WELLS' PRODUCT LIFE CYCLE THEORY FOR INTERNATIONAL TRADE REVISITED.

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The help of my researcher, Inger Wesenlund, is acknowledged in seeking out the statistics and providing the background to the MFA.
The business environment is constantly subjected to change in one form or another. For this reason, successful companies are those which recognise the need to forecast in order to make timely adjustment in line with those changes. Lack of foresight or an inability to change with the environment may be a prelude to the liquidation of a company, or even the destruction of an industry.

The need to recognise change has been no more prevalent than in the textile industry, where the development of new fibres and the shift in the base of production have let some producers fall behind in their own development. The U.K. textile and clothing industries of the sixties were apparently oblivious to the changing environment around them, so that in the seventies they were competing directly with developing countries' production with their concomitant low wages. As the textile and clothing industries combined are the second largest employers in the U.K., the Government deemed it necessary to step in and protect the industry from direct competition, encouraging the establishment of the Multi-Fibre Arrangement to limit imports of textiles from low-wage producers.

Against this background, the paper attempts to put theory into practice by relating a modified Wells' Product Life Cycle Theory for International Trade to the textile industry.
The product life cycle theory has been applied to many industries and has proved useful in identifying future strategies for products and services. By applying it to international trade, Welle (1) has shown the relevance of the theory to importing and exporting a product.

The theory would appear to relate well to the textile industry where production can be seen to be moving from developed to less well developed countries. In the United Kingdom over recent years the industry has lost many jobs, and further job losses can be expected. Many of these job losses are attributable to technological change and increased productivity, but much of it must be ascribed to the fact that it is a relatively labour intensive industry and this labour is more cheaply available in the less developed countries.

The strains and pressures faced by U.K. textile industries are not unique. There are large textile industries throughout the developed world. In the European Community the textiles and clothing industries provide an estimated 10% of wage earning industrial jobs. In the United States, they represent the largest single source of jobs in manufacturing industry with 2.3 million employees. All textile industries in the developed world are having to come to terms with the problems of competition from low-cost imports.

THE TEXTILE INDUSTRY SETTING INCLUDING THE MFA

As a crucially important and successful sector of the British economy, and as a sector with unique problems, textiles have long commanded a special consideration in manufacturing industry. Because of the continuing threat from low-cost imports, textiles now enjoy more protection through the Multi-Fibre Arrangement (MFA) than any other U.K. manufacturing industry. This is protection not to stop imports, but to control their growth. A similar approach is adopted by many other developed countries having major textile industries. Prior to the MFA there existed a Short Term Agreement (STA) established in 1961, followed by a Long Term Agreement (LTA) in 1962 which was replaced by the MFA in 1973.

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The present Conservative government was originally elected in 1979 on a manifesto which attacked the corporatist attitudes of its predecessors and advocated an anti-interventionist approach to the textile industry's problems. In the government's first year, a series of comments from ministers including Sir Keith Joseph and the then Trade Secretary, John Nott, suggested to industry that it had had long enough to adjust to world trade competition and that, in their view, industry was using the MFA to avoid necessary change. However, since June 1980 there have been no such statements and the British government put forward tough arguments in favour of a stricter MFA in the negotiations of 1981.

The MFA itself was signed just before the recession of 1974 and 1975 which decisively changed the environment in which the MFA operated. The combination of rising protectionist pressure (especially in the EEC) and the ready availability of an internationally-sanctioned instrument (the MFA) led to a major change in its operation when it came up for renewal in 1977. Despite the fact that imports from developed countries and technical changes were separately more important sources of change than third-world low-cost imports, it was the latter which formed the main target. This can be explained partly because the growth rates in their sales attracted the attention of industrial lobbies, despite the fact that they started from low bases. However, it was perhaps realistically because developing countries made a much easier target than for example the United States, where tough textile industries had the strength to take retaliatory measures through Congress if they suspected discrimination against themselves. The negotiating structure of the MFA favoured the EEC as it could effectively "pick off" developing county exporters one by one and achieved substantially what they wanted. Developing countries were willing to accept the quotas suggested rather than the threatened alternative of no quotas at all.

The 1977 MFA agreement succeeded in cutting back imports of sensitive products from developing countries: in 1978/9 sensitive imports from South Korea fell by 3.7% while between 1976 and 1979 imports from India and Hong Kong fell by 0.9% and 2.2% respectively. (2) Combined with a small increase in the level of demand in 1979, this encouraged optimism that if import restrictions could be maintained and government help for job saving and new investment increased, then short term prospects should be good. In the event this optimism was not justified. While the 1977 MFA attacked its designated target - the developing contd. . .
producers - a series of other challenges found much of European industry unable to compete.

Between 1977 and 1981 the economy failed to grow as fast as earlier optimistic forecasts had suggested. As a result "temporary" measures have appeared to be increasingly permanent, and the industry has called for a yet tougher MFA to last for ten years instead of five. The oil price increases of 1979-80 exacerbated the situation for those parts of the textile industry which used oil products as raw materials. Imports from the USA have grown into an increasingly serious problem for UK producers. The difficulties of managing textile relations with the Mediterranean countries are becoming increasingly difficult. Only the "Third World Challenge" has been dealt with effectively.

Consequent to these problems offered by the 1977 MFA, the 1982 MFA was bound to be tougher. The 26 bilateral agreements were concluded in late 1982, to run from 1982 until 1986 (not the ten year agreement hoped for). Part of the reason for this tough attitude on the part of the EEC may be due to a West German protectionist stance effected by the influence of fraud. It has been estimated that some 47 million garments have entered West Germany illegally. Germany, however, were not the only sufferers: Britain has had 500,000 gloves above quota from South Korea and there have been other cases in other countries, but it was the West German reaction which helped to produce a tougher set of agreements. For instance, if fraud similar to that already outlined was proved, the commission will deduct an equal amount from the offending country's quota. The new agreement also includes an "anti-surge mechanism" whereby imports can be stopped immediately they exceed the previous year's quota by 10 per cent.

A "Basket Extractor" procedure was introduced in 1977 to allow quota-free goods (or those in a basket) to be brought out of the basket if they showed signs of disrupting the market. In the past, supplying countries were able to indulge in delaying tactics, thereby evading the intention of the mechanism. This instrument has been tightened so that the EEC can establish a three month standstill while talks are going on about the level of goods to be allowed into the EEC.

The reasons for the development of this apparently complex system of protection is because of the size of the affected industries and their diligence in pursuit of such protection.

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Broader arguments relating to international trade in textiles have been advanced by Keen and Wolf (3) and these are summarised below:-

1. "Low cost" imports can threaten the survival of a major industry.
2. There is no alternative employment for a large section of the labour force employed in these industries in industrialised countries because the industry tends to be concentrated in declining regions and employs disadvantaged segments of the population.
3. "Real" developing countries do not benefit from the expansion of trade, but merely a few East Asian economies that are no longer poor.
4. The people of the exporting countries do not benefit, but rather local capitalists or - still worse - multinational enterprises.
5. The success of developing countries is the result of subsidisation and the exploitation of the workforce.
6. The developing countries themselves practice protectionism.
7. The "burden" of cheap imports is unfairly distributed.
8. The preservation of the textile industry should be a matter of national security and governmental strategy.

Thus it has been demonstrated that in the field of textiles, international trade is far from free. As will be shown later, a life cycle theory for international trade assumes unrestricted trade. We must then ask whether or not it is possible to apply such a theory where conditions for its application are not ideal.

**CURRENT THEORY - PRODUCT LIFE CYCLE**

A product's sales position is expected to change over time as is its profitability, and the product life cycle is an attempt to recognise distinct stages of the sales history of a product. With respect to its use, three operating questions arise:-

1. Given a proposed new product or service how, and to what extent, can the shape and duration of each stage be predicted?

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2. Given an existing product, how can one determine what stage it is in?

3. Given all this knowledge, how can it be effectively used?

In the context of the traditional product life cycle concept, where the points of beginning and end of each stage are placed is arbitrary, but they usually occur where sales growth or decline become pronounced. Polli and Cook (4) have proposed a more operational measure based on a normal distribution of percentage changes in real sales from year to year. Their sales data was adjusted to allow for population growth, change in the level of consumption and price changes and they defined different types of product as a product class, form or brand. For example, "jeans" is a product class, "stretch jeans" is a product form and "Levi's" is a product brand. They measured the percentage change in real per capita adjusted product sales over a period of time. Less than - 1% represented the decline stage, more than + 1% the growth stage, and + 5% represented maturity. The development stage was defined as that time period when annual sales were less than 5% of the observed peak level, which could be the real maximum sales level, or some observation en route to it. The important property of this definition is that it identifies major stages in a product life cycle without knowing what came before or after any pair of sales observations.

There have been attempts by some to develop a taxonomy of different life cycles. William E Cox (1) in a study of 258 prescription drug brands, identified six patterns, and found that for over 50% of these, a fourth degree polynomial best fit the historical data. J Hinkle, in collaboration with A C Nielsen (5) found the same phenomenon as did Buzzell (7), who found "innovative" "growth" and "stable" maturity stages. "Life extension" or "marketstretching" has also been proposed as an extension of the product life cycle theory, the most obvious example being the extension of nylon into stockings, tights, fabrics, tyres, seatbelts and many other uses.

Use of the product life cycle concept involves the investigation of the extent to which the concept holds up for products in the industry being studied. The life cycle is closely related to the theory of adoption and is essentially a demand model, but actual sales depend on both demand and supply. Hence the life cycle applies best to those products where sales are not significantly affected by variations in supply conditions.
The law of comparative costs states that trade will be beneficial to a country if it concentrates on the production of those goods in which it has the greatest relative advantage over its trading partners. The benefits of this law are reduced or delayed by lack of free trade and transport costs. The law does not allow for currency problems or for political, social or strategic government reasons for not permitting free trade to develop into over-specialisation.

There are many more obstacles to free international trade, for instance, with regard to tariffs, if demand is not perfectly inelastic, the quantity purchased will fall as the price of imported goods is increased. Subsidies are an alternative to tariffs: the home producer is given more money for his product to make it competitive with imports. Whereas tariffs are paid directly by the consumer, subsidies are supported indirectly by the taxpayer. Quantitative restrictions involve a quota system for imports, either by auctioning or selling import licences, but there also exist non-tariff barriers which show themselves in terms of discriminative administrative practices. Finally there are exchange controls which restrict the amount of foreign exchange available for the purchase of imported goods. The idea of using these instruments is to increase the demand for home goods at the expense of foreign suppliers, and tariff barriers are the most popular method of obstruction.

Tariff barriers are used for the following reasons:

1. As a short-term expedient method of correcting a deficit in the balance of payments, but which might induce a retaliatory response.

2. As a dumping policy where the price is raised to protect the home market and part of the proceeds are used to subsidize exports so that they can undercut competitors in the world market. This also provides retaliation.

3. To protect an infant industry in a developing country.

4. To reduce the level of unemployment, which postpones the readjustments that must occur in response to structural changes in the pattern of demand.

5. To protect industries whose products may be essential in times of war or international crisis.
The factor proportions theory is related to the law of comparative costs and this asserts that international wage/profit ratio differences decide comparative advantage, and hence the direction in which trade flows. The scale economy theory is also related to the above and this predicts that the country with the largest home markets will export those goods which exhibit the greatest economies of scale.

The technological gap theory is applicable where the innovating country initially exports large quantities of a new product and when the imitating country undertakes manufacture, the innovator's exports diminish. This process recurs with early imitators to late imitators. Consequently "low-wage trade" should eventually supplant "technological gap trade" for presumably at some point, the low-wage country will develop sufficient know-how and facilities that its labour advantage will overcome the high-wage nation's lead in improving technology and harvesting static scale economies.

At that point, the low-wage nation should reverse the flow of trade and begin exporting to the high-wage nation. This theory predicts that as a product passes from youth (or development) to maturity, low-wage exports should claim a larger and larger fraction of trade. However, because of tariff barriers and competition from established producers, an industrializing nation may find export markets easier in nations a few steps behind than in nations a few steps ahead.

PRODUCT LIFE CYCLE THEORY FOR INTERNATIONAL TRADE

The product life cycle theory and theories of international trade have been discussed separately; it is now appropriate to link the two together.

It would assist exporters if they had methods of analysing the export potential of their products and had predictors of which products were most likely to be threatened by import competition. Exporters have traditionally relied upon economic theories which concluded that each country will export those products that use the country's most abundant production factors. However, when such theories are applied to the detailed problems facing businessmen they become of limited value.

The trade cycle model has been proposed as an aid to exporters and this is closely related to the product life cycle concept in marketing. Wells first proposed a theory that combined both, and in order that we might attempt to modify his model, a summary of his proposal is given below.

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According to the trade cycle concept, many products follow a pattern which can be divided into four stages:

1. Phase 1: U.S. export strength.
2. Phase 2: Foreign production starts.
4. Phase 4: Import competition begins.

A brief look at the reasoning underlying each of these stages will give some clues which might help the businessman to identify the stage in which particular products may be. The concept can then be of assistance in predicting the future product trade performance, and in understanding what actions the manager can take to modify the pattern for certain products and to profit from different stages of the cycle.

**Phase 1: U.S. export strength.**

The U.S. market is special because it has a large body of very high income consumers, and products which satisfy the special demands of these consumers are likely to be introduced in the United States. Moreover, due to the monopolistic position of the United States as a supplier of such new products which satisfy these special demands, they offer the best opportunities for export.

There is no simple relationship between demand and invention, but nevertheless there can be little doubt that certain products are simply more likely to be developed initially in America. Although labour is cheaper abroad and production costs would be lower, it is more sensible to manufacture in the U.S. because production is closer to the market and near to specialist suppliers. This is because at the early stages of a product's life, design is often in a constant state of flux, and demands for design changes must be rapidly translated into more suitable products which require the availability of close communication with specialised suppliers. The existence of a monopoly, or significant product differentiation at the early stages of the product life cycle, reduces the importance of costs to the manufacturer.

At this point, the American manufacturer has a virtual monopoly for the new product in the world market. U.S. exports start as a trickle and develop into a steady stream as active export programmes are established by the American firms.

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Phase 2: Foreign production.

Product familiarity abroad increases, causing overseas markets to become large enough that the product which once appealed primarily to the US consumer has a broad appeal in more prosperous foreign countries. Not only does a potential foreign producer now have a market close at hand, but some of his costs will be lower than those of the US producer. Imports from America have to bear duty and overseas freight charges - costs which local products will not carry. Moreover, the potential foreign producer may have to invest less in product development, the US manufacturer having done part of this for him. Some measure of the size of his potential market has been demonstrated by the successful sale of imports. Favourable profit projections based upon a demonstrated market and an ability to underprice imports will eventually induce an entrepreneur in a more prosperous foreign market to commence manufacture.

During this second stage, American exports will still supply most of the world's markets. However, as foreign producers begin to manufacture, US exports to certain markets will decline. The pattern will probably be manifested in a slow down in the rate of growth of US exports.

Phase 3: Foreign production competitive in export markets.

As the early foreign manufacturers become larger and more experienced their costs should fall. They will begin to reap the advantages of scale economies previously available only to US manufacturers, but in addition, they will have lower labour costs. Hence, their costs may be such that foreign products become competitive with American goods in third markets where goods from both countries have to carry similar freight and duty charges.

During this stage, US producers will be protected from imports in their domestic market where they are not faced with duty and overseas transportation costs. However, foreign goods will gradually take over the markets abroad which were previously held by American exports. The rate of growth of US exports will continue to decline.

Phase 4: Import competition begins.

As the foreign manufacturer reaches mass production based on his home and export markets, his lower labour rates, and perhaps newer plant may enable him to produce at lower costs than an American manufacturer. His cost savings may be sufficient that he can pay freight and American duty and still compete...
with Americans in their own market. This stage will be reached earlier if the foreign producer begins to think in terms of marginal costs for export pricing. If he believes that he can sell above full costs in his home market and "dump" abroad to use up his excess capacity, he may very quickly undercut US producers who are pricing on full costs. During this final stage, US exports will be reduced to almost zero, whilst import competition becomes severe.

Thus the cycle is complete, from the United States as a strong producer and exporter, to the stage where imports may capture a significant share of the American market.

The early foreign producers (usually Western Europeans) will face a cycle similar to that of the US manufacturer. As still lower-income markets become large enough, producers in these countries will eventually become competitive, displacing the dominance of the early foreign manufacturers. The manufacture of products moves from country to country in what Hufbauer (10) has called a "pecking order".

Clearly, no simple model can explain the behaviour of all products in international trade. However, this model does appear to be useful for understanding trade patterns in manufactured goods. Although no such model should be used by the businessman without a careful examination of individual products, it does provide some useful hints as to which products might be exportable and which might suffer import competition. The concept can also give clues as to the potential success of various product policies.

To extend the market for a product at home and abroad, the businessman may practice a strategy of market segmentation making design changes in the product to appeal to different types of consumers, but there comes a point where design changes can no longer make a product competitive abroad or safe from imports. Firms may follow two strategies for survival: a continual product roll-over, shifting resources to new products more suited to the unique demands of the market and/or manufacturing abroad to take advantage of lower production costs and to save tariffs and transportation charges.

LANCASTER'S MODIFICATION AND EXTENSION TO THE THEORY

According to Wells' theory, as a product moves down the "pecking order" over time, a series of curves with similar amplitudes will result. However, Lancaster suggests that the further down the pecking order a product goes,
the higher will be its consumption over time. Thus each product life cycle curve will have a progressively higher amplitude. This is explained diagrammatically in the following figure:

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\( \n \)  Band 4 Production

Time
Curve (1) represents (Band 1) and we can see that (a) represents (Band 1) production of a product for the (Band 1) market. It is appropriate that the first curve should be the USA as most new products commence their life there. As this market becomes saturated, the American producers seek export opportunities in developed European markets (Band 2), shown in (b). The American production of the product continues to supply one market in decline in (c) as European producers begin to market the same product in their home market (d). At this stage European production grows as rapidly as American production declines, and eventually European producers are meeting their home market demand by themselves (e). In stage (f), the developed European producers have reached the pinnacle of production, providing their home market, the American market and next Band Developing Countries (Band 1) with the product. However, in section (g) sales of the product decline in the European and Developing Country markets now being supplied, as the Developing Countries themselves begin to produce the product (h). Now Developing Country production grows as rapidly as European production declines and eventually Developing Country producers are meeting their home market demand by themselves (i). Now the Developing Countries have reached the height of their production (j), supplying America, Europe, their home market, and Less Developed Countries (Band 4), and them move into decline (k) as Less Developed Country production increases (j). This cycle of trade from one group of countries to another can continue as long as there are countries less developed than the previous ones.

It should be noticed that each curve is higher than the previous one because production increases in relation to the increased demand. This is because the movement of the product from one curve to the next creates active consumers which did not exist before, primarily due to product development and experience gained in production, but also due to increased demand as less developed countries become more affluent.

To give examples of the type of countries involved in above model, 'Europe' denotes Western Europe: those countries which are technically advanced second only to the United States. Such countries would typically be Great Britain, West Germany or France. By developing countries, we mean some European countries and some Far Eastern countries: Portugal, Yugoslavia, Hong Kong and South Korea would be good examples. Less-developed countries would follow economically and technically after these developing countries, but may be split into various degrees of development. Such countries would...

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typically be: Thailand, Indonesia, Sri Lanka and Nigeria.

Looking at the model cumulatively we can see a gradual progression in sales of the product. By adding the total consumption levels at each point in time (i.e. by inverting sections d, b and t) we find a straight line of cumulative consumption. The different stages in each curve can still be identified on this straight line.
APPLICATION OF THE STATISTICS

It was initially envisaged that two tangible textile products would be investigated, but this proved to be impossible because the database did not extend far enough back to produce a discernible trend. Ultimately, cotton fabrics produced a set of statistics which did go back to 1956 for a sufficiently large number of countries, and it was decided to attempt to apply these figures to the theory.

Cotton - World Statistics, published by the International Cotton Advisory Committee provided figures for a number of countries. The Committee is "a worldwide association of governments compiling and publishing authentic information" and it was decided that it was unlikely that a more accurate guide would be available.

Nine countries were chosen for which a reasonable database existed. These countries were: USA, UK, Hong Kong, Yugoslavia, Portugal, Philippines, Turkey, Thailand and South Korea. The statistics for each country are examined individually.

The table shows the figures for cotton fabric production in the USA. This represents a decline in cotton production and reflect the decline stage of the product life cycle for cotton production in the USA. If it were not for the intervention of trade agreements, this would fit the decline stage perfectly. However, it can be seen that the Long Term Agreement for cotton textiles of 1962 has stemmed the decline in production, but only temporarily. From 1965 to 1975 there has been a rapid decline in cotton production, which may be partly due to the increased use of synthetic fibres, but the Multi Fibre Arrangement of 1977 (MFA II) has heralded a resurgence in production thanks to the protection from imports imposed by the agreement.

The picture is similar for the U.K. production of cotton. The U.K. production also fits the decline stage of the product life cycle, albeit a little more gentle in decline. Again, the decline is marked by respites offered by textile agreements. The 1962 LTA only delayed the decline in production. The 1972 MFA I appears to have slowed the decline little and the 1977 MFA II seems to offer a false hope before production tails off. The dramatic decline at the end of the curve may also be due to the country's economic recession.

The figures for Hong Kong show a striking difference in direction. From 1956 to 1971 Hong Kong was subject to rapid growth in its production. contd...
of cotton fabric, a line which fits the growth stage of the product life cycle. The 1962 LTA Agreement hardly had any effect on production, but MFA I in 1972 had a marked effect, creating a small decline in production and a subsequent recovery. MFA II in 1977 does not create the same effect, but it could be said that Hong Kong cotton fabric production is being forced into the maturity stage of the product life cycle.

The statistics for Yugoslavia are very similar to that of Hong Kong. Yugoslavian production shows considerable growth from 1956 to 1966 after which point it levels off into maturity, with MFA I in 1972 producing a few low production figures in the following two years.

Another country at the maturity stage would appear to be Portugal which has had a more gradual growth from 1956 to 1973 and a levelling off into maturity afterwards. Portugal's production was not reduced after MFA I (1972); in fact it increased considerably as it was not directly covered by the agreement, and found that it could supply markets which were out of bounds to developing Asian countries. MFA II did have the effect of reducing production as Portugal was incorporated into the Mediterranean agreement which was part of MFA II covering Mediterranean producers. This agreement restricted production, but did not impose specific quotas.

The Philippines have also reached the maturity stage in the cycle. As with Hong Kong this maturity stage seems to have been imposed on them by trade agreements. The industry received a great deal of capital investment between 1959 and 1961 and the 1962 agreement merely restrained the growth in production. After 1968 the industry moved into maturity, apparently aided by the 1972 MFA, but not hindered by MFA II in 1977.

In Turkey there was no restriction by MFA I or II. From 1956 to 1966 Turkey was in the introduction stage, possibly affected by the 1962 LTA, but after 1966 the curve grew rapidly aided by government investment.

The introduction stage for Thailand is short (according to the restricted number of figures available) and the growth stage was probably due to illegal trade across its borders. Far Eastern Economic Review sources suggest that this "export" trade accounts for about 30% of total textile production in Thailand. The composition of this 30% figure is approximately 60 - 65% to Burma, 30% to Indochina (through the Thai-Cambodian border) and less than 10% together for Laos and Malaysia. (11)

The growth stage of South Korea's product life cycle can

contd.
be seen quite well. The effect of the 1962 Agreement and MFA I appear to be delayed, and MFA II has failed completely to restrain the growth curve. This lack of restraint may not last for long as South Korea's lack of respect for quotas has resulted in a much tougher deal in the recent MFA III.

As overall picture of worldwide production of cotton fabric is shown in Graph 1. This shows different stages of the product life cycle for different continents. Africa shows slow growth, indicating the introduction stage of the cycle, whereas Asia and Oceania, although heavily affected by the LTA of 1962, has since shown rapid growth of the type symbolised in the growth stage of the product life cycle. Western Europe is gradually moving from maturity to decline, cushioned on its way by the protecting effects of the Multi Fibre Arrangements, but North America has been in constant decline from 1965 to 1975, consequently recovering thanks to protectionist measures.

It is graph 2 that points out best the different stages of the product life cycle. The figures on this graph represent consumption of cotton fabric by continent. It is consumption figures that have been used for previous examples of the product life cycle theory and therefore this method of calculation comes closest to the theory. The consumption figures are obtained by adding production to import figures and subtracting exports. It can be seen from the graph that, although the figures are again affected by trade agreements, each continent (except Eastern Europe) represents a stage in the product life cycle. Asia and Oceania represents growth, North America represents decline, Western Europe represents maturity and Africa a slow introduction stage.

Graph 3 shows how these stages look in perspective when one is able to examine the remainder of each curve in a total picture. The section between 1956 and 1980 represents the consumption curves described in Graph 1. It is in this section, between the two vertical heavy lines, that factual evidence has been used.

Before and after this factual section of the graph, the curves have been extended to project a picture of trade over a long period of time. Western European consumption first exceeds a minimum level in the late eighteenth century. Growth continues in Western Europe until the advent of North American mass production, at which point it levels off into maturity. This maturity stage is sustained over a long period by government support to the industry, but eventually declines at the end of the twentieth century.

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North America is the next continent to cross a minimum consumption level, rising to a peak in the 1920's. Since the Second World War it has suffered competition from synthetic fabric production and developing country imports, resulting in a steady decline up to 1990. The curve for Asia and Oceania grows steadily from the 1920's up to the mid 1960's, achieving a higher peak level of production than North America. The curve declines rapidly as African production grows and reaches a peak at approximately 2010 - 2020, and so one could speculate even further by introducing yet another band of countries.

It could be suggested that the curve for Western Europe should, according to theory, follow the path of the dotted line outlined in the graph. The extension of the maturity stage in this instance is most probably due to strategic reasons for maintaining production. Western European Governments see their textile industry as being of vital strategic importance: that is to say that in times of crisis the country should be able to produce its own clothing and not be dependent on external sources. It can, however, be seen from this graph that there is indeed a series of product life cycle curves.

The graph disregards trade agreements in its interpretation which can be seen by comparing the curve for Asia and Oceania in Graph 2 with that of Graph 3. In Graph 2, the curve drops dramatically after the LTA Cotton Agreement of 1962 and is stemmed in its growth after 1972 due to MFA I which restricted Asia and Oceania's export capability. In Graph 2, the curve portrays what would have been the picture if there had been no restrictions to trade. This rule applies to all the curves in Graph 3, which seems apt as a product life cycle theory for international trade assumes free trade.

It was not possible to show total world consumption of cotton fabric over the time period, because these figures were not available. It may be useful, however, to look at total world production, although it should be observed that world cotton fabric production has been affected by the growth in the use of synthetics and is prone to the success of the cotton harvest.

Graph 4 shows world production of cotton fabric which has had to be partly estimated due to the lack of production figures for China before 1978.

Figures were only available for China between 1978 and 1981 and the percentage growth from one year to the next for this period was calculated. From these percentages, an average percentage of growth was obtained for the contd. . . .
four years, and this figure of 6.7% was used to calculate figures for Chinese Cotton Fabric production from 1956 to 1978.

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Going backwards from 1978, each year's production was calculated as being 6.7% less than the year ahead. These hypothesised figures for Chinese cotton fabric production were then added to world production figures for 1956 to 1978 to give the curve in Graph 4. The graph shows that cotton production has suffered heavy competition from synthetics, but production has indeed grown over this period.
GRAPH 1
Production of cotton fabric by continent (1956-80)

Asia and Oceania (not China)

Western Europe

North America

Eastern Europe (not USSR)

Africa

South America

Metric tons (x 100,000)

Time
GRAPH 2
Consumption of cotton fabric by continent (1956-80)

Asia and Oceania (not China)

Western Europe

North America

Eastern Europe (not USSR)

Africa

Metric tons (x 100,000)

Time
GRAPH 3
Theoretical consumption of cotton fabric over time - by continent

Metric tons (x 100,000)

Late C18th Early C19th Early C20th

W. Europe

N. America

Asia and Oceania

Africa

Estimation
Fact
Projection
GRAPH 4
Total world production of cotton fabric

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Adjusted figures
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CONCLUSION

"The rapidly growing integration of the global economy has raised a number of major tensions between and within nations, arising especially from problems inherent in existing mechanisms of adjustment to the quickening pace of change."(12)

This article has pinpointed this "growing integration" in describing the Product Life Cycle Theory for International Trade and applying it to the textile industry. Trade is important in a developing world, and how countries trade in different commodities depends on trading conditions. America and Europe once dominated trade in cotton fabric, but as we have seen, they have had to adjust to "the quickening pace of change." Asia and Oceania now trade in more cotton fabric than America or Europe ever did, showing how the world's population is buying more cotton fabric as they become more affluent and developed. However, the "problems inherent in existing mechanisms of adjustment", that is, the ability of manufacturers to adapt to change in the environment, has created "major tensions between and within nations" effecting the emergence of the Multi Fibre Arrangement and other forms of protectionism.

The theory has been found to operate using the example of cotton fabric. This operation is naturally not as perfect as the theoretical model, which does not take into account the many factors which have affected trade in cotton fabric. These factors include competition from the development of synthetic fibres and the protectionist policies prevalent in developed countries.

Further research would be useful to complement this article. Other products, especially products for which sales figures are available from development through to maturity or decline in world sales and production would make a useful comparison. A longer series of figures would have been useful in studying cotton fabric but these figures were not available. It should also be remembered that cotton fabric is unlikely to fit the theory perfectly due to its strategic importance viz à viz the ability to clothe a country's population in the event of strife.

Finally the PCCF emphasises the need to recognise the changing environment of the textile industry. The imposition of quotas on imports should be seen as a temporary "cushion" to manufacturers who should be directing their production to meet the changing needs of the consumer. The practical contd. . .
application of theory in this article should help businessmen to recognize the constant process of change in order that they may survive and that they may themselves change.


(9) loc. cit. (1)

(10) op. cit. (8)
