake stirrups were completely re-designed, with the central pivot bolt being offset to provide an even greater lever-multiplication effect. Braking performance was outstanding.

Super SLR enhances the braking power of Shimano Linear Response.

- **Just what is Super SLR?**
  Super SLR is a new type of sidepull brake caliper and lever. What makes the Super SLR caliper different is that it has an individual pivot point for each caliper arm. These separate pivot points increase the power multiplication factor which results in more braking power.

- **How does Super SLR work?**
  The main parts of the sidepull caliper are the "Y" arm and the "C" arm (named for their basic shape). With conventional brakes, both arms pivot on the same point. The Super SLR caliper, however, gives the "C" arm its own pivot point that's separate from the "Y" arm in order to increase leverage. The result is that the pressure applied to the rim increases in relation to the pressure applied at the lever. Furthermore, the increase in braking leverage at the "C" arm is transferred to the "Y" arm so that the increased leverage is applied equally between the two caliper arms. The increased power multiplication factor causes the shoes to move a shorter distance in relation to lever travel. To compensate for this shortened caliper movement, the Super SLR brake lever has been designed to provide a 2-phase action. The 1st phase quickly brings the brake shoes into contact with the rim, while the 2nd phase applies increased leverage to enhance braking power.

- **What are the benefits for the rider?**
  The benefit of Super SLR is that it provides the cyclist with greater braking power without the need to squeeze the lever harder. Coupled with the highly sensitive SLR mechanism, Super SLR provides even more braking power that can be easily modulated at the lever with a secure feeling of control. Super SLR is a significant improvement in overall braking performance.
Gear cable routing from the STI levers on the handlebar was achieved by having the cables exit the brake lever body on the inner face. Each cable, from left and right hand levers, then followed an inward curve to the bike frame:

Cables

The first cable 'stop' was at the point where the gear levers had traditionally been mounted, on the down tube. In the STI arrangement, the right hand cable 'stopped' into a hollow lever having 4 click positions, all of which increased cable tension. Finally, this particular cable was 'stopped' once more into a hollow-headed adjusting bolt in the body of the rear derailleur. The left hand cable 'stopped' into a hollow-headed cable adjusting bolt (screwed in to release cable tension, out to increase cable tension).
These extensive stopping/adjustment features speak volumes for Shimano's mechanical inventiveness, yet also indicate a certain frailty of the system overall. One thing is clear: the inward curving cables, from the brake levers to the bicycle frame are the least aesthetic and most-disliked feature of the whole ensemble.

At the rear mechanism end there were also major innovations. The derailleur itself was modified to travel across a wider range of gears--now 8 sprockets instead of 7, giving a theoretical 16-speed racing bike. The sprockets themselves were cassette-type only, with special angling and profiling of the teeth to improve gear changing. They were slipped onto the Shimano freehub, whose special feature was the positioning of the right-hand (sprocket side) bearings. This positioning of the bearings made the wheel stronger, and indeed created space for the extra (8th sprocket). The 'dishing' (offset) of the wheel was therefore minimized, which is a feature vital to the strength and lasting 'trueness' of the wheel.

A significant improvement of rear hub design.

- Just what is the freehub?
The freehub integrates the rear hub and freewheel mechanism into a single unit design. Cassette sprockets slip on and off the splined freehub for fast and easy gear changes.

- How does the freehub work?
Besides integrating the hub body and freewheel into a single unit, the freehub features "unibalance" design which helps to reduce rim offset, often called "rear wheel dish". With reduced dish, spoke tensioning can be more uniform to make a stronger wheel. In addition, freehub design allows the right side hub bearing to be positioned closer to the right dropout where the axle is supported. This greatly reduces the load on the axle and just about eliminates bent axles.

- What are the benefits to the rider?
The freehub is the heart of a stronger and better performing rear wheel which contributes to cycling performance and safety. A freehub wheel also results in extended spoke life, greater stiffness, and increased power transmission efficiency. Furthermore, Shimano offers an 8-speed freehub which does not increase the amount of dish over 7-speed types.
Thus, in one new groupset Shimano introduced many significant innovations which substantially increased the rider's control of the machine, at the expense of some gain in weight of the ensemble. While some problems have been registered with the levers and/or quietness of the transmission, this was a triumph of engineering. No doubt this was due, in great part, to the lengthy prototype testing carried out on the European racing scene, as well as the creativeness which spotted the opportunities for product development. STI meant that the rider need not take his hands from the handlebars to change gear - invaluable when sprinting, when tired, when 'out-of-the saddle', i.e., when standing on the pedals. The gear change was positive even when the load on the chain is high, as when climbing.

Although the rider could no longer change down more than 3 sprockets at a time, nor change up more than 1 sprocket at a time, these disadvantages, most users still say, are outweighed by the overall component integration and the resulting increased functionality.