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Population Growth, Urbanization and Industrialization

Population Growth, Urbanization and Industrialization

Prepared for the UNIDO
under agreement CLT 94/037

written by Anna Elizabeth Wils

REPORT, 15.7.1994

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Table of Contents

| | |
|--|----|
| 1. Introduction | 3 |
| 2. Population Growth 1750-2030 | 7 |
| 2.1 Historical Population Growth: 1750-1900 | 7 |
| 2.2 Historical Population Growth: 1900-1990 | 9 |
| 2.3 Future Population Growth, 1990-2025 | 13 |
| 2.4 The Demographic Transition | 15 |
| 3. Economic Change 1750-1990 | 18 |
| 3.1 The Demise of Less Developed Country Industry: 1750-1900 | 18 |
| 3.2 Re-industrialization, 1900-1990 | 20 |
| 3.3 The Economic Transition | 23 |
| 4. Social Aspects and Human Resource Development | 29 |
| 4.1 Poverty, Population Growth and Industrialization | 29 |
| 4.2 Urbanization, Population Growth and Industrialization | 31 |
| 4.3 Education, Population Growth, and Industrialization | 36 |
| 4.4 Women, Population Growth, and Industrialization | 40 |
| 5. The role of industrial branches, enterprise size and market orientation | 41 |
| 5.1 Food Industry | 41 |
| 5.2 Textile Industry | 44 |
| 5.3 Pharmaceutical Industry | 46 |
| 5.4 Small and Medium Industries | 46 |
| 5.5 Manufacturing for Export | 47 |
| 5.6 Environment | 48 |
| Bibliography | 52 |

1. Introduction

At the International Conference on Population and Development in Cairo, September, 1994, the discussion will be directed at human resource development, poverty eradication, and sustainable development, and population growth, and their interactions.

the basic interactions, as they are argued in the ICPD document are the following. "There is general agreement that persistent widespread poverty as well as serious social and gender inequities have significant influences on and are in turn influenced by, demographic parameters such as growth, structure, and distribution ... Unsustainable consumption and production patterns are contributing to the ... reinforcement of social inequities and of poverty with the above-mentioned consequences for demographic parameters" (ICPD, 1994:3.1). Inversely, slower population growth is seen as giving breathing room to tackle poverty, which paves the way to sustainable economic growth. The unsustainable consumption and production patterns are those in the industrialized countries, which consume 80 percent of the resources used annually, but also over-use of resources by growing numbers of people in poverty who scratch out a living on, for example, marginal and delicate lands.

The "sustainable consumption and production patterns" are, however, hardly specified. What is the role of agriculture, agro-industry, manufacturing, trade and transport, and other services. Is sustainable development technological advance in high-output agriculture? Is it industry which minimally depletes and pollutes natural resources? Is it a service-based economy which hardly interacts with the natural environment? What guarantee is there that when/if poverty is eradicated (if indeed, it can be) that there will not be a severely polluting industry or soil-salination due to over-fertilization at the base or as the result of it? The ICPD says "development" should be "sustainable" but does not say where it should come from.

There is a growing consensus that population growth slows down economic development. Inversely, evidence shows that slowing population growth could facilitate economic development. Economic development is associated with higher per capita consumption and production. Therefore, if population growth slows down and economic development takes place, there will be a disproportionate growth of consumption and production. Economic growth is also positively correlated with resource use. If slowing down population growth speeds up economic development then the smaller number of people could still be (over-)using resources just as larger number of poor people might have in a fast growing population. Development in developing countries with slower population growth need not be sustainable. The upshot of this argument is that there are no alternatives to more benign production and consumption patterns *if* development takes place.

When concern with the development of the countries of Asia, Africa, and Latin America arose, it was expected that these countries would follow a similar path as the industrialized countries had, which had been an economic transition from largely

agriculture to an industry and service based economy. Accompanying the economic transition would be the demographic transition, with death rates reaching low levels due to low mortality, and birth rates also falling as small family size became the norm.

In the past few decades, a number of developing countries have developed according to this pattern exactly, notably the newly industrialized countries in South-East Asia, Taiwan, South Korea, Singapore, and Hong Kong. But it seems that countries which neatly flow this "classic path of development" are the rare exception rather than the norm. Most other developing countries have experienced a completely different history. Demographically, all developing countries have one common experience which is a sudden mortality declines after World War II which had nothing to do with economic factors, and which set their populations increasing at unprecedented rates. Some countries have since then achieved high levels of economic wealth, but with no concomitant social development and hardly any transition to a small family norm, therefore, their populations are still growing very quickly. Other countries have experienced very high population growth and high rates of urbanization, but neither economic nor social or demographic transition in the past 30 years.

A new, not yet widely known phenomenon is the small, but growing number of countries are experiencing or have experienced a hopeful type of change of a different kind, namely, a very rapid fertility decline before economic growth. These are countries that make the transition from about 5 children per women to 2 children in 25 or fewer years. In these countries, we find that high social development measured in terms of high life expectancy and high literacy rates for all and particularly women have been possible in *poor* countries. These countries have showed that slowing down population growth by reducing fertility is possible with a high level of social development *but not necessarily* a high per capita income.

We find that poverty, low education levels, and high population growth can hinder the development that is supposed to eradicate them.

It is found that certain industries have a special role in the beginning of modern development. Also, it is argued that the role of choosing to support export industry or import substitution industry has different effects depending on the social and demographic environment. This has much to do with the scale possibilities of export industries which face a very competitive global market, and industries for domestic goods.

The main conclusions of the report are the following.

1. Population growth reduction with high life expectancy and low fertility rates is possible in the absence of economic growth and -modernization. A prerequisite is *social* development, particularly, women's education, basic health care and -information, and perhaps some social security measures like a minimum pension plan.
2. Three-quarters of the world's population growth in the next decades is expected to be in developing country cities. According to the United Nations medium population variant, the world's population will grow by 1.85 billion to 7.15 billion in 2010, of whom

1.73 in the less developed countries, of whom 1.32 in cities. This rapid urbanization leaves no alternative to the creation of industrial and service jobs. Many people have created for themselves informal service jobs, and it appears in some countries (e.g. Brazil) an informal manufacturing sector for the local market is also beginning. If we want to eliminate poverty in the cities, these services and manufacturing activities must be supported. Thus increasing the buying power of the cities' poor would also allow governments to remove the urban food subsidies which presently keep agricultural production low because farmers do not receive adequate prices for their products. The population concentration in cities and the urban life-style are also promising for successful maternal health and family planning activities to curb the high natural growth of the cities.

3. There is, for almost all countries, no alternative to the transition from agriculture to industrialization and services for economic growth. In the first stage of industrialization, small and medium scale industry which (mainly) produces goods for the local market results in more equal distribution of the surplus, requires lower starting capital and organizational know-how, and is more beneficial to the poor than most export oriented industry. The ability to produce many basic products for the local population is (perhaps a necessary) basis for further development.

4. If population growth can be slowed down, and if developing countries can eradicate poverty, and improve economic growth, there is by itself no guarantee that this development will be "sustainable". There is no alternative to directly promoting more environmentally benign technology and production methods. Research *in* the developing countries, applied to their specific (more tropical than industrialized countries) climate and environment will identify such technologies and production methods.

The sequence of the discussion in this report is to review historical population growth from 1750 to the present and to review this growth in the context of the theory of the demographic transition. Then, global industrialization from 1750 to the present is discussed, the division of the world into the developing and the developed countries in the course of industrialization of the latter, and how the present possibilities and experiences of the developing countries differ from the developed countries. Urbanization, a concern for those who find it is occurring too fast, but supposedly a prerequisite for modern development, and the role of rural-urban migration is discussed. It is found that a large part of modern city growth is due to the natural growth of the cities themselves. We review the poverty in the present world, and how it hinders modern development. Besides the sheer numbers involved, modern poverty is also different than in earlier times of slower population growth. Education is reviewed. There are different views on the role of education. One view argues that education may not have the beneficial effect it is supposed to because children do not acquire the skills they need in school, and it may reinforce inequality as children from middle-class families receive a higher education which further improves their position vis-a-vis the children of poor families. The other view argues that a somewhat educated and literate work-force is a sine quae non condition for modern development, and that a lack of a large enough group with high education levels is an absolute bottle-neck to the development of countries which then find they do not have enough people with managerial, organizational, and entrepreneurial skills. The position of women in modern

development is also disputed. Some argue that women's work marginalizes their position as they now have double burden. Others argue that women's work gives them independence. It is shown that there does appear to be one constant and strong relation and that is that more educated women have fewer children. The closing part of this report consists of a discussion on the role of different industries in the course of modern development: the sector of industry, the size, and the market orientation.

2. Population Growth 1750-2030

As is well known, the high rates of global and regional population growth observed in the past few decades and the sheer numbers of people are a new and unique historical phenomenon. Throughout human history until this century, the rates of population growth have usually been nil or low. Since 1750 not only has population size been increasing, but on a global scale the rate of growth also accelerated to a record high in excess of two percent annually in the period 1960-1970. Since then, the growth rates have been slowly declining.

Although human populations have generally been increasing since their insemination, there have been fluctuations in that growth, including considerable population declines. The history of population growth has been neither regular nor monotonic. For example, the Black Death in Europe in the 14th century is estimated to have wiped out as much as one-third of the population. Famines reduced population size in Africa in the past, and slave trade caused the population size to shrink in some areas of that continent. The arrival of Europeans on the American continents resulted in the decimation of the original population -- through the introduction of new diseases as well as violence (e.g. Crosby, 1986). Present day Sri Lanka may have housed as many as 7-8 million inhabitants in the 11th century, had a population of only 1-2 million at the end of the 18th century (Sarkar, 1957). Populations in Iran and South-West Asia were probably also larger in the past than they were 200 years ago. In spite of such cases where populations in the past declined, the present population in probably all countries of the world is larger than it has ever been before.

It is also well-known that because of population momentum, the increase of the world's population of people will continue for some time into the future even if all couples decided to have one- or two-child families only tomorrow. This much is certain. There is, however, a large margin of uncertainty concerning the extent of the increase, which depend on assumed changes in fertility, mortality, and migration in different areas of the world.

2.1 Historical Population Growth: 1750-1900

In 1750, the world's population is estimated to have been around 700 million people. Most of them were in Asia, around 450 million, and in Europe, around 150 million. The populations of North and South America are estimated to have been very small -- 12-20 million in South America, and as few as 1-3 million in North America, and 2 million in Oceania. The size of the African population was about 100 million.

This was the period of the beginning of industrialization, and an increasing globalization of the world's economy. In the next hundred and fifty years, large populations in North and South America were established through immigration. Asia doubled and Europe

trebled in population size. The African population had hardly increased at all in this time.

In 1900 it is estimated that the world population was 1.6 billion people, of whom 120 million in Africa, 900 million in Asia, 65 million in Latin America, 81 million in North America, 430 million in Europe including the former USSR, and 6 million in Oceania. It can be noted that this time, which also marked the zenith of the economic rise of Europe and North America in the world coincided with these areas' largest share in the world's population. In 1750, 21 percent of the population had been European; in 1900, 32 percent were European or living in North America. Since then, this portion has been declining.

Table 2.1. shows the population growth rates by continent from 1750-1990. In the first period shown in the table 1750-1850, it is estimated that the natural growth rates -- the difference between births and deaths, excluding the effect of migration -- were about half a percent annually. However, local effects, particularly migration, resulted in very different population growth rates in the continents. In Africa the slave trade which took an estimated 30 million (?) people from the continent dampened population growth rates to near zero. In some regions, the population even decreased. On the other side of the Atlantic Ocean, North and Latin America experienced the highest population growth rates as involuntary immigrants from Africa and voluntary immigrants from Europe moved to the New World. The population of North America grew at almost 2 percent annually during these 100 years, a long period of population growth which has only been repeated in recent history. The population of Latin America grew at half the North American rate. Both Europe and Asia grew about half a percent annually, which are rates that just about equal the estimated natural growth rates of that period.

Table 2.1 Population growth rates from 1750-1990 by major region and continents. Estimates calculated with data from the United Nations (1973 and 1993).

| Period | World | MDCs | Europe incl. former USSR | North America | LDCs | Latin America | Asia | Africa |
|-----------|-------|------|--------------------------|---------------|------|---------------|------|--------|
| 1750-1850 | 0.47 | 0.60 | 0.53 | 1.95 | 0.43 | 0.86 | 0.48 | 0.05 |
| 1850-1900 | 0.49 | 0.97 | 0.81 | 2.12 | 0.29 | 1.12 | 0.23 | 0.34 |
| 1900-1950 | 0.88 | 0.99 | 0.59 | 1.44 | 0.86 | 1.81 | 0.85 | 1.07 |
| 1950-1960 | 1.87 | 1.27 | 1.11 | 1.81 | 2.09 | 2.79 | 1.93 | 2.27 |
| 1960-1970 | 2.03 | 1.04 | 0.94 | 1.27 | 2.45 | 2.68 | 2.31 | 2.56 |
| 1970-1980 | 1.85 | 0.80 | 0.61 | 1.09 | 2.24 | 2.39 | 2.07 | 2.81 |
| 1980-1990 | 1.74 | 0.64 | 0.57 | 0.95 | 2.09 | 1.97 | 1.88 | 2.90 |

During the second half of the nineteenth century, *crude death rates* in Europe and North America began to decline, as general wealth increased so that natural growth rates increased. This is the first phase of the so-called *demographic transition* which we will discuss below. In Europe, population growth was 0.8 percent annually in these fifty years. In North America, with the added effect of immigration, population growth exceeded 2 percent annually. Latin American population also continued to expand rapidly. The growth rates in Asia were considerably lower in the second half of the nineteenth century than before. This is because the population stagnated in China in that period. In most other Asian countries, it continued to increase at about half a percent annually. African growth rates recovered after slave trade ceased.

2.2 Historical Population Growth: 1900-1990

This century has witnessed the greatest population growth in our history. Figure 2 shows the world population from 1900-1990 by continents. In 1900, Europe and Asia were by far the most populous continents.

In the beginning of this century the crude death rates in Asia and Africa also began to decline slowly, as they had in Europe 50 years earlier and from 1900-1950 natural population growth increased to 0.8 percent annually. The lower death rate was not, as in Europe, associated with higher wealth. According to Maddison (1989) GDP per capita in international 1980 dollars increased from 485 in 1900 to 505 in 1950 in Asia. While fertility remained high, population increased to 217 million in Africa and 1.37 billion in Asia by 1950.

At the same time, in Europe the second half of the demographic transition which is declining birth rates began in the beginning of this century, and population growth rates decreased to 0.6 percent annually in the period 1900-1950. The decline was augmented by the large wave of European emigrants to the New World and the deaths caused by the first and second world wars and the early Stalinist era in the USSR.

The population in North and Latin America continued to expand at even faster rates than before because of immigration.

In 1950, the population of the world had doubled from the beginning of the century to 3.29 billion people. Europe's population had grown most slowly, from 423 to 675 million, a fifty percent increase. The Asian population doubled to 1.83 billion. The fastest growth was in South America, which quadrupled its population from 63 million to 246 million in 1950. North America and Africa both trebled their populations to 214 and 303 million respectively.

After 1950 we observe a discontinuity with the past growth rates. See table 2.1. Population begins to increase at a much more rapid pace than before. In Asia, there are 1.67 billion in 1960, 2.10 billion in 1970, 2.58 in 1980, and 3.12 in 1990. Much of that growth is concentrated in areas which had high population densities to begin with. At

much smaller absolute numbers, population size in Africa and Latin America also grows much faster than previous to 1950. There is no data existing on the actual decreases in crude death rates or life expectancy in most developing countries.

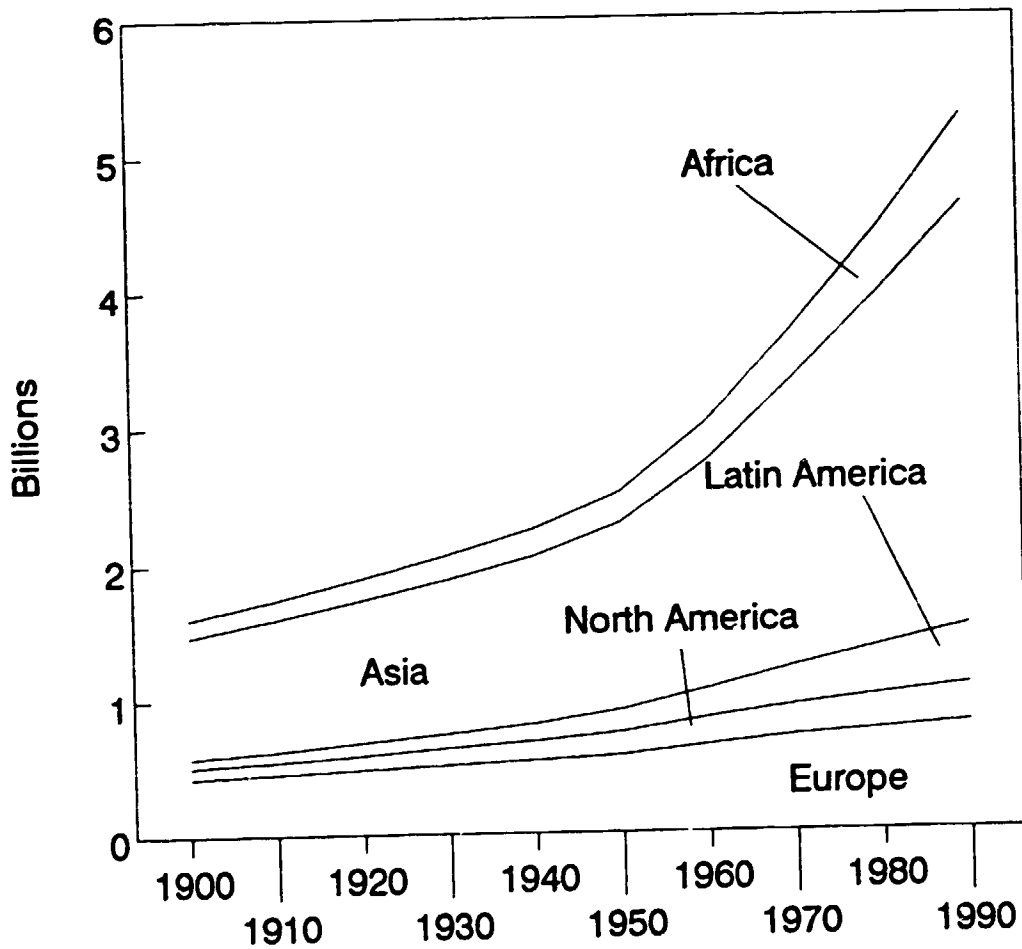


Figure 2.1 World population by continents 1900-1990. Sources: UN 1973 and 1993.

It is estimated that life expectancy in India increased from 24 years in 1891-1901 to 32 years in 1931-1941, to 39 years in 1950-55 and 45 years in 1955-60 (UN, 1973:114 and 1993:498). It is presently around 60 years. According to these estimates, the fastest increase was in the 1950s. Table 2.2 shows the estimates for death rates in selected less developed countries in the period 1920-1990. Although there has been a constant crude death rate decline since 1920 in all these countries, the decline was biggest in the middle of the century.

Table 2.2 Crude death rates in selected developing countries for which data exists, from 1920 to 1990. Data from United Nations (1973) for the period 1920-1969, and from United Nations (1993) for the period 1970-1990. Note that at the break, there is sometimes a slight increase in crude death rates because the two sources do not perfectly match.

| Period | Sri Lanka | Chile | Jamaica | Mauritius | Mexico | Singapore | Trinidad and Tobago |
|----------|-----------|-------|---------|-----------|--------|-----------|---------------------|
| 1920-24 | 29 | 30 | 24 | 32 | 25 | 31 | 22 |
| 1920-29 | 25 | 26 | 20 | 27 | 26 | 29 | 20 |
| 1930-34 | 22 | 24 | 18 | 32 | 26 | 24 | 19 |
| 1935-39 | 25 | 23 | 16 | 27 | 23 | 22 | 17 |
| 1940-44 | 20 | 20 | 14 | 26 | 22 | 21 | 16 |
| 1945-49 | 16 | 17 | 14 | 25 | 18 | 13 | 13 |
| 1950-54 | 12 | 14 | 12 | 15 | 15 | 10 | 11 |
| 1955-59 | 10 | 13 | 10 | 12 | 12 | 7 | 10 |
| 1960-64 | 9 | 12 | 9 | 10 | 10 | 6 | 7 |
| 1965-69 | 8 | 10 | 9 | 8 | 11 | 6 | 8 |
| 1970-74 | 8 | 9 | 8 | 7 | 9 | 5 | 8 |
| 1975-79 | 7 | 8 | 7 | 6 | 7 | 5 | 7 |
| 1980-84 | 6 | 6 | 6 | 6 | 6 | 5 | 7 |
| 1985-89 | 6 | 6 | 7 | 7 | 6 | 5 | 7 |
| 1990-95* | 6 | 6 | 7 | 7 | 6 | 6 | 6 |

* Estimates

Another reason the growth rates increased in such discontinuity with the past in the middle of the century in developing countries is that *fertility increased* in many countries simultaneously with the mortality decline. This is for the most part a health phenomenon. For example, malaria, which was greatly reduced in many countries in the 1950s, not only kills, but because of the high fever, decreases male fertility, and in the

women leads to more still-births. Other infectious diseases, which were reduced in the 1950s may also have inhibited fertility before and were now released. Countries where there was an increase in the total fertility rate of more than half a child per woman are: Comoro, Kenya, Mauritius, Rwanda, North Korea, Hong Kong, Jordan, Lebanon, but the majority of countries experienced at least some increase. This would mean that couples were not planning their family size exactly and that the fertility increase was purely a health phenomenon. There is another school of thought which claims that couples -- even in the absence of modern contraception -- do plan their family size. This school would say that the increase in fertility was the combined effect of 1. high confidence in the future with the shackles of colonialism removed, and 2. an intrusion of modernity which upset traditional ways of family limitation (e.g. Abernethy, 1992).

The combination of the lower death rates with high, and often increased fertility led to population growth rates in excess of two percent annually in Latin America, Asia, and Africa alike during the 1960s and 1970s. At the end of this peak in growth rates, around 1980, the world's population was 4.45 billion people.

Since then, *rates of increase* have begun to decline, as table 2.1 shows. Only Africa has growth rates still increasing and approaching 3 percent annually, while all other continents have growth rates under 2 percent -- Europe and North America under 1 percent. This decrease in growth rates has been the result of the fact that crude death rates no longer fall as quickly as before (most of the quick and easy eliminations of causes of death are being applied and further health increases are more difficult) and that fertility has declined considerably in the past twenty years. In 1965-70, the average fertility in less developed countries was still over six children per women. In 1985-90 it was below four children. There are places where the fertility decline has been much quicker with peaks of 20-25 percent decreases in one five year period (on a voluntary basis) observed in some countries like Mauritius (5.7 to 4.3 children from 1960-65), Cape Verde (6.3 to 4.9 children from 1980-85), Tunisia (4.9 to 3.9 children from 1980-85), South Korea (4.1 to 2.8 children from 1970-75), Kuwait (4.9 to 3.9 from 1980-85) and others.

However, because of the larger number of women in their childbearing ages, the absolute number of children born, and the absolute numbers in the increase of the human population are still increasing from year to year and are likely to continue to increase until the second decade of the next century, as table 2.3 shows. The table shows the number of births, which is increasing, and the crude birth rates, which are consistently decreasing from the world as a whole and less developed countries from 1950 to 2020 (according to the UN medium variant population projection).

The increasing absolute numbers of people, even if the rate of increase is falling is a sobering thought, because, as Keyfitz states in his paper "Population growth can prevent the development that would slow population growth":

Note the world crude birth rate (CBR) in [the table]. Much satisfaction is taken in its decline, from thirty-seven per thousand to the present twenty-five or so, with an even larger fall for the less developed countries. But the table also shows that the absolute number of births is increasing and will continue to increase, both for the

world as a whole and for the LDCs at least to the year 2010, while the population increases to the end of the table in 2020 and well beyond.

The tree cutting and other demands on the environment are not related to the CBR but to the population, and the relation to population is not linear or proportional, but much more than proportional once a resource has become scarce.

Table 2.3. Population, births, and birth rates, world and LDCs, 1950-2020 in thousands. Source: Keyfitz, 1991 (might be copyrighted).

TABLE 1. Population, Births, and Birth Rates, World and LDCs, 1950-2020 (Thousands)

| Year | World | | | Less Developed Countries | | |
|-------------------------|------------|-------|---------|--------------------------|-------|---------|
| | Population | CBR | Births | Population | CBR | Births |
| Estimates based on data | | | | | | |
| 1950 | 2,515,652 | 37.33 | 93,902 | 1,683,796 | 44.39 | 74,749 |
| 1960 | 3,018,878 | 35.25 | 106,418 | 2,073,969 | 41.86 | 86,810 |
| 1970 | 3,693,221 | 31.65 | 116,879 | 2,645,829 | 37.23 | 98,510 |
| 1980 | 4,449,567 | 27.11 | 120,610 | 3,312,899 | 30.96 | 102,557 |
| Projected | | | | | | |
| 1990 | 5,246,209 | 25.04 | 131,381 | 4,036,432 | 28.08 | 113,327 |
| 2000 | 6,121,813 | 22.25 | 136,223 | 4,845,166 | 24.41 | 118,261 |
| 2010 | 6,989,128 | 19.92 | 139,230 | 5,657,929 | 21.38 | 120,972 |
| 2020 | 7,822,193 | 17.72 | 138,570 | 6,445,508 | 18.61 | 119,957 |

Source: United Nations (1988)

2.3 Future population growth, 1990-2025

Many authors write about the future population growth as if it were a certainty, as if it were sure that the United Nations medium variant projection will materialize. In part, it is true that most of the next 20-30 years of population growth are embedded in the present age structure of the population. In short that means: the number of births (additions to the population) in the next 20-30 years is to a large extent determined by the number of girls and women who have been born and are between 0 to 20 years. Also: the number of deaths (subtractions from the population) in the next 20-30 are to a large extent known because deaths are overwhelmingly concentrated in the old ages (in the present time and in almost all parts of the world) and determined by today's number of people in middle age.

In spite of this, there is considerable uncertainty about the changes that will take place in the fertility behavior of today's girls; and also about the mortality developments both in the developed and the developing countries.

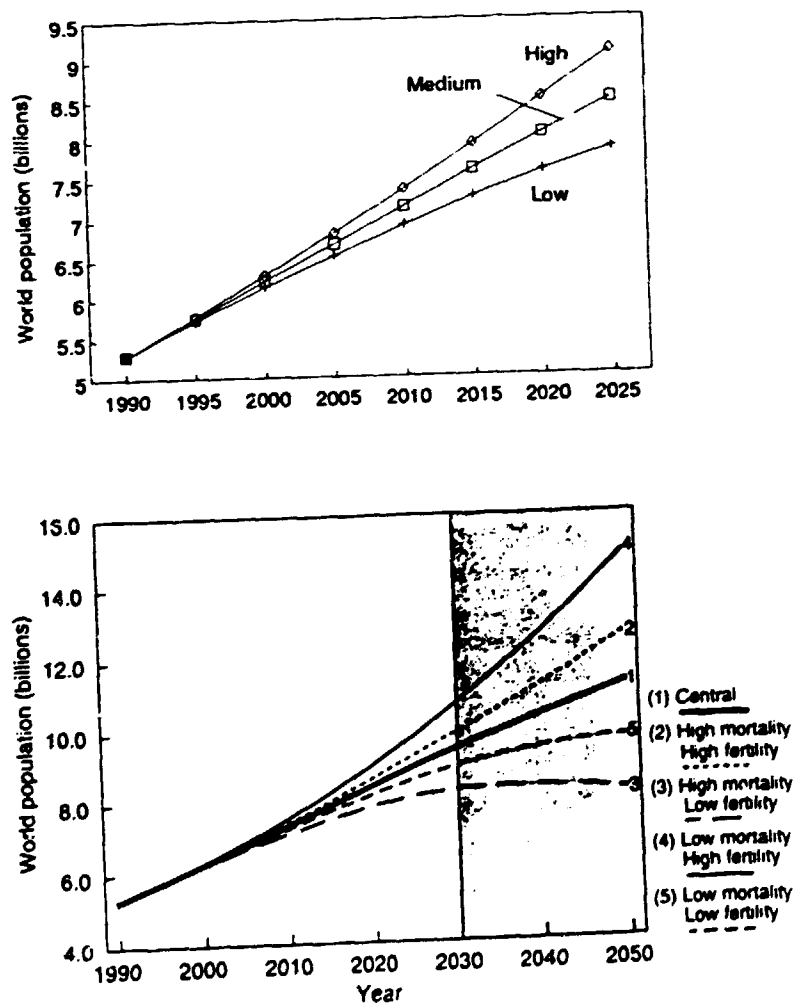
The United Nations 1992 Population Prospects publishes a low fertility, high fertility and medium fertility population variant, which result in a margin of between 7.85 and 9.08 billion in the year 2025, only thirty years from now. Another recent study, basing its

assumptions on a pool of experts and varying mortality and migration as well as fertility found a range of uncertainty from 8.23 to 10.74 billion in the year 2030.

Figure 2.2 shows the United Nations population projections until the year 2025. A second panel of the same figure shows the population projections from the IIASA until the year 2050. The variance for the IIASA projections is much higher than for the United Nations because alternative scenarios for high and low mortality are also considered. It turns out that different mortality paths can have quite an impact on population size. This is especially true in areas of high mortality such as Sub-Saharan Africa where considerable improvements can still be made in avoiding early deaths.

These projections and scenarios, even with the wide range of variation, show that the world's population will increase greatly in the next decades.

Figure 2.2 United Nations high, medium and low population projections from 1990-2025 and IIASA population projections with alternative high and low fertility, and high and low mortality from 1990-2050. Source: United Nations, 1993, and Lutz, 1994.



2.4 The Demographic Transition

This section reviews the theory of the demographic transition in which populations go from a situation of high birth and death rates, slow population growth to a situation where first death rates, then birth rates decline and there is a period of high population growth to a renewed stable situation of low birth and death rates and low growth. The classic version of this theory proposed that this transition would coincide with economic modernization and growth.

In pre-modern times and -societies, population size is relatively stable over the long run because growth rates are slow. Crude birth rates are high but offset by high death rates. These facts translate into high *total fertility rates* and low *life expectancy* at birth. Fertility is often hardly controlled, although many societies have ways to keep the birth rate down through late marriage, high rates of celibacy or sexual taboos at certain times. Some traditional societies had total fertility rates as low as 3-4 children (Abernethy, 1993:23 and 85-91). The main causes of death are infectious diseases such as malaria, tuberculosis, plague, cholera, etcetera. The infant mortality rates can be as high as over 200 per 1000 live births. Income per capita is low. This is called the "first phase".

According to the demographic transition theory which developed in the 1930s, this initial, stable situation is upset when economic growth and technological progress initiate a fall in the death rates. While fertility stays high the population goes through the "second phase" of high population growth rates. At the same time, modern economic growth (Kuznets, 1966, see below) also continues, and per capita incomes increase. Eventually, fertility begins to decline also as people attain high incomes. The period of declining fertility and medium high income is the "third phase". Finally, population size stabilizes again as birth rates fall to the low levels of the death rates, and this marks the "fourth" and final stage of the demographic transition. Some recent authors (van der Kaa) have postulated a "Second Demographic Transition" at even higher levels of per capita income, when fertility falls below the level needed to replace each generation in a post-modern, individualistic society. This would describe the old market economies of the industrialized world, Japan, and the NICs in South-East Asia which all have had fertility well below replacement since the end of the last baby boom in the 1960s.

This theory describes the experience of the presently developed countries fairly well, although it is disputed also for these countries, but it does not describe the experience of many developing countries quite as neatly. It is true that we have observed a fall in the death rates in all countries of the world at different periods in this and the last century, and that in many countries fertility declines followed or are following.

How relevant is the demographic transition for LDCs? Since the beginning of this century, as we have seen, death rates have been declining in the less developed countries, and in the past few decades, birth rates have also begun to decline. On the face of it, it seems the less developed countries are following the demographic transition as described above. However, the demographic changes are *not necessarily associated with increasing wealth*.

First, the death rate decreases in Asia in the first half of the century occurred in a period of no per capita income increases. But much more importantly, the big blow to mortality in less developed countries came immediately after World War II, sometimes cutting death rates in half in a few years *in the absence of economic growth*. The enormous decreases in mortality were due to the *importation of medical and pesticide technologies* which had been developed in the industrialized countries, and which reduced mortality from infectious diseases (particularly malaria) quickly and at a low cost.

Life expectancies in many developing countries are similar to those in the OECD in the beginning of this century, but at much lower real per capita incomes. See table 2.3. The average 1990 life expectancy in all less developed countries was almost 63 years in 1990 at a real per capita income of 2170 1990 dollars. OECD countries had a similar life expectancy, 62, around 1930 at a real per capita income twice as high, 4636 1990 dollars. The gap is even greater between the income of the least developed countries with a life expectancy of 50 years in 1990 and a per capita income 740 dollars, and the OECD countries in 1900 with a life expectancy of 50 years and a per capita income more than four times as high.

Table 2.3. Life expectancies in developing, least developed and European countries and the real purchasing power per capita income in 1990 dollars. Sources: United Nations, 1973; Madison, 1989, World Tables, 1993, and own calculations.

| Region and Period | Life expectancy | Real Per Capita Income in 1990 US dollars |
|------------------------------|-----------------|---|
| All Developing Countries | 62.8 | 2170 |
| Europe 1929 | 61.7 | 4636 |
| Least Developed Countries | 51 | 740 |
| Europe 1900 | 50 | 3089 |

Second, the correlation between declining fertility and income in developing countries is not clear. There are some countries which experienced fertility declines at low levels of per capita income, such as Mauritius, Sri Lanka, Taiwan, Indonesia, Thailand, Jamaica and others (subsequently, some of these countries experienced industrialization and economic growth). There are other countries which have had enormous increases in wealth but slow fertility declines, notably the Arab oil producing countries. See table 2.4. We consider the information contained in this table to be of great importance because it shows that fertility declines, and thus, lower population growth is possible at low levels of income. It also shows what all countries which have experienced this decline have in common is that their literacy rates and life expectancy (a reflection of health) are high. It shows that the level of modernization, indicated by the percentage of the labor force in industry, is very variable.

It is further questionable whether countries with high population growth -- due to high fertility rates combined with low death rates -- can, in the present world, ever attain the minimum income levels for the majority of the population that *could* lead to reduced fertility.

Table 2.4 Countries with fertility below 2.5 in 1990, industrialization, income, income of the poor, literacy. Source: UNDP, 1993 and UNESCO, 1993.

| country | Percentage of labor force in industry | | Percentage of adults literate | | Total fertility rate | | Life expectancy | Income | Income of lowest 40% |
|-----------------------|---------------------------------------|------|-------------------------------|------|----------------------|------|-----------------|--------|----------------------|
| | 1990 | 1965 | 1990 | 1970 | 1990 | 1965 | 1990 | 1990 | 1990 |
| Hong Kong | 35 | 53 | | 64 | 1.4 | 5.0 | 77.3 | 15595 | 6316 |
| Barbados | 26 | | 99@ | 99 | 1.7 | 4.4 | 75.1 | 8304 | |
| Singapore | 40 | 27 | | 54 | 1.7 | 5.3 | 74 | 15888 | 5955 |
| Korea, Rep. of | 34 | 15 | 96 | 88 | 1.7 | 5.7 | 70.1 | 6733 | |
| Antigua and Barbuda | | | | | 1.7 | | 72 | | |
| Cuba | 29 | 25 | 94 | 87 | 1.9 | 4.2 | 75.4 | | |
| Mauritius | 31 | 25 | 75 | | 2 | 5.7 | 69.6 | 5750 | |
| Bahamas | | | | | 2.1 | 3.9 | 71.5 | 11235 | |
| Thailand | 11 | 5 | 93 | 79 | 2.3 | 6.4 | 66.1 | 3986 | |
| China | 14 | 8 | 73 | | 2.3 | 5.8 | 70.1 | 1990 | |
| Cyprus | 37 | | 91* | | 2.3 | 3.5 | 76.2 | 9953 | |
| Korea, Dem. Rep. of | 30 | 23 | | | 2.4 | 5.7 | 70.4 | | |
| Uruguay | 18 | 29 | 96 | 93 | 2.4 | 2.9 | 72.2 | 5916 | |
| Sri Lanka | 12 | 14 | 88 | 77 | 2.5 | 5.2 | 70.9 | 2405 | 800 |
| Dominica | | | | 94 | 2.5 | | 76 | 3910 | |
| Jamaica | 12 | 20 | 98 | 97 | 2.5 | 5.4 | 73.1 | 2079 | 1139 |
| Saint Kitts and Nevis | | | | 97 | 2.5 | | 67.5 | | |

@ estimate based on 99 percent in 1970.

* 1987

3. Economic Change 1750-1990

We are going to begin this section with a descriptive part and conclude with a theoretical part as in the previous section. The economy is much more volatile and it is more difficult to make scenarios therefore, this section gives an historical overview only. The historical overview concentrates on the development of industrialization specifically, and less on agriculture and services. There are more different economic theories to explain and predict than there are demographic ones and the theoretical review will be very restrictive. The role of population growth and change as we shall see has played an important part in economic development, which will be more apparent in the sections following on poverty and urbanization.

3.1 The demise of less developed country industry: 1750-1900

In 1750 the world consisted of agricultural societies with larger and smaller urban centers. The majority of the population was rural and engaged in agriculture. Many articles such as clothing and simple furniture were made by the families themselves. There was a small group of artisans engaged in industry and a small group engaged in services, mainly commerce and government administration. The economic difference between Europe and the high cultures in other continents, measured in per capita industrial output was practically none.

From the middle of the eighteenth century, the industrial revolution started in England which transformed the world. It resulted in a small number of rich, industrial countries, and a larger number of what we now call developing countries. Table 3.1 shows the industrial output estimated by Bairoch (1982) and the UNIDO (1991).

At the beginning of the European industrial revolution, the industrial output in what are now the LDCs was higher than in Europe, reflecting the larger populations and equal per capita production. From this time, there was a very rapid rise in the output of what are now the more developed countries. The output in the LDCs stagnated, and from 1830 actually goes into a steep decline. In 1900, the output in LDCs was only two-thirds of what it had been 150 years earlier! Meanwhile, the MDCs produced 15 times as much as they had 150 years before.

The manufactured products that came out of the factories of Europe and soon, North America, were cheaper than the artisanal products. In the MDCs this eliminated the artisanal production by replacing it. In the present less developed countries many of which were colonies in this time, the manufactured products were imported and also eliminated or reduced artisanal production, but there was no industry to replace it.

There cannot be any question but that the cause of the de-industrialization in the Third World today lay in the massive influx of European manufactured products, especially textiles, on the markets of these countries.

Bairoch, 1992:277

While there can be no doubt about the effect that the rapid expansion of Europe and North America had on the now less developed countries, there has been some question whether the large markets in the tropical continents were an added impetus to the industrializing countries. Bairoch (idem) has estimated that the value of the imports to the tropical continents was 5-8 percent of the total European and North American industrial output. Although this is a percentage that for some firms could mean the difference between profitability and going out of business, in general "[t]his would seem to suggest that the damage caused to Third World countries did not in fact have a correspondingly massive positive effect in the developed countries" (Bairoch, 1982:279).

The fact that the less developed countries had their domestic artisanal production thus damaged must be a severe handicap to their development today, because the import of simple consumer goods is a constant drain on limited resources needed for development. This drain did not exist for the presently developed countries in the nineteenth century. A review of successful cases of industrialization would show that these countries began by producing goods for the local market (import substitution as it is now called, but which is actually simply domestic production as it was in the 19th century).

Table 3.1. Levels of industrial output and average annual industrial growth in the world, present MDCs, present LDCs and the UK (used as an index) from 1750-1990. Sources: Bairoch (1982) and UNIDO (1991).

| | Total industrial output, U.K. 1900 = 100 | | | | Interval | Annual growth of industrial output | | | |
|------|--|-------|------|-----|-----------|------------------------------------|------|------|------|
| | World | MDCs | LDCs | UK | | World | MDCs | LDCs | UK |
| 1750 | 127 | 34 | 93 | 2 | | | | | |
| 1800 | 147 | 47 | 99 | 6 | 1750-1800 | 0.3 | 0.5 | 0.1 | 2.2 |
| 1830 | 164 | 73 | 112 | 18 | 1800-1830 | 0.4 | 1.5 | 0.4 | 3.7 |
| 1860 | 226 | 143 | 83 | 45 | 1830-1860 | 1.1 | 2.2 | -1.0 | 3.1 |
| 1880 | 320 | 253 | 67 | 73 | 1860-1880 | 1.7 | 2.9 | -1.1 | 2.4 |
| 1900 | 541 | 481 | 60 | 100 | 1880-1900 | 2.6 | 3.2 | -0.6 | 1.6 |
| 1913 | 933 | 863 | 70 | 127 | 1900-1913 | 4.2 | 4.5 | 1.2 | 1.8 |
| 1928 | 1356 | 1258 | 98 | 135 | 1913-1928 | 2.5 | 2.5 | 2.2 | 0.4 |
| 1938 | 1684 | 1562 | 122 | 181 | 1928-1938 | 2.2 | 2.2 | 2.2 | 2.9 |
| 1953 | 3070 | 2870 | 200 | 262 | 1938-1953 | 4.0 | 4.1 | 3.3 | 2.5 |
| 1963 | 5138 | 4699 | 439 | 334 | 1953-1963 | 5.1 | 4.9 | 7.9 | 2.4 |
| 1973 | 9359 | 8432 | 927 | 471 | 1963-1973 | 6.0 | 5.8 | 7.5 | 3.4 |
| 1980 | 11040 | 9718 | 1323 | 454 | 1973-1980 | 2.4 | 2.0 | 5.1 | -0.5 |
| 1990 | 14035 | 12109 | 1954 | | 1980-1990 | 2.4 | 2.2 | 3.9 | |

3.2 Re-industrialization, 1900-1990

We have taken 1900 as a turn-around point because that is the time when industrial output in developing countries began to increase again, albeit at a slow pace.

In the first half of the century, the more developed countries continued to expand their industrialization. Figure 3.1 shows how this expansion resulted in a *sectoral change* in the economy -- industry increases to about one third of employment, agriculture decreases, and services increase to about 60 percent of employment. The top figure shows the percentage of the labor force employed in agriculture. In the six countries shown agricultural employment starts at high levels in the beginning of the industrial revolution and decreases to less than 10 percent. The industrial employment changes more gradually, but for all six countries converges to around a third of the labor force. Note the extremely fast industrialization experienced by the USSR from the 1920s through the 1950s, during Stalin's reign. This industrialization was forced politically. Japan's industrialization was also very fast, and seems to have benefitted from government intervention and support. The proportion of the labor force in services increases more quickly than that in industry in the six countries shown and rises to take up a larger portion of the labor force than industry, namely around 60 percent.

The figure shows that there is a convergence among the MDCs to the post-industrial economy, and that the speed of the transition is increasingly fast for later starters (excluding the LDCs for the moment).

The reason for the economic transition as experienced in the MDCs shown in the figure, is the following.

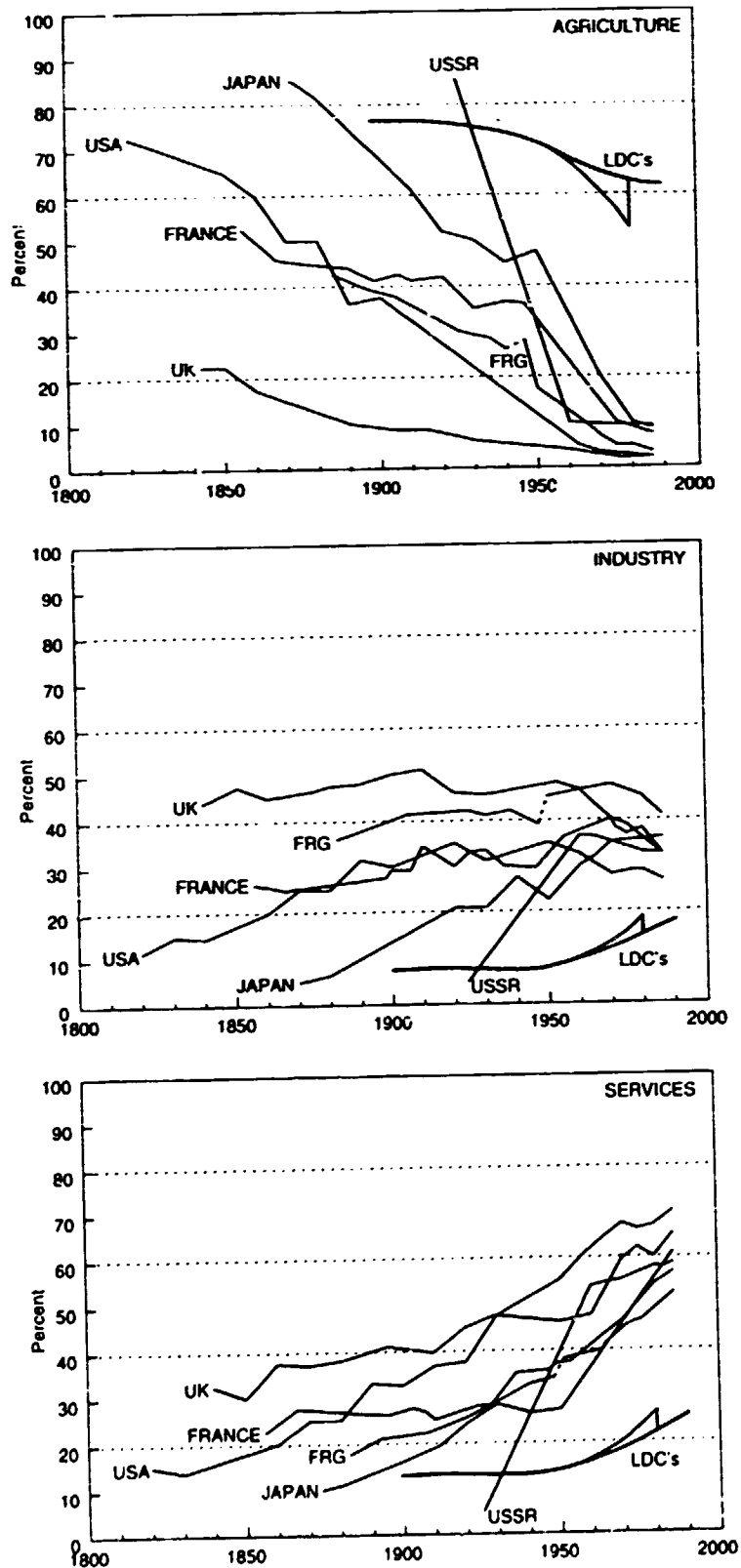
Clark (1940) and Fischer (1939) argued that as a country's per capita GNP grows, the decline in the relative demand for agricultural goods, along with rising agricultural productivity, causes the relative employment in agriculture to fall. At the same time, an increasing relative demand for manufactured goods causes the percentage of labor engaged in the sector to rise. In later stages of development, productivity increases in manufacturing, along with an accelerated demand for services, cause the relative employment in manufacturing to fall in favor of services.

Pandit and Casetti, 1989:331

Figure 3.1 also shows the less developed countries from 1900. During the whole first half of the century, there was no structural change in these countries, on average. The slight industrial growth that was mentioned above and which is shown in table 3.1 was just a tiny bit more than enough to keep up with the growth in population and the labor force. The total industrial output -- using the UK = 100 in 1900 as an index -- increased from 60 in 1900 to 122 in 1938.

From 1950 on there is an increase in industrial output and the beginning of a structural change in the developing countries. This change coincided with political independence, with the greater health of the population and the beginning of its very fast increase.

Figure 3.1 The sectoral economic transition in six more developed countries from 1800-1990, and in LDCs from 1900. Percentage employed in one of three economic sectors. The flag in the LDC line after 1950 indicates discrepancy in source data. Sources: Gilli et. al. (1990), Pandit and Casetti (1989) and World Bank (1993).



In absolute terms, the industrial growth in the LDCs together from 1953-1980 exceeded the maximum growth rates of the industrial countries during any period of their history. See table 3.1. The proportion of industrial output from LDCs in the world industrial output is increasing and is projected by the UNIDO to continue to increase. Some countries -- much of Latin America, Singapore, Malaysia, Hong Kong, Taiwan and some others -- have reached rates of employment in industry which are comparable to MDCs. Nonetheless,

[t]he very low starting points of Third World manufacturing mean that despite the rapid progress registered, the gap which divides them from the developed world is still enormous. Around 1953 the gap was of the order of 1 to 27 in terms of per capita output; by 1973 it had become 1 to 23; by 1980 1 to 20.

Bairoch, 1982:308

The average productivity per industrial worker in LDCs was about 1/13 that of the average productivity per industrial worker in MDCs in 1990. This is partly because of the mixture of industries in the developing countries which is often labor-intensive low-wage industry, and domestic goods industry, whereas in the MDCs the modern high-skill manufactures such as computer and communications hardware are a large portion. Also, even within the same industry, MDCs often use more technology-intensive production techniques. Considering the large numbers of people without work in the LDCs, the more labor-intensive production even if it results in lower productivity is probably good.

Figure 3.1 shows that LDCs are industrializing and on the average, are well on their way to reaching the one-third employment in industry with the MDCs. Where there is a much greater discrepancy is in the large portion remaining in agriculture, and the small amount employed in services compared to MDCs. There are however, many authors who argue that the service sector in the less developed countries is inflated. Large numbers of people who could otherwise not find a job are in the informal service sector and some governments have an inflated number of civil servants to keep unemployment and social unrest down. In fact, however, compared to MDCs the modern, productive service sector may be too small.

In spite of very impressive growth the increase in industrial employment and output on average, the sectoral change in many individual LDCs is proceeding more slowly than in Europe in the past and in the newly industrialized countries (NICs) mentioned above. In some of these countries, the service sector is growing much more quickly than in industrial states in early stages of their development. There appear to be two complementary explanations. One is that the present LDC countries have access to the labor-efficient technology developed in the industrialized world. Since the LDCs adopt these capital-intensive technologies it is argued that their labor shares in industries will never be as high as they were in presently industrialized countries. The other side is demographic: LDCs are experiencing high population growth rates.

This, together with the high rates of rural out-migration, allowed the urban labor force growth to outstrip the absorptive capacity of industry. The surplus labor thus generated entered the service sector, and engaged largely in the low-productivity,

individual and family enterprises known collectively as the "traditional" or "informal" services.

Pandit and Casetti, 1989:333

A number of authors (e.g. Bairoch, 1973; Mouley and Costa, 1974) noted early on that the industrial sector lagged behind the growth in the labor force and the service sector acted as a sponge taking up the excess labor.

The rates of industrial growth experienced in the past 20 years have differed very much from continent to continent as table 3.2 shows.

Table 3.2 Industrial growth by continents from 1970-1990. Source: UNIDO, 1991.

| Region | 1970s ^{a/} | | 1980s ^{b/} | | 1987 IFA per capita (1980 dollars) |
|-------------------------|---------------------|----------------------------|---------------------|----------------------------|--|
| | IFA (percentage) | Employment (percentage) | IFA (percentage) | Employment (percentage) | |
| World | 3.5 | 1.4 | 2.4 | 0.0 | 705 |
| Developed regions | 3.1 | 0.5 | 2.2 | -0.4 | 2 549 |
| North America | 2.7 | 0.6 | 1.6 | -0.7 | 2 987 |
| Western Europe | 2.1 | -0.4 | 1.7 | -1.2 | 2 687 |
| Eastern Europe and USSR | 5.8 | 1.6 | 2.9 | 0.3 | 1 951 |
| Japan | 1.1 | -0.6 | 3.7 | 0.6 | 3 800 |
| Other | 2.5 | 0.9 | 1.2 | -0.2 | 991 |
| Developing regions | 7.4 | 5.0 | 3.9 | 1.1 | 176 |
| Latin America | 6.6 | 4.0 | 1.6 | -0.7 | 661 |
| Tropical Africa | 5.7 | 4.7 | 0.5 | 1.2 | 32 |
| North Africa | 7.0 | 5.6 | 5.1 | 3.8 | 138 |
| Western Asia | 7.6 | 5.4 | 4.0 | 2.0 | 305 |
| Indian Subcontinent | 3.4 | 3.9 | 6.2 | 0.4 | 53 |
| South-East Asia | 11.6 | 7.2 | 7.5 | 2.5 | 329 |

Source: UNIDO database, consolidated Industrial Statistics.
^{a/} Between 1970 and 1980.
^{b/} Between 1980 and 1990 (estimates).

The table shows the enormous discrepancies between per capita LDC industrial value added and MDC values. It also shows that the industrial growth rates in employment and in value added were very high in the 1970s and in Asia also in the 1980s. It shows that during the last decade, Latin America and Tropical Africa experienced enormous slumps.

3.3 The economic transition

The economic change described above has occurred relatively recently and quickly and has given rise to various explanatory economic theories as each new change and unexpected development occurred.

In the beginning of modern economic thought, the economies were largely agrarian with 70-90 percent of the population working in the primary sector. A small portion was employed in artisanal production and in services. Technological change was slow.

Early thinkers on economic change and population growth such as Ricardo and Malthus in the 18th and early 19th century observed this world and noted that there were limited, fixed amounts of land on which agricultural populations of varying size could live. Ricardo saw that as the population increased, it would first produce on the best land, then progressively start to cultivate more marginal lands -- so that for each additional person or farmer, there would be decreasing returns.

Ricardo did not mention what would happen to increasing numbers of men who would no longer be employable when their wage exceeded the product. Malthus, writing about the same time, saw the accumulation coming to a catastrophic end as people multiplied, because their birth rate was higher than their death rate until their numbers were such that a bare subsistence level could be given to each of them. At that bare subsistence level, death rates would increase again, and be so high as to stop further population growth. The only alternative he saw was to limit births in the period of growth and stabilize population at a lower level where more (agricultural) product would be available to each.

Neither of these important thinkers gave much room to technological innovation which as we know now provided the motor to (at *least* temporarily) overcome the decreasing returns associated with higher populations. Moreover, as we have seen, the population of Europe did not grow at a very fast pace -- the total population increased from about 200 million (including area of USSR) in 1750 to around 550 million 150 years later -- while the New World continents offered such vast expanses of fertile agricultural land that even Malthus would have allowed for a period of population growth there.

Technological innovations were the main reason that neither Ricardo nor Malthus proved correct in Europe and North America. In agriculture, mechanization of certain work such as replacing cotton pickers with the cotton gin in the United States made thousands of workers redundant, but those who remained were more productive. The productivity increase in agriculture was particularly important because it meant that fewer people could produce more on less land than before, thus providing a food surplus for those who were now free to become involved in industrial or service production.

In England, the introduction of the weaving loom and other machines put thousands of people to work in industry in the 18th century, followed by other countries in Europe in the 19th. Much of this industry was what we would now call small scale and located in small towns as well as in bigger cities. Further innovations (technical and organizational -- e.g. Fordian production) made labor more productive, therefore freed up many workers for other productive activities. Industrialization also put many people to work in mines for coals to feed the machines; the urban masses were markets for greater output. The industrialists of that period reinvested the surplus their workers produced for them in more capital and so, the industrialization of Europe, North America, and along slightly different lines Japan, became a self-sustaining upward cycle.

The role of capital accumulation in this cycle was formalized during the 1930s through the 1950s in the Harod-Domar growth model (Domar, 1958). This model says that the

rate of economic growth is equal to the ratio of the savings rate, s , to the capital output ratio, k .

$$\Delta Y/Y = s/k.$$

An economy with more capital can be more productive. The funds with which to increase capital accumulations come from savings. Therefore, the higher the savings rate, the higher the investment rate and the more capital accumulation which increases growth. In the original model the most important variable to change the growth rate, $\Delta Y/Y$ was through a higher savings rate, s . But it need not be the only factor.

As the formula shows, economic growth can also result from decreased in k , more efficient capital, through technological innovations. Some developing countries, notably in Latin America also tried to circumvent the requirement for higher savings by "importing" foreign savings through loans. The debt crisis of the 1980s showed that this formula is at best more risky than using home savings.

In a detailed study of India, Coale and Hoover (1957) looked at the influence of population change on this growth model. Their conclusion was that if the population is growing quickly, more investments have to be used for basic infrastructure for the growing population and less remains for investment into the productive sector. That is, population growth reduces economic growth, all things being equal, according to this model.

A very influential thinker on modern economic growth is Kuznets, who noted that there had been increasing per capita incomes, even while population was increasing during the industrial revolution. This led Kuznetz (1971) to the concept of "modern economic growth". This growth is characterized by the following:

1. high rates of population *and* per capita economic growth;
2. high rates of innovation and productivity increases, particularly labor;
3. fast structural transformation of the economy and
4. of social and ideological beliefs;
5. the propensity of the economically more advanced countries to reach out to the rest of the world to sell their products and obtain materials;
6. the tendency of the economic growth to be limited to a third of the world's population.

Kuznets based his observations on an analysis of the MDCs from the middle of the nineteenth century to the middle of the twentieth. Table 3.3 shows the annual rates of population growth and income growth for selected countries. Those which experienced the highest population growth rates also experienced the highest income growth.

The question whether Kuznets' modern economic growth applies to today's developing countries must probably be answered in the negative in general. First, we observe that in those countries with the highest population growth -- mostly in Sub-Saharan Africa with growth rates sometimes in excess of three percent annually -- are also those which presently have the lowest per capita income growth. Also, if modern economic growth

is limited to one-third of the population, then by definition, two-thirds is excluded from it and develops according to different rules.

Table 3.3 Population growth rates and per capita income growth rates from the middle of the nineteenth century to the middle of the twentieth in presently industrialized countries. Source: Bose et al., 1981.

| Country | Average Annual Percentage Increase | | | Period |
|--------------------------------------|------------------------------------|-------------------------------|-------|-----------------|
| | Population | National Product ^a | | |
| | | Per Capita | Total | |
| France | 0.3 | 1.8 | 2.1 | 1841 50-1960 62 |
| England | 0.6 | 1.4 | 2.1 | 1855 58-1957 59 |
| Sweden | 0.7 | 2.8 | 3.7 | 1861 65-1960 62 |
| Italy | 0.7 | 1.3 | 2.0 | 1861 65-1960 62 |
| Switzerland | 0.8 | 1.6 | 2.6 | 1890 99-1957 59 |
| Norway | 0.8 | 1.9 | 2.9 | 1865 74-1960 62 |
| Denmark | 1.0 | 1.9 | 3.2 | 1870 74-1960 62 |
| Russia USSR | 1.0 | 2.0 | 3.3 | 1860-1958 |
| Germany Fed. Germany | 1.1 | 1.6 | 2.9 | 1851 55-1960 62 |
| Netherlands | 1.4 | 1.4 | 3.0 | 1900 04-1960 62 |
| Average ^b of 10 countries | 0.8 | 1.8 | 2.8 | |
| Japan | 1.2 | 2.6 | 4.2 | 1879 81-1959 61 |
| Canada | 1.9 | 1.8 | 4.1 | 1870 74-1960 62 |
| U.S.A. | 2.2 | 1.7 | 4.3 | 1839-1960 62 |
| Australia | 2.4 | 0.8 | 3.4 | 1861 65-1959 62 |

^a In constant prices. ^b Unweighted.
 DATA SOURCE: Simon Kuznets, *Modern Economic Growth, Rate, Structure and Spread* (New Haven, 1966), pp. 64-65.

Before Kuznets' observation that his "modern development" was limited to a part of the world, the idea of development in the 1950s and 1960s as the colonies became independent countries was that if these countries could save, and transform from agricultural to industrial societies, then they would develop like Europe, North America and Japan. Now, after some decades of experience, it appears that it may not be so simple.

There are a number of countries which have industrialized with regards to the percentage of the labor force employed in industry. According to the demographic and the economic transitions, those economies which have industrialized should have relatively high income levels, relatively low fertility, and also, high literacy rates. Table 3.4 shows those countries which had 25 percent or more of their labor force employed in industry in 1990.

All the countries in table 3.4, except Hong Kong, Singapore and the United Arab Emirates have income levels which are far below those of the developed countries. This has to do with the low productivity in industry, but also with the low productivity in agriculture and the small sector of modern services. According to the UNIDO 1992/3 Global Report, the largest part of the profits in the modern productive cycle are made in financial, managerial, transport, and other services, and only a small part in the actual industrial process.

The table shows that there is a large disparity of income among these countries with over a quarter of the labor force in industry. For example, there were four countries with real purchasing power per capita incomes below \$2000 in 1990. The correlation between fertility and industrialization is particularly weak. There are 11 countries in our sample with fertility above four children, of which 5 have a fertility above six children. In general, literacy rates are fairly high, but there are three notable exceptions: Iran, Morocco and Pakistan have low adult literacy levels. In Morocco, the high percentage of people in industry could be related to the still large artisinal tradition.

Table 3.4 Countries with more than 25 percent of the labor force in industry in 1990 by several indicators. Source: UNDP, 1993.

| country | Percentage of labor force in industry | | Adult literacy rate | | Total fertility rate | | Life expectancy | Per capita income 1990 | |
|------------------------|---------------------------------------|------|---------------------|------|----------------------|------|-----------------|------------------------|------------|
| | 1990 | 1965 | 1990 | 1970 | 1990 | 1965 | 1990 | all | lowest 40% |
| Costa Rica | 46 | 19 | 93 | 88 | 3.2 | 7.0 | 74.9 | 4542 | 1317 |
| Trinidad and Tobago | 41 | 35 | | | 2.8 | 5.2 | 71.6 | 6604 | |
| Singapore | 40 | 27 | | | 1.7 | 5.3 | 74 | 15888 | 5955 |
| United Arab Emirates | 38 | 32 | | | 4.6 | 7.0 | 70.5 | 16753 | |
| Cyprus | 37 | | | | 2.3 | 3.5 | 76.2 | 9953 | |
| Syrian Arab Rep. | 36 | 20 | 65 | 40 | 6.3 | 7.2 | 66.1 | 4756 | |
| Hong Kong | 35 | 53 | | | 1.4 | 5.0 | 77.3 | 15595 | 6316 |
| Bahrain | 35 | | 77 | | 3.8 | 7.0 | 71 | 10706 | |
| El Salvador | 35 | 16 | 73 | 57 | 4.2 | 6.9 | 64.4 | 1950 | |
| Argentina | 34 | 34 | 96 | 93 | 2.8 | 3.1 | 71 | 4295 | |
| Korea, Rep. of | 34 | 15 | 96 | 88 | 1.7 | 5.7 | 70.1 | 6733 | |
| Lesotho | 33 | 3 | | | 4.8 | 5.9 | 57.3 | 1743 | |
| Venezuela | 32 | 24 | 88 | 75 | 3.2 | 6.4 | 70 | 6169 | 2144 |
| Maldives | 32 | | | | 6.3 | 7.0 | 62.5 | | |
| Colombia | 31 | 21 | 87 | 78 | 2.7 | 6.6 | 68.8 | 4237 | 1345 |
| Mauritius | 31 | 25 | | | 2 | 5.7 | 69.6 | 5750 | |
| Mexico | 31 | 22 | | 74 | 3.3 | 6.7 | 69.7 | 5918 | |
| Chile | 30 | 29 | 93 | 89 | 2.7 | 5.3 | 71.8 | 5099 | |
| Korea, Dem. Rep. of | 30 | 23 | | | 2.4 | 5.7 | 70.4 | | |
| Libyan Arab Jamahiriya | 29 | 21 | 64 | 37 | 6.5 | 7.1 | 61.8 | | |
| Cuba | 29 | 25 | 94 | 87 | 1.9 | 4.2 | 75.4 | | |
| Iran, Islamic Rep. of | 28 | 26 | 54 | 29 | 6.1 | 7.2 | 66.2 | 3253 | |
| Qatar | 28 | | | | 4.5 | 6.9 | 69.2 | | |
| Lebanon | 27 | 24 | 80 | 69 | 3.2 | 6.3 | 66.1 | | |
| Malaysia | 27 | 13 | 78 | 60 | 3.7 | 6.7 | 70.1 | 6140 | 2134 |
| Jordan | 26 | 26 | 80 | 47 | 5.8 | 7.6 | 66.9 | 2345 | |
| Guyana | 26 | | 96 | | 2.6 | 6.3 | 64.2 | 1646 | |
| Barbados | 26 | | | | 1.7 | 4.4 | 75.1 | 8304 | |
| Brazil | 25 | 20 | 81 | 66 | 2.9 | 6.2 | 65.6 | 4718 | 955 |
| Morocco | 25 | 15 | 50 | 22 | 4.5 | 7.1 | 62 | 2348 | 1338 |
| Pakistan | 25 | 18 | 35 | 21 | 6.3 | 6.8 | 57.7 | 1862 | 884 |

4. Social Aspects and Human Resource Development

This section looks at poverty, urbanization, education, and women's position. These are seen as important intervening variables between population and development. As we saw in the introduction, poverty can be a result of excessive population growth together with slow economic growth. Poverty is seen to influence demographic variables such as life expectancy, family size and education. Some view in poverty a hindrance to economic development because of the low purchasing power, especially for manufactured and service goods, of the very poor. Moreover, the poor are forced into a marginal existence, where they can have no concern for environmental damage, caused for example, by over-cultivation. On the other hand, the urban poor are great recyclers.

Urbanization is a global trend, with more and more of the world's population living in cities. Partly, the new urbanites are immigrants from rural areas who seek a better fortune in the city. Much of urban growth in present cities also comes from natural growth in the cities themselves. Urbanization is associated with larger portions of the labor force working in industry. In many less developed country cities, we see a growing number of marginal poor who eke out a living in the informal service sector.

Education is viewed by many as the sine quae non of development. An educated, disciplined labor force, by virtue of being able to read and write is able to pick up new technologies or directions more quickly. A certain number of people with high education is necessary not only for governing the country, but also for management, organization etcetera of companies.

Women are one-third of the world's labor force, and this does not include the enormous amounts of work they do unpaid in the home. Women's labor force participation can be a driving force in economic growth. Educated women who are working have smaller families than their uneducated or non-working counterparts.

4.1 Poverty, Population Growth and Industrialization

The proportional difference in the number of poor is the most important difference between the developed and the developing countries.

Keyfitz, 1992:44

Poverty of large numbers of people is one of the chief concerns of the ICPD. Poverty keeps people in poor health, suffering malnutrition, and dying premature deaths. To poor people with no social security and scraping together a living with many simple tasks, a large number of children is a good investment, and so they do not reduce their family size with consequences for population growth. In the past, early deaths and many births balanced out but today as we have seen the past balance has been upset by the medical innovations which in developing countries did not come from economic growth.

Until now, the vast number of poor in the world have been rural, mainly because most people in the world were rural. Now, as urbanization increases, so does the proportion of poor that is living in cities. In the 1970s, only 20 percent of the world's poor were urban. In 1990, that percentage was estimated to be almost 30. It will increase as the world's population becomes urbanized.

There have always been poor throughout human history. But today, the numbers of poor are increasing more rapidly than ever before. At the same time, the numbers of people with middle-class or at least above poverty incomes, are increasing even faster. As measured by the number of automobiles and other artifacts, the middle class of the less developed countries has been increasing at about 6 percent annually. With population growth at 2 percent annually the proportion of the population in the middle class is growing at 4 percent annually and the poor decreasing 2 percent. Ultimately, at these rates, the whole world will have attained a middle class lifestyle, but in the contemporary phase the numbers of the poor are increasing (Keyfitz, 1992).

When population was increasing slowly, the economy developed in such a way as to give most (poor) people a productive place. The poor during the industrial revolution in Europe, America and Japan were certainly not enviable, but their work was clearly the source of increasing national wealth. The poor on the land were clearly the source of national food. Today, with increasing use of capital and labor-saving technology even in developing countries, and the unprecedented rate of population growth, increasing numbers of poor are finding themselves not only exploited by, but worse still, useless to the mainstream economy.

The world's real purchasing power income per capita was almost \$5000 in 1990. On average, the world's population is far from poor. One of the main causes of poverty is an unequal national distribution of wealth. One of the apologies for an unequal distribution of income and a large group of poor people in a growing economy is the following: on average, people with higher incomes save a greater portion of their income, and these savings are necessary for investments. In many developing countries, this assertion appears to be contrary to the facts. The rich spend large portions of their income on imported consumer articles, and are not noted for their propensity to invest in the local economy, rather, they invest abroad. Also various studies showed that it was small farmers and individuals who had the highest savings rates.

Another reason poverty hinders the economy is that the poor, malnourished, and uneducated have lowered economic productivity. Not only that, but large masses of disenfranchised, especially educated poor, are a real threat to security as many examples of youth riots have shown. More seriously, soldiers and guerilla fighters are almost invariably young men and women who might not be in the jungles fighting if they had a decent job.

If the buying power of the poor were raised by some measure which would allow them comfort, they would be buying simple consumer goods like food, clothing, small appliances, bicycles, toys, etcetera. These are precisely the kind of goods which can be made by local industry with relatively simple technologies, at a small or medium scale, with relatively low starting investments. By contrast, rich people tend to spend larger

portions of their income in complex luxury goods such as cars, air-travel, color televisions and other things which require high technology, large economies of scale, and large initial investments to produce and are therefore usually not produced locally. It should be noted that during the industrialization period of the developed countries, the factories were very busy producing bread, shirts, chairs, light-bulbs and the like for the simple consumer whose large numbers and large demand fueled economic growth. One simulation study by Locatelli (1985) found that if the income distribution of Brazil were more equal, and the buying power of the poor increased, then this would increase industrial output of Brazil by 16 percent.

One of the classic arguments on why a large population or population growth would fuel the economy is that it provides a large number of laborers, who, because of competition among themselves, are cheap. Labor in the LDCs is certainly cheap, but its low price is not always fueling the economy. In some countries, the urban populations are growing more quickly than industrial and mainstream service jobs. The urban poor, who cannot afford better, live in make-shift housing. One author argues that,

[i]f the populations in the LDCs had become stationary at about 1950, instead of exploding as they did ... [t]here would be labor shortages, the elite would be cultivating the poor rather than bulldozing their homes.

Keyfitz, 1992:45

The unemployed poor may be "useless" to the middle class as we observed above, but they are not useless to themselves, on the contrary, the whole informal sector has them providing services to each other. It appears that in Brazil, the informal sector has also begun actual manufacturing (Interview at UNIDO, 1994). Small scale industries, and those which produce for the local market can help the poor.

If we mean what we say about alleviating poverty, a much larger part of foreign aid budgets should go to strengthening the informal sector.

Keyfitz, 1992:46

A large part of this informal sector is in the urbanized areas, which we turn next.

4.2 Urbanization, Population Growth and Industrialization

One of the most ubiquitous elements of recent LDC history is the urbanization rate, the inability for the growing cities to provide jobs for all the immigrants, and therefore, the increasing numbers of the urban destitute.

Most of the world's population growth is concentrated in the less developed countries and most of that growth is in the urban populations. See table 4.1. From 1970 to 1990, the world population grew by 1.60 billion people, of whom 1.43 in less developed countries, and of these .75 billion in LDC cities. In the twenty years from 1990 to 2010, this pattern is expected to be even more extreme. According to the UN medium

population variant, the world's population will grow by 1.85 billion to 7.15 billion, of whom 1.73 in less developed countries, of whom 1.32 in cities. Thus *most of the world's population growth is concentrated in developing country cities.*

Table 4.1 Population size in 1970, 1990 and in 2010 according to the UN medium variant projection for the world as a whole, less developed countries only, and urban population in less developed countries. Source: United Nations, 1993

| Region | Population in billions | | |
|--|------------------------|------|------|
| | 1970 | 1990 | 2010 |
| World population size | 3.70 | 5.30 | 7.15 |
| Less developed country population size | 2.65 | 4.08 | 5.81 |
| Less developed country urban population size | .65 | 1.40 | 2.72 |

The visible poverty, the political potential of the poor masses, the levels of pollution and the difficulty in keeping infrastructure amenities in pace with the population growth has attracted the attention and alarm of many observers and affected.

Why do cities in the developing countries grow at such a high rate? Are they doing as badly as it appears in providing jobs for the increasing numbers?

One of the reasons cities in less developed countries grow is because of immigration from rural areas. Todaro (1969) proposed an adaptation to an earlier model by W. Arthur Lewis which is that labor moves from rural to urban areas based on the *expected income*. The potential migrant calculates the chances of getting a job times the wages of the job to find his or her potential income. The city is a place with much underemployment, and it may take some time to secure a job, if one can be found at all. Once a job is found however, the migrant would earn much more than in the place of his or her rural origin. The move to the city is, in this model, rather like a lottery.

Rural migrants, says Gugler (1988:54) are usually well-informed about the city. They have heard first-hand stories from people who have been there and they may have visited or worked in the city themselves before. They often go to a settled urban host, a family member or fellow-villager who gives them a place to stay until they find work and a house of their own, who tells the new migrant the city ropes and often also helps the new migrant find work. Again and again, research shows that the rural migrants who go to cities find that they have improved their life.

To the government official, the concerned expert however, large enough numbers of them have worsened the cities. Cities in less developed countries are seen as harbors of under-employment or unemployment. The creation of productive jobs, say in

manufacturing, is seen to lag behind the growth of urban workers. In part, governments react by expanding their bureaucracy -- most of which is located in cities -- or people create their own jobs in the informal service sector where starting capital requirements are low.

The remedy which is proposed to stop urban growth is to stem rural-urban migration by improving the living standards in rural areas so that the rural poor will be less inclined to migrate to cities. However, rural emigration rates in developing countries have probably been relatively low in the past 40 years. Preston (1979) calculated out-migration rates in the 1950s and 1960s of 25 per thousand for Latin American countries with high economic growth, and low rates of about 8 per thousand in low-growth Asian countries, and noted that "countries more advanced economically have experienced a more rapid flow from rural areas" (p.13). The indication is that people move more to urban areas when there are actually opportunities there. Using UN population data, we estimate that the rural out-migration rate in the past 20 years from 1970-1990 was not much different: 5 per 1000 for Africa from 1970-1990; 5 per 1000 in Asia; and 22 per 1000 in Latin America (Rural out-migration rates in developed countries are typically higher!).

However, even if the out-migration rates are not so high, in those countries where the overwhelming portion of the inhabitants is rural, the large weight of the rural population causes even small rates of rural *out*-migration to translate into high rates of urban *in*-migration.

Another important reason cities grow in Africa, Asia, and Latin America today is because of natural growth because death rates are low and fertility rates high among today's urban dwellers in most less developed countries. Even if urban fertility is slightly lower than rural fertility, it is often still high.

Both of these points can be illustrated with historical data.

Table 4.2 shows the total population, the urban and rural populations, and the rates of growth in Africa, the continent with the fastest urban growth rates. In the period from 1950-1990 the total population of Africa trebled from 222 million to 643 million, but the urban population, despite low rural out-migration rates of only .5 percent annually, increased seven times from 32 to 206 million. How much of this resulted from rural-urban migration and how much from direct natural growth? The total growth rate of the cities from 1970-1990 was an average of 4.5 percent annually. The natural growth rate was 2.9 percent. For the moment, we are going to assume that the lower fertility rates and the higher concentration in the child-bearing ages cancel each other out and that natural growth is the same in rural and in urban areas. That means only 1.6 percent came from immigration, or, only one-third of the total urban growth.

Actually, migrants add more to urban growth than their immigration rates alone because they are usually young adults concentrated in their child-bearing ages. Thus, they increase the birth rate. Probably, about half of city growth in Africa is due to migration and half to own natural growth.

Table 4.2 Total population and urban population growth in Africa 1950-1025, historical and UN medium projection. Source data: United Nations, 1993.

| | 1950 | 1970 or 1950-1970 | 1990 or 1970-1990 | 2010 or 1990-2010 | 2025 or 2010-2025 |
|---|------|----------------------|----------------------|----------------------|----------------------|
| <i>Population growth rates in percent</i> | | | | | |
| urban | | 4.74 | 4.53 | 4.37 | 3.67 |
| rural | | 1.94 | 2.23 | 1.77 | 1.02 |
| emigration rate | | 0.52 | 0.63 | 0.99 | 1.30 |
| immigration rate | | 2.28 | 1.67 | 1.61 | 1.35 |
| total | | 2.46 | 2.86 | 2.76 | 2.33 |
| <i>Population in millions</i> | | | | | |
| urban | 32 | 83 | 206 | 493 | 856 |
| rural | 190 | 280 | 437 | 623 | 726 |
| population | 222 | 363 | 643 | 1116 | 1582 |

In other words, although the rural out-migration in Africa is comparatively low, the combination of high natural growth and a predominantly rural population resulted in Africa having the highest urban growth rates of all continents in the past 40 years.

The obvious policy implication is that, *since the out-flow from rural areas is rather low as it is* it may be difficult to combat urban growth by stemming migration and second, *since the large part of urban growth is from natural increase*, urban growth would continue very quickly even if migration decreased or ceased. At the same time, decreasing migration, considering the real opportunities in cities, is probably very difficult.

If one wants to stem city growth one has to decrease the natural growth in the cities. A concerted effort to make use of the higher density of health centers in cities to promote family counseling; to promote job opportunities for women in the service or manufacturing sectors in cities; and to increase education opportunities for children in cities would be the policy implications. The positive effect cities can have on family planning is for example showed in Cape Verde where a concerted family planning effort started in the middle of the 1980s. By 1990, prevalence of contraceptive use was 25 percent in Praia, the capitol city, compared to 7 percent of the women in fertile ages in the neighboring rural municipality Santa Cruz. This is probably because urban women are more receptive and because health centers are more easily accessible to a large number of women.

One of the concerns with urban growth stems from the fear that the cities cannot accommodate all of the people, cannot give them jobs quickly enough, cannot provide infrastructure. Table 4.3 shows the rate of urban increase and the rate of industrial employment increase during the 1980s in African countries where data is available.

Africa is the continent that experienced the fastest urban growth and lowest economic growth, so we would expect the relationship between urban growth and jobs to be the worst here.

Table 4.3 Average annual urban growth rates and average annual increases in industrial employment in selected African countries during the 1980s. Source: calculations with data from ILO, 1993 and United Nations, 1993.

| Country | Period of industrial employment growth | Average annual increase of industrial employment | Period of observation for increase of urban population | Average annual increase of urban population |
|--------------|--|--|--|---|
| Botswana | 1985-1992 | 14 percent | 1980-1990 | 8 percent |
| Burundi | 1984-1991 | 3 | " | 5 |
| Kenya | 1983-1991 | 3 | " | 7 |
| Malawi | 1983-1990 | 4 | " | 7 |
| Niger | 1983-1991 | 2 | " | 7 |
| Sierra Leone | 1983-1988 | 1 | " | 5 |
| South Africa | 1983-1992 | 0 | " | 3 |
| Swaziland | 1983-1989 | 6 | " | 7 |
| Togo | 1983-1987 | 0 | " | 5 |
| Zambia | 1983-1989 | -1 | " | 4 |
| Zimbabwe | 1983-1992 | 2 | " | 6 |

According to Preston (1988) there is a normal relationship of one percent urban increase and one half percent industrial employment increase observed in developed and in developing countries. In those cities with faster industrial growth, the population growth is also faster. The African data show that the three countries with high industrialization growth experienced the highest rates of city growth in excess or equal to seven percent annually. The countries with no or negative industrial employment growth experienced lower urban growth rates. The relationship is not neat, but the tendency is there. This means that the migrants, who as we said are informed, actually move less to the cities when there are fewer opportunities there.

Cities are the centers of modern growth. They are also now centers of the poor helping themselves by creating informal service jobs and in some cases informal manufacturing jobs for themselves. For the modern economy, cities provide agglomerations of scale -- it is here that a modern industry can expect to find the services, infrastructure and manufacturing input it needs. But for the informal sector cities provide large, concentrated markets. Local production of consumer goods from small and medium

enterprises can immediately go just around the corner to a busy street of buyers.

It is also a little recognized fact that many of the cities in today's developing countries are great producers of food. Around their houses, in little back gardens, on empty plots, people grow vegetables and keep animals in a very intensive and productive form of agriculture. The extent and the further possibilities of this production are discussed by e.g. Bill Mollison in various books.

For those who fear that supporting the informal sector and providing health care and family planning services to the poor in the cities would induce even more migrants to come from rural areas than already anticipated, we can point out that the UN medium projection as it is already assumes considerably increasing rates of out-migration from rural areas. Also, as the rural population decreases relatively in size, its effect on urban growth also decreases. The UN medium projection assumes as it is that "only" 400 million more people will live in today's rural areas in 2010 than in 1990 – 3.09 billion up from 2.68 billion, an increase of 15 percent in 20 years. The anticipated urbanization therefore is probably close to a maximum which can hardly be increased by improving life in the cities.

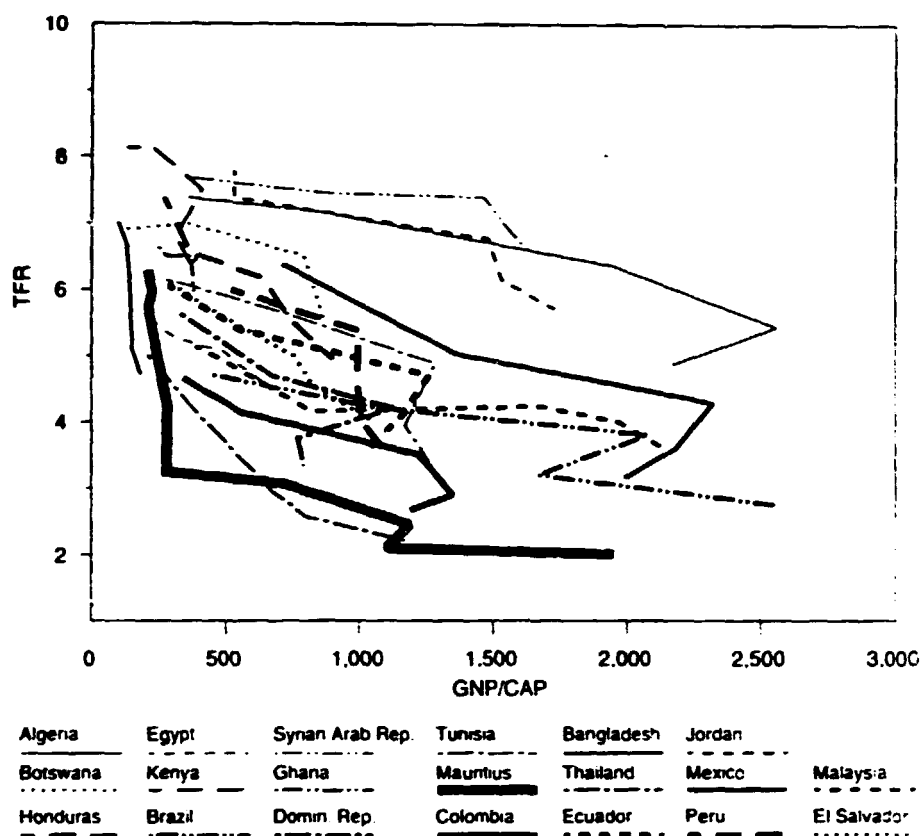
There are fears that the world's major cities will explode to 20, 30 and more million people. Recently we see however, some cities which are stagnating or even decreasing in size (e.g. Mexico City). There will be a rise in secondary and tertiary cities. For example, Chiang Mai in Thailand may grow much faster than Bangkok in the next few years.

4.3 Education, Population Growth, and Industrialization

It is being increasingly argued that education has a positive effect on reducing family size. In the past, it was argued that increasing income reduces fertility because the need for children as sources of income are reduced. Also, leisure time increases and the cost of children increases. Figure 4.1 shows the relationship between income per capita and fertility for 20 countries which had a fertility rate above 6 in 1950. The relationship is jagged and the pattern unclear, although a vague general tendency of higher GDP and lower fertility can be discerned.

There is a clearer relationship between female education, measured by literacy, shown in figure 4.2. The figure shows only a simple correlation, but it is quite certain that the causality is from higher literacy rates to lower fertility: the main child-bearing ages come after schooling.

Figure 4.1 Relationship between GDP per capita and fertility rates in a sample of developing countries. Source: Lutz, 1994:269



The role of women's education is indicated to be strong in reducing fertility for a number of reasons.

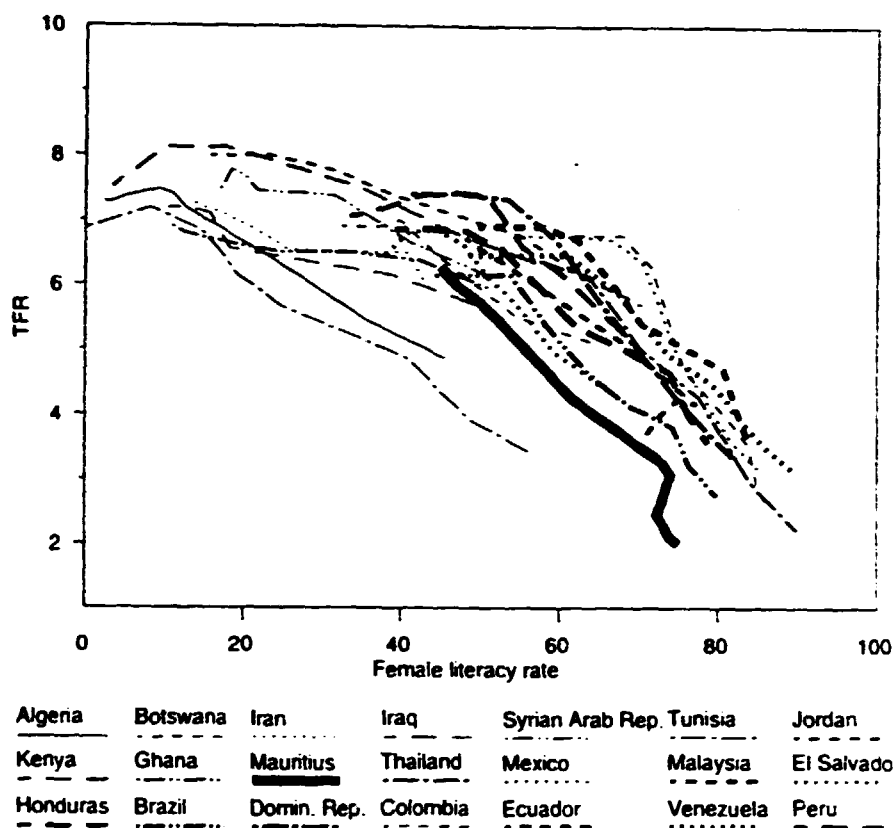
This assumed effect of female education on fertility can be seen as operating through three different mechanisms: first, it increases the age at marriage ..., second education is likely to change the value system by putting more emphasis on the life opportunities of children and women than on large families; third, there is evidence that education increases the relative status of a woman within the family to carry out her own (usually lower) desired family size.

Lutz, 1994:368

Female education also increases the number of women who are working in education and health centers. These women in turn, speak to other women about health and family planning.

At present, it is believed by many scholars that the education of girls may be the single most important measure to reduce fertility. However, it is a long-term project. If education rates of school-girls are increased today, it will be 10-15 years before this affects fertility when these girls reach their main child-bearing age.

Figure 4.1 Relationship between female literacy rates and total fertility rates in a sample of developing countries with a total fertility rate above 6 children in 1950. Source: Lutz, 1994:370.



Education affects rural-urban migration. The migrants from rural areas tend to be the better educated young people who believe that with their higher education the city will offer them better opportunities. Parents send their children to cities to be educated. For example, Cebu, the second city of the Philippines, is run over with secondary school and college students not only from the city itself, but from regional rural or sub-rural areas. It is estimated that in 1985, 40 percent of the age-group 15-24 was enrolled in school (Wils, 1990).

If the city cannot provide a living for these young, educated people with high expectations, this can become an explosive mixture. The youth riots and militant groups in the United States during the Vietnam war; the Philippines 1987; Iran 1979; Sri Lanka 1980; Korea 1988; Algiers 1988; and other examples have been associated with large concentrations of unemployed, dissatisfied, educated young adults (Wriggins, 1989).

These young, educated and new migrants and resident city folk are also potentially the most productive and adaptive group in the population. Their agglomeration in cities acts as a reinforcement for possibilities to develop the industrial and modern service sector, which require a somewhat educated (at least) labor force. Experts at the UNIDO confirmed that:

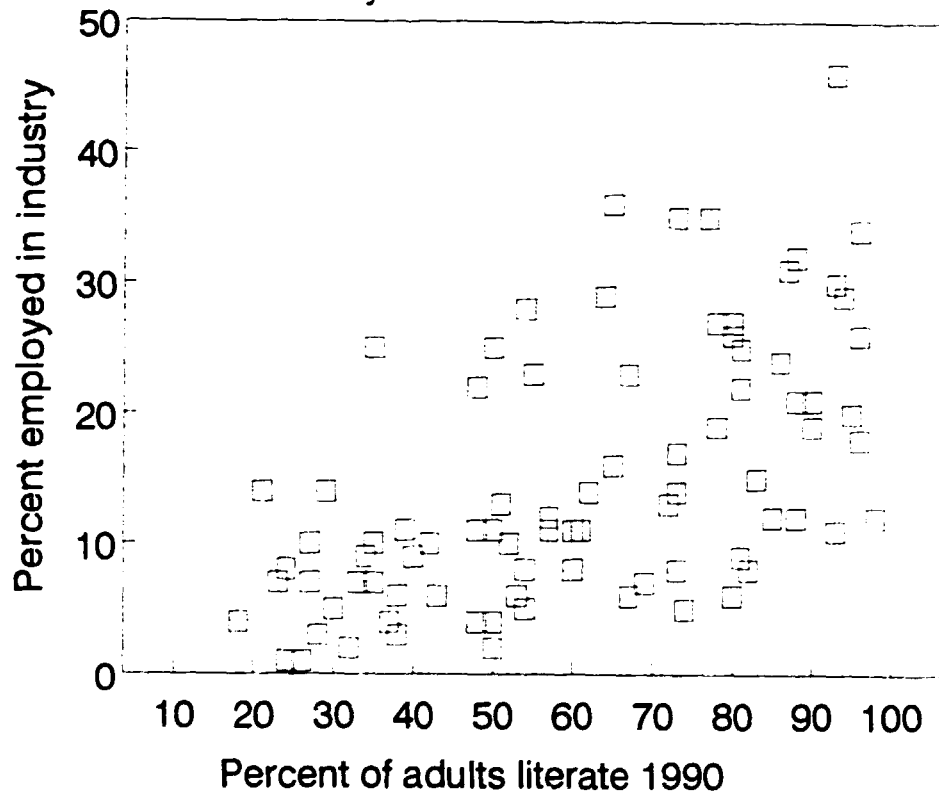
A somewhat skilled labor force is necessary for industrialization. Primary education is possible in all countries.

More education/skills quickens and eases the industrialization process.

A study by Forstner and Ballance (1990) at UNIDO found that the most important competitive advantage a country in today's world can have is not: natural resources, geographic location or low wages, but the availability of a semi-skilled work force.

In other words, education seems to be a *prerequisite* for development and more of it improves the chances of development. It is also argued that every country, no matter how poor, can afford at least basic education.

Figure 4.3 plots the levels of illiteracy among the adult population and the percentage of the labor force in industry.



The figure shows that there is a correlation between the percentage of the adult labor force that is literate and the level of industrialization, measured by the percent employed in industry. Cross-sectional figures such as this one are usually not very clear because there are so many other important factors and noise. This figure shows that there are no countries with literacy rates below 45 which have a level of industrialization above 15 percent of the labor force -- except Pakistan. There are also no countries with adult literacy above 85 percent with less than 18 percent of the labor force employed in industry, except Vietnam, Sri Lanka, Thailand and Jamaica (which had 20 percent in 1965).

4.4 Women, Population Growth, and Industrialization

The participation of women in the economy is large. Thirty-four percent of the total number of (non-domestic) workers in the world are women.

Sub-Saharan African countries have among the highest female labor force participation rates. Women do a large part of the agricultural work. In these and many other countries, the informal commerce sector -- the colorful markets and the little food stalls - is completely dominated by women. Women are also the cheap, nimble and diligent workers in many of the export-oriented industries in those countries that successfully developed such a sector.

There is a discussion about whether the involvement of women in the industrial economy results in their marginalization or their integration as equal partners, and on what effects women's work has on their family size.

A part of the answer is that it depends on the level of social development. In very traditional, patriarchal, rural societies where women work, they give their wages to their husbands, fathers or brothers, and thus there is no increase in their independence. The structure of such societies also keeps women from translating their economic independence into actual emancipation because they cannot move away from the households they are in. In other words, it is not enough simply to give women jobs.

Generally, where there are higher participation rates of women in manufacturing, fertility is lower (e.g. UNIDO, 1994). It is not resolved what direction the causal relationship is, nor whether women themselves want fewer children or whether their husbands/fathers value their working time and keep them from having children.

Although legislation on women's rights is important, it should be noted that there is very often a gap between women's de jure and de facto position. Sometimes, the de facto position is "ahead" of the de jure, for example in many countries where women have no legal rights to run a business or own property, they do so de facto behind a male straw-man. In other countries, a liberal legal system is ahead of the actual position of women.

The effect of work on family size may depend on the type of work women do. For example, in rural Africa where most of the rural women do farm work, many children are not only a joy, but also soon become helping hands. Since land is often communal, there are no later problems with dividing the inheritance. In a different situation, with a women working in a textile factory, children cannot help a women with her work. This difference will usually be reflected in fertility differences.

However, there are cases where women in predominately rural societies have decreased their fertility, such as Mauritius in the 1960s and Sri Lanka in the 1970s. In Sri Lanka, the quarter of the population that lives from subsistence agriculture in the "home garden" system has similarly low fertility of about 2-3 children as urban or other families (Zinggl, 1994).

5. The role of industrial branches, enterprise size and market orientation

This section discusses the role of a few selected industrial branches, the effects of enterprise size and in closing, environmental aspects.

We discuss the food industry, the textile industry, and the pharmaceutical industry. Food and textiles in particular have a double role in serving the local market, and competing in the global export market. The food processing industry often emerges as a first industry. Some food industries, such as sugar-cane factories, and fish canneries, existed even in colonial times. The textile industry often marks the beginning of industrialization -- this is a position it acquired in 18th century England and continues to hold in yesterday's Mauritius and today's Bangladesh. The pharmaceutical industry is a relatively small branch but important for affordable medicine provision in developing countries.

Enterprise size is an important factor in developing countries. On the one hand, enormous multi-national enterprises dominate the export market. On the other hand, the rise in communications have allowed the externalization of the production process so that one product is often manufactured in different phases by different small companies rather than one large one. Small enterprises require lower starting investments and can sometimes make do with fewer managerial and organizational skills than large companies, which make them attractive for developing countries. Large enterprises require capital input from abroad, and often management skills for abroad as well and because of this have often fostered dependence.

Production for the local market or the export market are two different things. Although the local market is also infiltrated with imported goods against which the local products have to compete, local products can take easier advantage of informal networks, have lower transportation costs and fewer intermediaries, things which might give them enough competitive edge over imported goods if it were not through quality alone. The export market is very lucrative if one succeeds in it, but its exigencies are high and the broad population effect is not always high.

If population growth can be slowed down, and if developing countries can eradicate poverty, and improve economic growth, there is by itself no guarantee that this development will be "sustainable". There is no alternative to directly promoting more environmentally benign technology and production methods. Research *in* the developing countries, applied to their specific (more tropical than industrialized countries) climate and environment will identify such technologies and production methods.

5.1 Food Industry

The agro industrial complex consists of the input industries to agricultural products, the agriculture products themselves, their transformation, marketing, and consumption. It has also been called agro-business. The input industries produce fertilizers, implements,

and large capital goods like tractors. Part of this input is relatively easy to produce and this can be done by countries themselves. The agricultural or primary products (fish) usually come from the domestic market. These are transformed into new products such as flour, bread, jams, put into cans, etcetera. The products can then be marketed locally or sent for export. Consumption finally concerns the interplay of supply, demand, buying power, but also government interventions in the form of subsidies, price regulations, and food aid.

The transformation of agricultural products can be divided into five major categories: wood, textiles, leather, food, and pulp, of which food is by far the largest industry. Table 5.1 shows the percentage of manufacturing value added from food industry in 1990 by country.

The table shows that, considering this is one industrial branch out of 28 used, the food industry takes up a sizeable portion of the manufacturing activity in a great many countries. Very generally, one can observe the pattern that the less developed countries in Africa and Latin America tend to have a relatively larger portion of total manufacturing from food processing industry than in the developed countries. This is because the food industry is one of the earlier industrial branches to be established. In a more industrialized economy, the food industry may be large in absolute size, but because of many other industrial activities, it can be small in relative size.

The food processing industry is linked to population. Food is a basic good, and it can, theoretically, be provided by agriculture alone. However, it is seasonal. In agricultural societies households process the food themselves or store it properly to get through between the harvest seasons. In the cities of such societies, food prices fluctuate greatly. Processing food is one of the first industries that starts. This is because it is relatively easy to do; because input is in the vicinity. Once food is processed, the price of food goes down. The off-season prices are lowered; losses are reduced; and because of greater economic activity, the relative price of food decreases. This allows people to buy more food which has a positive impact on nutrition and health, and hence on productivity.

The food industry differs very much depending on whether it is geared mainly to the domestic market or to exports.

The export market for processed food consists of a relatively narrow range of goods and is highly competitive. In order to compete, a country must use high technology, highly skilled labor, and take small profit margins. Usually, because of the stiff competition, a given food product is exported by a small number of nations. For example, frozen poultry to the Arabian nations comes from France, Brazil and Germany only.

Food processing for domestic consumption does not face an equally competitive market. Countries have the advantage of being in the market, and it is possible to regulate imports of food products to avoid unfair competition (e.g. against subsidized European products).

Table 5.1. Percentage of total manufacturing value added in 1990 which comes from the food industry. Source: UNIDO, 1994b.

| MDCs | | Africa | | Asia | | Latin America | |
|----------------|------|--------------|------|-------------|------|---------------|------|
| Austria | 0.09 | Algeria | 0.15 | Sri Lanka | 0.19 | Argentina | 0.15 |
| Belgium | 0.14 | Burundi | 0.56 | China | 0.05 | Barbados | 0.33 |
| Canada | 0.11 | Cameroon | 0.22 | Taiwan | 0.09 | Bolivia | 0.30 |
| Czechoslovakia | 0.07 | C.A.R. | 0.25 | Cyprus | 0.13 | Brazil | 0.12 |
| Denmark | 0.17 | Zaire | 0.31 | Hong Kong | 0.03 | Belize | 0.57 |
| Finland | 0.10 | Ethiopia | 0.19 | India | 0.10 | Chile | 0.18 |
| France | 0.10 | Kenya | 0.27 | Indonesia | 0.12 | Colombia | 0.17 |
| Germany (W) | 0.05 | Mauritius | 0.17 | Iran | 0.11 | Ecuador | 0.27 |
| Greece | 0.16 | Morocco | 0.06 | Israel | 0.12 | Guatemala | 0.31 |
| Hungary | 0.08 | South Africa | 0.10 | Japan | 0.07 | Honduras | 0.28 |
| Iceland | 0.41 | Zimbabwe | 0.12 | Jordan | 0.10 | Jamaica | 0.22 |
| Ireland | 0.21 | Tunisia | 0.13 | Korea | 0.06 | Mexico | 0.15 |
| Italy | 0.06 | Egypt | 0.21 | Macau | 0.01 | Uruguay | 0.19 |
| Luxembourg | 0.03 | Zambia | 0.10 | Malaysia | 0.10 | Venezuela | 0.10 |
| Netherlands | 0.03 | | | Philippines | 0.34 | | |
| Norway | 0.01 | | | Singapore | 0.03 | | |
| Poland | 0.06 | Oceania | | Syria | 0.18 | | |
| Portugal | 0.06 | Australia | 0.14 | Thailand | 0.17 | | |
| Spain | 0.12 | Fiji | 0.42 | Turkey | 0.09 | | |
| Sweden | 0.08 | New Zealand | 0.26 | | | | |
| U.K. | 0.10 | | | | | | |
| U.S.A. | 0.09 | | | | | | |

On the population side, it is important to ask to what extent the income from exports covers the food that has been "lost" from not processing or cultivating it for the local market and which now has to be imported. For example, Mauritius at the end of the 1980s could cover the costs of its food imports three times with the revenues from sugar exports. This makes economic sense. Countries which rely to a large extent on agriculture for their exports and which import a large proportion of their food needs make themselves very vulnerable in case of a bad harvest. Then, the exports decrease just at a time when the need for food imports increases. Some large countries such as Kenya, Senegal, Mozambique, and Tanzania are in this vulnerable position.

5.2 Textile industries

Textile industries were part of the beginning of the industrial revolution in England and have marked the beginning of (export) industry in many developing countries. The textile industry is a simple type which requires little capital, and many cheap workers. It therefore usually situates in a country with low wages, which is typically a poor, non-industrialized country. If the economy in general picks up, which usually means that the wages increase, the textile production has to move up-market to higher quality textiles, or relocate again to a country with (still) low wages. However, two successful countries which began with textile industry, South Korea and Mauritius, both were able to maintain that industry for long enough to move into other branches before beginning to relocate the textile firms to other east-Asian locations or Madagascar respectively.

Textile industry is the female workers' prerogative per se. Whether because it is an extension of a traditional women's role, or because women are more nimble, or willing to work for lower wages, textile workers the world over are women, whether in large or in small enterprises.

It is believed, and many examples seem to prove the case that in the right circumstances, providing women with work where children are *not* helping hands induces them to have later and fewer children.

Table 5.2 shows employment (almost all female) in the textile industry in six selected countries from 1963-1992. In South Korea, the textile industry increased during the 1960s and 1970s. At that time, fertility was decreasing. Female employment in textiles and fertility were perfectly negatively correlated. Employment increased fast, during its maximum period of growth, employment in the textile industry in South Korea increased from 59 thousand to 205 thousand in seven years. A similar take-off can be observed in Bangladesh, where textile employment increased from 9500 in 1985 to 20 thousand in 1988, the last year for which we have data. In Bangladesh, fertility levels have also been decreasing since then. In Malaysia, employment in textile has been increasing slowly and steadily and fertility decreasing slowly and steadily.

In Mauritius however, fertility was already low before the industry located on the island and found a ready work-force of young women. Here, the textile industry exploded once it was established -- employment increased from 21 thousand in 1983 to 77 thousand in 1987, perhaps a world record. The same may be happening in Sri Lanka at the moment.

In the same way that more education is said to speed up industrialization, so this case seems to indicate low fertility, and a large pool of young women who "have time" as it were, gives rise to the possibility of expanding an industry like textiles which employees almost solely women, quickly. We say "possibility" because low fertility was never a *sufficient* condition to attract industry: it helps.

Table 5.2 Employment in the textile industry in six selected countries from 1963-1992.
Source: UNIDO, 1994b.

| Year | Bangladesh | Sri Lanka | South Korea | Malaysia | Mauritius |
|------|------------|-----------|-------------|----------|-----------|
| 1963 | | | 13000 | | |
| 1964 | | | 15343 | | |
| 1965 | | | 18209 | | |
| 1966 | | 10576 | 31600 | | |
| 1967 | 770 | 10739 | 40400 | | |
| 1968 | 610 | 10962 | 41400 | 3596 | 223 |
| 1969 | 540 | 11322 | 47500 | 4222 | 339 |
| 1970 | 490 | 9453 | 48700 | 5231 | 374 |
| 1971 | 620 | 9967 | 58900 | 6144 | 1044 |
| 1972 | 520 | 8679 | 75800 | 8863 | 2222 |
| 1973 | 580 | 8068 | 89900 | 11155 | 4007 |
| 1974 | 500 | 8068 | 118500 | 11462 | 6625 |
| 1975 | 907 | 8934 | 148700 | 11259 | 7574 |
| 1976 | 1050 | 9380 | 200900 | 12134 | 11484 |
| 1977 | 580 | 8605 | 205300 | 12899 | 13757 |
| 1978 | 420 | 7579 | 207600 | 15113 | 14280 |
| 1979 | 490 | 15140 | 188800 | 16322 | 15144 |
| 1980 | 70 | 14913 | 186300 | 22076 | 16298 |
| 1981 | 350 | 24753 | 209100 | 29700 | 18718 |
| 1982 | 2710 | 38462 | 213100 | 24900 | 19395 |
| 1983 | 4240 | 30151 | 219600 | 27600 | 21324 |
| 1984 | 8180 | 32506 | 237300 | 30900 | 29186 |
| 1985 | 9500 | 19294 | 242600 | 31100 | 48044 |
| 1986 | 11082 | 32554 | 262500 | 34100 | 64577 |
| 1987 | 16230 | 36950 | 271400 | 39400 | 75555 |
| 1988 | 20518 | 50374 | 277200 | 46200 | 78053 |
| 1989 | | 55110 | 262500 | 55500 | 77741 |
| 1990 | | 82096 | 231500 | 64500 | 76209 |
| 1991 | | | 225577 | 64814 | 77604 |
| 1992 | | | 215118 | 67957 | |

5.3 Pharmaceutical industries

Producing pharmaceutical domestically decreases their price which is a well-known beneficial effect -- also because the illnesses in LDCs are different than MDCs' which hardly produce LDC-specific medicines. Socially, there is a second effect, namely that most of the employees in pharmaceutical manufacturing are women who, through being involved in the production process, learn about vaccinations, contraceptives, etc. and are influenced to use them. Most of the women in this industry are well-educated and few in number (the social population effect therefore should still be checked). Many countries already produce up to 80 percent of their pharmaceutical. Africa, Bangladesh, Vietnam and others produce only little. The main constraint is *not* the labor force, but investment.

5.4 Small and medium industries

The definition of small and medium enterprises is not exact at a cut-off point of ten or fifty or a hundred employees, or below a certain turn-over volume or value added volume. National definitions of small and medium enterprises differ and therefore, international comparisons are, at present, difficult to make. The UNIDO collects data on enterprise size for a selected number of countries by industrial branch. In these data, the small and medium enterprises range in size from 10 to 500 employees. In many countries, they are a sizeable employer.

SMEs have the advantage that they require much lower starting capital than a large industry. And they are more flexible than large industries. The SMEs result in a more equal distribution of wealth than large industries. This is because they can be located in rural and in urban areas, rather than urban areas alone. Also, because they are small, the income difference between the lowest-paid worker and the top manager or entrepreneur is smaller than in large industries (the top managers or entrepreneurs of SMEs having a lower income on average than owners of large industries). Both of these factors positively influence a more equitable social structure.

The traditional image of small and medium enterprises is that they are those which produce artisanal products, while the large industries make the manufactures. Recently, however, the small and medium enterprises have also gained increasing importance in modern manufacturing thanks to advances in communication technology. In the past, one firm processed a product more or less from beginning to end. Now with telefax, international computer networks and other advances it is possible to place orders, send designs, and ask questions over long distances without losing time. With these possibilities, it is possible for different small firms to specialize in various parts of the process. The production process has become externalized. Not one, but a cluster of firms make a product.

The traditional type of small and medium enterprises produce for the domestic market. Many of these types of enterprises are supported by international organizations sometimes although they are not economically viable. These small domestic industries produce simpler final goods, most of the process is internal. These goods are such things as food, implements, furniture, basic fertilizers, clothing, construction. However, those countries which have been successful in economic growth appear to have had a base of manufacturing for the domestic market. This type of enterprises would appear to be ideal in developing countries because they do not require highly skilled management and complex organization and make goods local people need. As they serve the local market, they would also grow with population via increased demand once their market functioned, rather than be dependent on a limited MDC market. It would be useful to find out why such enterprises are often not economically viable.

The small and medium enterprises which concentrate on exports require very high entrepreneurial skills because the network in which they function is complex. They produce parts of a more complex product or compile a product and must tailor their work to that of other, external firms. Countries which have succeeded in establishing a base of such firms are Indonesia, Thailand, Malaysia and to a lesser extent Latin America.

5.5 Manufacturing for export

A small number of small countries has been spectacularly successful at economic growth pulled by exports. These are notably the newly industrialized countries (NICs) in south-east Asia, Mauritius, and a few others. These countries began their success with government support such as the establishment of *export processing zones* (EPZs) which offered tax breaks, free facilities and other advantages to foreign investors. These countries also began their success with specialization in one special labor-intensive industry -- textiles in the case of South Korea and Mauritius -- and gradually diversified to other industries. These labor intensive industries spread the benefits of industrialization to the poorer, less educated part of the population, particularly women which, as we saw above, benefits the society as a whole.

Lured by these dazzling success stories, many other countries established EPZs in the hope of attracting firms in the 1970s and 1980s. However, it would be overly optimistic to believe that the south-east Asian success could be repeated everywhere if one just followed the right recipe. The MDCs which so far have been the main importer are erecting various trade barriers. But even if they did not, the market of the one billion people in the MDCs is not large enough to support the export industrialization of all of the LDCs. Knox and Agnew conclude that:

[i]t would probably be mistaken to believe that these [export] industries can make anything other than a marginal contribution to employment in the periphery [LDCs] as a whole. As of 1980, the World Bank estimated the total number of direct jobs created by export industries in the LDCs as between 2 and 3 million, about 10 percent of total industrial employment in these countries, or, in other terms, less than

In order for development to be sustainable however, it is not enough to slow population growth. The discussion on population growth sometimes detracts from the fact that *there is no alternative to the development of cleaner and more efficient technologies* even if population growth could be stopped tomorrow. This is true for the presently industrialized countries but also for the developing countries. It is not necessary for developing countries to industrialize in the same polluting manner as the developed countries have -- in the same way as the LDCs did not have to go through the same history as MDCs before death rates decreased -- because there have been so many technological innovations since 1900 and in particular in the past few decades.

Technologies which are environmentally benign often use the natural setting, such as sunlight, wind, ocean waves, etcetera, which is specific for each area. In this way, these technologies are very different from fuel combustion and other energy and production technologies we use today which are the same the world over. This means that research has to be applied to the specific areas where the technology will be implemented. For example, research with wind-mills in Austria cannot be easily applied in the South American Pampas.

So far, technological research has been dominated by the MDCs, with a definite and natural bias towards application in those countries themselves. This has resulted in under-research of solar energy for example. In the MDCs, most of which are in temperate climates, solar energy is usable only 6 months of the year. How different in the tropical climates where most LDCs are located. There, solar energy could be used year round. Another area that is under-researched is the production and use of bio-gas - which is created quickly in the hot, tropical climate.

Research in the MDCs also assumes finished networks for electricity for example, networks which embody an enormous sunk cost. Thus, developing electricity provision which is based on small independent units rather than the existing network is economically unattractive. In LDCs however, which have much less extensive electricity networks, small units for electricity provision using hydro, solar or other energy are much more attractive. Promoting decentralized solar energy use therefore makes good sense in developing countries. Some, like Cape Verde, see a long term goal of being self-sufficient using the wind and the sun, both of which are about the only abundant resources on these small, dry land-flakes in the Atlantic ocean.

Another advantage of environmental technologies is that since they use resources which are available sur place, they can be installed on a small household or neighborhood scale. Such a decentralization would enable developing countries to partly avoid installing the huge networks of electric cables and gas pipes, and use their precious management resources for other institutions.

Moreover, although much research needs to be done, it appears that solar, wind, hydro and bio-gas technology is relatively simple and the panels can be produced in small and medium size enterprises.

Environmental technologies are, as the words imply, part of and dependent on the environment where they are applied. Therefore, research into them can only be done

there where they will be applied, that is, in the LDCs in their tropical climate, using their rainy seasons, and their ocean waves. If such research is not sponsored and developed, then even the quickest imaginable halt to population growth cannot lead to a sustainable development for our future.

International agencies many of them already experienced in such research, together with scientists and local institutes, sponsored by industrialized countries can take the lead in this endeavor.

When the developed countries industrialized, they did so on the basis of fossil fuels and later electricity networks. Alternative energy technology had not been developed and great annual climate swings make using e.g. solar energy almost impossible for 3-6 months during winter. In the presently developing countries this is different. The alternative technologies exist. The climatic conditions are such that for example solar energy is available year around. Moreover, the electricity network is nascent, rather than a huge installed sunk cost. Promoting decentralized solar energy use therefore makes good sense in developing countries. Some, like Cape Verde, see a long term goal of being self-sufficient using the wind and the sun, both of which are about the only abundant resources on these small, dry land-flakes in the Atlantic ocean. Decentralized solar electricity would not require large organizational skills to run the network. It can be run on a household or neighborhood scale. solar technology is relatively simple and the panels can be produced by small and medium size enterprises. In Austria, a large portion of the solar panels is even home-made. This and other technologies however, can only be developed by the developing countries themselves because these technologies are only applicable there in a large scale. As Todaro, a leading development economist says "

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