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Source: *The American Journal of Economics and Sociology*, Jan., 1980, Vol. 39, No. 1 (Jan., 1980), pp. 1-21

Published by: American Journal of Economics and Sociology, Inc.

Stable URL: <https://www.jstor.org/stable/3486765>

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The AMERICAN JOURNAL of ECONOMICS *and* SOCIOLOGY

Published QUARTERLY in the interest of constructive
synthesis in the social sciences, under grants from the Francis
Neilson Fund and the Robert Schalkenbach Foundation

VOLUME 39

JANUARY, 1980

NUMBER 1

Economic Growth and Quality of Life:

A Comparative Indicator Analysis Between China (Taiwan), U.S.A. and Other Developed Countries

By BEN-CHIEH LIU *

ABSTRACT. A composite *Quality of Life* (QOL) indicator model of five major components—*Social, Economic, Energy and Environmental, Health and Education, and National Vitality and Security*—was developed. Based on cross-national data of 1975, 32 developed countries and China (Taiwan) were ranked according to their component and overall QOL measures. The influence of *income* and other variables on QOL was analyzed; it was found that the income variable is not as significantly related to the composite QOL indexes as are other variables and China (Taiwan's) QOL rankings far exceed its per capita income ranking in the international comparison. The U.S. surpassed all the countries studied in providing its citizens with *basic human needs* and the highest material *standard of living*. The national vitality and security component indicated, however, that the U.S. may have lost, militarily and strategically, some of its influence and perceived power to the U.S.S.R.

* Earlier versions of this paper were presented at the Conference on the Chinese Ideal and the American Dream, Chinese Academia Sinica, Taiwan, Republic of China, Oct. 6–8, 1978 and the 2nd Annual Third World Conference, Omaha, November 16–18, 1978. The views expressed do not necessarily reflect those of Midwest Research Institute. The author acknowledges computational assistance from Dr. Chang-Tseh Hsieh but is solely responsible for any shortcomings.

American Journal of Economics and Sociology, Vol. 39, No. 1 (January, 1980).

0002-9246/80/010001-21\$00.75/0

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I

INTRODUCTION

INDUSTRIALIZATION AND ECONOMIC GROWTH as represented by gross national product (GNP) or real income per capita have elicited nearly total adoption in the Western Hemisphere over the past four decades as the national policy goals. A healthily-large GNP provides an ever-increasing living standard, enabling more people to pursue their aspirations and exercise their choices. But it seems when a nation approaches certain stages of industrialization and urbanization, an increasing number of its citizens express discontent with their quality of life.

In spite of a rapid growth in per capita income and a high standard of living, dissatisfaction among the American people has grown because of social, political, and environmental problems such as urban crimes and ghetto slums, political scandals, the generation of waste and pollution, inflation, and the energy crisis. In other countries also, the past two decades have been a period of progress in which material wealth has grown at a rather rapid rate, but dissatisfaction with individual quality of life and the social order has been unprecedented. More people are commenting on the paradox of affluence and urban life. Industrialization and urbanization seem to be associated with some subtle forces which reduce social well-being in some dimensions just as they improve it in others. There are some people who have been made worse off as a consequence of inappropriately planned industrialization and urban development and ill-devised income redistribution and social welfare systems. Why should new technology and a high rate of income growth fail to diminish social pathology and improve the overall urban quality of life?

Both industrialization and urban development require capital accumulation, technological change, and improvement in human skill and living conditions. They also often require changes in institutional structures and policy implementation with respect to resource allocation and output distribution. As a result, random growth in industrialization and urbanization is frequently associated with undesirable social and environmental costs that adversely affect quality of life. When the costs of the by-products of the growth are greater than the gains, the potential for discontent is unavoidable and the overall quality of life is downgraded. People have come to realize that quality of life is not a necessary function of material wealth.

During the Great Depression, Keynes suggested that some appropriate preparation be made for testing and changing our social value system. He suggested that the arts of life be encouraged and experimented with, letting material wealth serve as a means rather than an end.

Growing attention to the social, economic, political, and environmental health of our nation and peace and harmony among nations have led to a search for other indicators which can more adequately reflect overall national health and citizen well-being. Psychological and spiritual inputs have acquired some weight in determining the value system of a society with respect to its concepts and the practical circumstances individuals enjoy.

I studied empirically the variations in quality of life in the United States by state and by metropolitan area since 1973 (Liu, 1973–1978) and have concluded that income beyond a certain level bears little ascertainable relationship to the quality of life. The locational decisions of heads of households have had a tendency to be associated more with quality of life ingredients than with income or employment, factors which traditionally have dominated all others in migration studies (Liu, 1975c, 1979).

Although industrialization, economic development, and material well-being in the Republic of China in Taiwan have improved substantially in the past decades, little is known about the overall quality of life of its 17 million people. Based on per capita GNP alone, the country is still not officially classified as “developed” (1). However, what has long been overlooked in this country are the great contributions of a deep-rooted Chinese philosophy, well-developed cultural and family backgrounds, customs, traditions, and ethics that have intertwined the thoughts of Confucius in individuals and guided public and institutional decisionmakers in the development of a democratic, free, peaceful, prosperous, and egalitarian society. The Republic of China has recently been openly evaluated and recognized by Cline (1977) as one of the top 30 powerful countries in the world due primarily to her strong will, persistence, determination, united spirit and a well-defined national goal. In a recent study by Sewell (1977), China was placed 35th among all countries.

The primary objective of this paper is to develop a social indicator model by which the major quality of life concerns from the physical point of view may be investigated and studied, and, consequently, the

quality of life measures in China (Taiwan) can be compared with those enjoyed by the people of the U.S. and other developed countries when psychological or spiritual ingredients are held constant.

In the following paragraphs, a theoretical quality of life production model is presented first and then a statistical framework developed for quantitatively assessing the national quality of life. The actual quality of life indicators for China, U.S.A., and the other 31 so-called developed countries are constructed and discussed in Section III. Section IV draws tentative conclusions and makes policy recommendations and suggestions.

II

A PRODUCTION APPROACH TO QUALITY OF LIFE MODELING

THE INTEGRATION of the quality of life concept into the general framework of production theory in the conventional microeconomic analyses has gradually become an important but as yet little explored subject. I attempted to deal with this issue several years ago, and my QOL production model, however rudimentary, is briefly summarized in this section.

It is generally believed that the structure of our system not only influences the degree to which the members in the system can maximize their quality of life at any given point in time, but also shapes the value concept as to what life quality is all about, and how, in general, an individual's achievement is revealed and ranked when compared to others. Therefore, the state of the quality of life for any individual is interdependent via the following three mechanisms: the intrapersonal capability of the individual, the interpersonal relationship with other individuals, and the political system or society in which they all live as members. Any exogenous changes in one of these components will result in changes in others; and, as a result, there will be feedback effects.

To optimize an individual's life quality, *i.e.*, development of one's latent potential and self-actualization, it is necessary, according to Maslow, that needs be met on two levels—basic needs and growth needs. Basic needs include physiological needs, safety and security needs, belongingness and love needs, and esteem needs. Growth needs are those which develop and actualize one's fullest potentialities and capacities in relation to others in the community. Thus, what con-

stitutes one's quality of life in both a physical and psychological sense must be related to the extent of meaning and satisfaction produced by one's existence in an organized human society.

The quality of life (QOL) that each individual (i) attempts to maximize may be expressed as an output function with two input factors as arguments—the physical (PH) and the psychological (PS)—a portion of which is owned and a portion of which is shared with other people in the community at any given point of time (t) under a societal framework designated by the production function (F):

$$1) \quad \text{QOL}_{it} = F(\text{PH}_{it}, \text{PS}_{it})$$

It should be noted that the input factors are not completely independent and also that they can be employed in varying proportions in the production of QOL. The physical inputs consist of material goods and services which satisfy most basic needs of human beings, and the psychological inputs are mostly self-actualized and developed. It is possible that the physical inputs can be used as substitutes to a certain extent for the psychological inputs. Although deprivation of ownership of physical goods and services below the subsistence level is serious and physiological survival and psychological health are hazards, depreciation in psychological inputs could also impoverish considerably an affluent society. That both PH and PS play an important role in determining the quality of life is manifested by the discontent expressed by many Americans.

In summary, we have employed a micro quality of life production model on the assumption that rational individuals are always attempting to maximize their level of quality of life. It has been illustrated that both physical and psychological inputs are factors which can, to a certain extent, substitute for each other and vary in proportion to produce a given level of QOL (2). The assumptions employed under the normal situation are that the marginal technical rate of substitution is diminishing and that the marginal contribution of factor input is positive but diminishing, other things being equal. Thus, an increase in both inputs should yield a higher level of QOL. A "good" social system which enhances its members' capability to meet basic and psychological needs is one which constantly helps to push onward the capability constraints of all its members. To be specific, a good society is one whose objective is to ensure the maximum of the iso-capability curves for all individual members for any given point in

time and to shift the curves upward to the right-hand side over a period of time.

III

QUALITY OF LIFE INDICATOR DEVELOPMENT

A. *Quantitative Framework for Physical QOL Assessment*

Interest in the development of the quality of life concept grew during the 1960s because its measures became essential to the assessment of many aspects of social progress and social accounting and useful for national goal-setting, program evaluation, and priority ranking. Social indicator development has been advanced theoretically by Cantril (1965), Campbell and Converse (1972), Campbell (1974), Cohen (1969), Fox (1974), Gehrmann (1978), King (1974), Land (1970, 1971), Liu (1973, 1975b), McGrandhar *et al.* (1972), Russett *et al.* (1964), Sewell *et al.* (1977), Sheldon and Moore (1968), Sheldon and Park (1975), Smith (1973), among others. Quality of life, however, remains a very subjective value concept. People tend to alter their value concept depending upon what role they are playing where, when and how. The quality of life concept is multidimensional; and because of the differences in values among individuals, its conceptual heterogeneity can have an infinite number of combinations even if it refers to a particular point in time for a particular group in a particular area. The major problem in defining QOL is that everyone has his or her own set of favored criteria.

The theoretical framework outlined to assess the QOL production by measuring the QOL inputs is similar to the micro-economic model conventionally employed to study the production behavior of firms. The major difference is that the QOL model reflects a combination of people's subjective feelings about well-being and their objective status as opposed to the strictly physical inputs employed in output calculation. While some may prefer the term "consumption" to "production," I chose the latter because of its collective nature in that individuals generally consume what they have produced. No matter how economic growth is measured or in which sector it is, it tends to increase the production of unwanted by-products whereas the QOL production by definition does not.

Since what I call spiritual inputs are not normally quantifiable at the present, and thus must be assumed to be constant, the quality of life output (QOL) may be taken at a particular point in time as a

positive function of those social (SO), economic (EC), environmental (EN), and national vitality and security (NV) inputs which are quantifiable, or:

$$\begin{aligned}
 2) \quad & \text{QOL}_{it} = F(\text{PH}_{it}, \text{PS}_{it}) \\
 & \text{QOL}_{it} = F(\text{SO}_{it}, \text{EC}_{it}, \text{HE}_{it}, \text{EN}_{it}, \text{NV}_{it}, \text{PS}_{it}) \\
 & \text{SO} = f(\text{SL}, \text{IC}, \text{WI}) \\
 & \text{EC} = f(\text{IE}, \text{ES}) \\
 & \text{HE} = f(\text{IH}, \text{CH}, \text{EA}) \\
 & \text{EN} = f(\text{NE}, \text{ME}) \\
 & \text{NV} = f(\text{NC}, \text{PSNS}).
 \end{aligned}$$

SL is standard of living or satisfaction with basic human needs—including housing, transportation, nutrition, clothing, and cost of living factors.

IC is informed citizenry with modern conveniences—including factors affecting mass communication and modern recreation such as television, radio, telephone, etc.

WI is welfare and independent status—including factors promoting social welfare and individual development, improving opportunities for self-support, and reducing inequality.

IE is individual economic well-being—including both flow and stock variables pertaining to real income and wealth measures.

ES is economic structure and productivity—including factors measuring its diversity.

IH is individual health status—including factors reflecting life expectancy at birth and infant survival rate.

CH is community health condition—including factors describing the available health facilities and services to lengthen the life expectation.

EA is educational attainment—including elements reflecting the level and quality of educational services.

NE is natural environment—including national endowment such as usable land per capita.

ME is man-made environmental problems—including factors that deteriorate the environment such as industrial wastes and pollution.

NC is national carrying capacity—including items depicting the availability of natural resources, human capital, technology, and market stability.

PSNS is political stability and national security—including factors demonstrating international power and strength such as military and trade potential.

Based primarily on criteria developed by President Eisenhower's Commission on National Goals (1960) and global public opinion research on individual concerns surveyed by Cantril (1965), the QOL concept as I have perceived it is measured quantitatively by the five major components and their 12 objective indicators. Each indicator is represented by a set of variables expressing the physical factor inputs to each nation's QOL production. In other words, to measure

objectively the output level of quality of life as subjectively perceived by individuals, I have suggested that we start with the cardinal measures of the physical inputs by holding constant the psychological inputs.

Clearly, there is not one single commonly accepted value system whose existence is the best precondition of an efficient QOL indicator that would at the same time be meaningful to all people. Also, the areas of current social, economic, political and environmental concerns are almost unlimited (3). Nevertheless, from the many possible variables, I selected 50 to construct indexes of QOL indicators for 32 developed countries and China (4).

Appendix A presents the variables selected for the 12 objective indicators of QOL production, the expected individual variable effect, and the ladder structure of model specification. Theoretically, the five major QOL components are assumed to be independent of each other and the QOL level is viewed strictly as a stock variable in that it reflects the degree of human satisfaction at a particular point in time, given the quantity of inputs possessed. Practically, some of the assumptions must be relaxed; the quality of life output is usually defined over a period of time and, hence, is a flow variable. Since flow and stock variables are relevant for evaluating social well-being, the actual calculation of QOL indicators involves both. Furthermore, the quality of life model developed on an individual basis is used to describe the entire nation on the assumption that individuals in the nation are more or less homogeneous in socioeconomic background and utility considerations.

B. Methodology and Data Sources

Although there are five QOL components, only the social component, which encompasses three categories and 18 variables, is discussed in this paper. The first category, satisfaction of basic human needs (SL), can be expressed in terms of food, housing, transportation, and wool and cotton consumption. Also, energy, steel, and cement consumption was added to the list to illustrate a modern standard of living. All of these are positive factors contributing to a better QOL. The relative cost-of-living index, which was computed by the U.S. Department of State for the capital city of each country on the basis of the cost of living in Washington, D.C., is a negative variable adversely affecting the satisfaction of basic physical needs (5).

The category informed citizenry with modern conveniences (IC) was judged by ownership of televisions, telephones, and radios per 1,000 population regardless of the quality of the communication services rendered or the programs received. The number of domestic newspapers in circulation and pieces of mail sent reflect the level of comprehension or the extent to which the general public is informed. Provided that modern communication is good, ethical, and well perceived and delivered, the mass communication system and the news media influence and shape the development of social value concepts, impacting the quality of life positively.

The welfare and independent status (WI) category may seem at first glance a contradiction in terms. From an individual's point of view, independence not only is an essential ingredient of personal integrity and dignity but also implies maturity and self-reliance. From a societal viewpoint, all disadvantaged, handicapped, and disabled people should enjoy as decent a life as their fellow citizens, so governing institutions should provide adequate and efficient social security and insurance programs to correct deficiencies in the free enterprise market mechanism and protect basic human rights. The simultaneous inclusion of these two variables in the category of social concerns is influenced by the current western stress on human rights and is also largely attributable to the Chinese philosophy of humanitarianism.

Data on social security and insurance programs were taken from a United Nations publication, "Social Security Programs Throughout the World, 1977." The programs were evaluated on the basis of their comprehensiveness, overall coverage, and updated amendments. Accordingly, point scores ranging from 5 to 10 were assigned to each country. All other data in this and other components (except the relative cost-of-living index) were obtained either from the *U.N. Statistical Year Book, 1976*; the *U.S. Statistical Abstract*, U.S. Department of Commerce; or the *World Population Estimates*, Environmental Fund, Inc. Data for China were obtained either from these sources or from Chinese publications such as *Social Welfare Indicators*, *A Review of Public Administration*, and *Statistical Year Book*.

The weight which appears to the left of each variable shown in Appendix A was derived from the opinion survey on the most significant individual concerns as reported by Cantril (1965) for four westernized nations (United States, West Germany, Yugoslavia, and Poland). The weights adopted in this study are the average weights of the opinions expressed by the people in these four countries (6).

Most data collected from the above-mentioned sources were for 1975. Data from later years or estimated statistics were used when 1975 data were not available. To derive the QOL indicators, the standardized Z-values were first computed for all raw data. Thus, each variable is expressed in terms of deviation from the mean value of all 33 countries. The computed Z-scores for each variable were first multiplied by the weight assigned to the variable and then added to generate a weighted average index, the categorical indicators. These indicators were then multiplied by their corresponding weights to form an average indicator for the component (7).

In summary, the methodology for indicator construction (I_{ij}) developed in this study can be illustrated by the following steps:

$$3) \quad Z_{ij} = (X_{ij} - \bar{X}_i) / S_i$$

$$I_{ij} = \sum_{i=1}^n W_i Z_{ij} / N$$

Where Z_{ij} stands for the transformed or standardized Z-score of the i th variable for the j th country, \bar{X}_i and S_i are the mean and standard deviations of the i th variable computed for the 33 countries under consideration, and W_i is the weight assigned to the i th variable.

IV

EMPIRICAL RESULTS, FINDINGS, AND IMPLICATIONS

TABLE 1 CONTAINS the computed indicators for the five QOL components and the means and standard deviations of the component indicators for the 33 countries. Also, the rankings of these countries are presented. The overall QOL indicators and rankings are the weighted results when the five components are summed.

Some findings:

1. The U.S. surpassed all the countries being studied in providing its citizens with basic human needs and the highest material standard of living. Its indicator in the social component is 1.87, far exceeding three standard deviations above the mean. Sweden ranked second with an index less than one standard deviation above the mean. Chile ranked 33rd (-1.14) with an index more than two standard deviations below the average. But Spain ranked 32nd with an index slightly more than one standard deviation below the norm. As seen in Table 1, other than the U.S.A. and Chile, the countries reveal close

TABLE I

QOL INDICATORS AND RANKINGS BY COUNTRY, 1975

Nation	Social		Economic		Health and Education		Environment		Nat. Vitality and Security		Overall	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank
U.S.A.	1.87	1	1.13	2	.47	7	.53	6	.40	6	.93	1
CHINA (TAIWAN)	-.08	20	-1.15	32	-.55	28	-.62	28	.51	5	-.36	30
ARGENTINA	-.39	29	-.95	30	-.62	30	.61	3	-.44	30	-.41	31
AUSTRALIA	.07	15	.68	8	.38	10	2.90	1	.58	2	.78	2
AUSTRIA	-.01	17	.30	14	-.09	23	-.25	21	-.12	19	-.02	14
BELGIUM	.17	10	.44	9	-.07	22	-1.20	33	-.15	20	-.10	22
BULGARIA	-.04	18	-.89	28	.09	16	.09	14	.52	4	-.05	18
CANADA	.32	4	1.32	1	.53	6	1.63	2	.36	8	.77	3
CHILE	-1.14	33	-1.22	33	-1.44	33	.56	5	-.84	33	-.91	33
CZECHOSLOVAKIA	.15	12	-.26	22	-.06	21	-.30	24	-.54	3	.03	13
DENMARK	.29	5	.68	7	.42	8	.09	15	-.11	18	.29	6
FINLAND	-.05	19	.11	17	.17	13	.28	8	-.21	23	.05	11
FRANCE	.09	13	.34	11	.14	14	-.27	23	-.22	24	.04	12
GERMANY, D. R.	.24	7	.31	12	-.00	19	-.51	26	.37	7	.11	9
GERMANY, F. R.	.15	11	.72	6	.05	17	-.86	29	.04	15	.07	10
GREECE	-.08	21	-.09	19	-.35	27	.29	7	.08	14	-.06	19
HUNGARY	.08	14	-.45	24	-.31	25	-.07	20	.31	10	-.09	20
IRELAND	-.14	22	.13	16	.20	12	.15	11	-.50	31	-.04	16
ITALY	-.25	25	.14	15	.11	15	-.45	25	-.39	27	-.15	24
JAPAN	.17	9	-.41	23	.64	4	-.87	30	-.32	26	-.09	21
NETHERLANDS	-.22	23	.31	13	.60	5	-1.09	32	-.44	29	-.10	23
NEW ZEALAND	.22	8	.83	5	.39	9	-.03	18	-.43	28	.22	7
NORWAY	-.01	16	.98	3	.68	2	-.06	19	.35	9	.40	5
POLAND	-.41	31	-.11	20	-.05	20	-.27	22	-.16	22	-.20	25
PORTUGAL	-.41	30	-.59	26	-.62	29	.11	12	.30	11	-.28	28
ROMANIA	-.25	26	-.94	29	-.33	26	.04	16	.27	12	-.26	27
SPAIN	-.47	32	-.20	21	-.22	24	.17	10	-.30	25	-.23	26
SWEDEN	.37	2	.85	4	.78	1	.02	17	.16	13	.46	4
SWITZERLAND	.34	3	.36	10	.67	3	-.58	27	-.16	21	.18	8
U.S.S.R.	-.24	24	-1.07	31	.01	18	.58	4	.76	1	-.04	15
U. K.	.29	6	-.07	18	.26	11	-.89	31	-.10	17	-.04	17
URUGUAY	-.32	28	-.53	25	-1.28	32	.18	9	-.56	32	-.54	32
YUGOSLAVIA	-.30	27	-.69	27	-.63	31	.09	13	-.06	16	-.35	29
MEAN	.00		.00		.00		-.00		.00		.00	
STD. DEV.	.4578		.7016		.5316		.7715		.3949		.3749	

social QOL indexes, indicating that the standards of living are much more similar than one might think.

Japan and the U.S.S.R. ranked 9th and 24th; and China (Taiwan), the only developing country in this group of developed countries, ranked 20th with an index value insignificantly below the mean.

2. Based on the available indicators representing both individual economic well-being and societal economic structure, the U.S. ranked second, trailing Canada. Since the income per capita figure was first deflated by the relative cost-of-living index, and since the productivity measure may favor countries with concentrated economic structures in the areas being examined, the ranking of the economic giants is not comparable to the rankings based solely on per capita income. Norway, Sweden, New Zealand, and West Germany ranked close to the U.S. Chile had the lowest economic QOL index, and the U.S.S.R. was 31st.

China (Taiwan), with a per capita income equivalent to \$891 in 1975 as measured by real purchasing power, ranked 32nd. The economic QOL index for China (Taiwan) is about 1.6 standard deviations below the average. Due to a low per capita income, China (Taiwan) has never been considered developed; but even so, by using a composite economic power index that includes productivity and economic viability such as the one in this study, she did not fare worst among the so-called developed countries. This fact alone may call for a revision in her status.

3. In the area of health and education indicators, variations among the most advanced countries are insignificant. Sweden, Norway, and Switzerland occupied the first three places while Japan, the Netherlands, Canada, and the U.S.A. were immediate runners-up. Their index values are close, and they vary little from the mean plus one standard deviation. On the other end of the rankings, the situation is different, especially for Chile and Uruguay. Both indexes are valued much lower than two standard deviations below the mean. Yugoslavia, Argentina, and Portugal have nearly identical indexes (about -0.62), which is about 1.2 standard deviations below the group mean.

The corresponding index for China (Taiwan) is -0.55 , or virtually one standard deviation below the mean. It is interesting to note that China (Taiwan) and the U.S.A. are nearly a balanced pair on the health and education scale; their QOL indicators are about equidistant from the mean but in opposite directions.

4. Since very few comparable statistics are available for measuring the environmental health of each country, the standard deviation in this component is the largest among the five components studied. Australia, Canada, and Argentina scored the highest primarily because of massive amounts of arable land and relatively sparse populations. The arable land per capita in Australia is 8.1 acres; in Canada, 4.7; and in Argentina, 2.2. The trade-offs between environmental deterioration and industrial development, particularly in the manufacturing process, have been relatively insignificant. In spite of these similarities, the index for Australia is almost twice the value computed for Canada and almost five times that of Argentina.

Also benefiting from large amounts of arable land and sparse populations are the U.S.S.R. and the U.S.A. In contrast, the United Kingdom and Japan suffer substantially from pollution and environmental degradation, and they ranked third and fourth from the lowest. China (Taiwan) is seriously handicapped by her high popu-

lation density and very low natural carrying capacity as measured by arable land per capita. The continuing natural growth of population will probably intensify the trade-off between industrial development and environmental deterioration in China (Taiwan).

5. The last component in the QOL indicator study is national vitality and security including two major categories reflecting international strength and power and domestic carrying capacity. While no one would question the positive impact of domestic carrying capacity upon an individual's overall QOL, political stability and national security are also of great concern to our daily life. Cantril (1965) reports that most of the world's people are afraid of wars, and long-term international peace is the most significant and important hope of their lives.

The influence and impact of an economic war can be illustrated by the 1973 oil embargo and its aftermath of international trade turbulence.

Given military strength and an economy which is less dependent upon foreign trade, the U.S.S.R. ranked first in this QOL component with an index almost two standard deviations above the mean. Surprisingly, Australia, Czechoslovakia, Bulgaria, and China (Taiwan) also scored higher than the U.S.A. While the strength of the socialist countries is built upon their military power, unified national goals, and cohesive governments, the higher ranking for Australia may be due more to her independent national policies and accelerated economic prosperity than to anything else. China (Taiwan), a small country with an island position, must benefit from all these factors in order to be outstanding. As Cline (1975) correctly points out, the strong strategic power of China (Taiwan) today might have never been perceived had there not been an intelligent, efficient, progressive, democratic government in the face of still serious military threats from Mainland China.

In light of recent development throughout the world it is not inconceivable that the U.S.A. has lost militarily and strategically some of its influence and perceived power to the U.S.S.R. Economically, the U.S.A. has suffered substantially from constantly rising oil prices and an unprecedented decline in the value of U.S. dollars on the world market. Many domestic problems in this country, including inflation, energy, environmental deterioration, impaired credibility of government, and confused value concepts, have degraded the quality of life. The standard deviation computed for this component is the

smallest of the five, which means that the spread of the indexes among countries is the smallest and that most indexes are clustered around the mean. Therefore, comparisons based solely on a country's ranking may be misleading since the actual differences are not as apparent as the rank-order system may indicate.

6. QOL cannot be represented theoretically by one factor or variable alone, nor can it be empirically measured by one index, regardless of how this index is developed. The overall QOL index was generated and is shown in Table 1 for two reasons. First, this index may be employed to show the extent to which income per capita may vary. Second, it is the intention of this paper to evaluate the physical QOL ingredients in China (Taiwan) as compared to those in developed countries and to rank China (Taiwan) based strictly on indexes developed by using the western standards of QOL.

With the weights assigned to the five QOL components being 24.0, 20.0, 22.0, 15.0 and 19.0, the additive model generated the overall QOL indexes for all 33 countries as shown in Table 1. China (Taiwan) received an index of -0.36 , less than one standard deviation below the mean of the 33 countries. Although China (Taiwan) ranked 30th, her overall QOL index was almost identical to that of Yugoslavia, 29th.

Despite the fact that the U.S. led other countries in only one of the five QOL components, the overall QOL index for this country far exceeded any others and even outscored Australia and Canada, second and third, by almost one-half of one standard deviation. The distorting picture of using a rank order system alone should now become clear since both Australia and Canada have a nearly identical index and their respective physical well-being may not differ significantly at all. Sweden, Norway, Denmark, New Zealand, Switzerland, and East and West Germany make up the rest of the top 10.

Chile, with an index trailing a great deal behind those of other countries, is last. Uruguay and Argentina also received smaller overall QOL indexes than China (Taiwan). Japan, the so-called economic giant second only to the U.S. and U.S.S.R. in terms of GNP, ironically ranked slightly below average and shares with Hungary the rank of 20.5.

Competing with 32 developed countries, China (Taiwan) (which is classified as "developing" based on GNP per capita) rated relatively favorably in this QOL study. Adopting western standards and criteria for index weights and employing more than 50 available physical

data for index inputs, the social indicator model in this study illustrates that the physical QOL in China (Taiwan) is better generally than in some of the so-called developed countries (30th). Moreover, China (Taiwan) is far better off in the national vitality and security component in particular. For comparison, China (Taiwan) ranked 35th among 160 countries in terms of the three physical quality of life indexes constructed by Sewell (1977) and 29th in perceived power by Cline (1977).

7. One of the principal issues raised in this paper is that QOL may vary directly with the level of income initially, but additional income beyond a certain level or a relative threshold will not necessarily enrich one's QOL. This may be restated as: Any country whose primary national objective is to maximize her citizens' quality of life need not, and indeed cannot, continuously focus her national policy on industrial development and economic growth. Without the concomitant satisfaction derived from the production and consumption of things other than income or material wealth, such as spiritual or psychological inputs, the nation's overall health will not be improved collectively and the citizens' pursuit of happiness will not be complete individually.

Regressing the overall QOL indexes of the 33 countries on some categorical indicators essential to human concerns selected from the five QOL components and the per capita income variable (Y), one may be able to test the hypothesis concerning the importance of the variable. The statistical results in the following two equations tentatively support our hypothesis that income per capita is neither an important determinant nor a good measure of QOL once the national carrying capacity (NCC), satisfaction of basic human needs (SBHN), individual health condition (IHC), and community health facilities (CHF) have been considered.

The addition of the two income variables raised only 6.0 percentage points the explanation of the total variations in QOL: the adjusted coefficient of determination (\bar{R}^2) changed to 0.77 from 0.71; neither of the variables is estimated with coefficients significantly different from zero; and the QOL indexes tend to decline with income at an increasing rate.

$$4) \text{ QOL} = -1.34 + 0.00008\text{NCC} + 0.0007\text{SBHN} + 0.0137\text{IHC} \\ \begin{matrix} (0.18)^* & (0.00003)^* & (0.0002)^* & (0.006)^* \\ + 0.0011\text{CHF} & & & \bar{R}^2 = 0.71 \\ (0.0015) & & & \end{matrix}$$

$$\begin{aligned}
 5) \quad &= 0.79 + 0.000003 \text{ NCC} + 0.0004 \text{ SBHN} + 0.009 \text{ IHC} \\
 &\quad (0.00004) \quad (0.0001)^* \quad (0.006) \\
 &\quad + 0.001 \text{ CHF} - 5.7\text{Y} + 201.3\text{Y}^2 \quad \bar{R}^2 = 0.77 \\
 &\quad (0.001) \quad (11.9) \quad (155.4)
 \end{aligned}$$

8. Using a framework similar to the one in this study, Lu (1978) has shown the accomplishment of political progress toward a more democratic government in China (Taiwan) striving to provide a better and a healthier QOL for the people. In a paper on growth and defense in developing countries, Benoit (1978) recently pointed out that countries with a heavy defense burden generally had the most rapid rate of economic growth in nondefense output, and those with the lowest defense burdens tended to show the lowest growth rates. China (Taiwan) was one of the 44 sample countries he studied to substantiate his conclusion.

A growing body of evidence suggests that the benefit of economic growth in many developing countries has not been equitably distributed, and Chinn (1977) has stated that the poor in India may have become absolutely as well as relatively worse off in the past two decades. However, in the same paper Chinn argued that economic policies can also be designed to achieve growth and equity simultaneously, rather than the substitutive presumption ordinarily held by most economists; *i.e.*, their idea that economic growth and the equity objective (more equal distribution of income) are conflicting national policies. The case study employed to support his argument is China (Taiwan).

Competition is the mother of success if and only if it motivates and stimulates a cohesive desire for betterment and improvement. An international comparison of QOL indicators in this study also underlines some comparative weaknesses and strengths for each country. Government officials and public decisionmakers dedicated to enriching overall well-being are encouraged to reexamine and reinvestigate the national objectives and policy strategies for the pursuit of happiness for all people.

Ultimately, it is hoped that development in this type of analysis will enable us not only to measure and evaluate the shifts in the capability curves for QOL production, but also to identify and predict the expansion path of the QOL over periods of time under different national goals and policies.

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Appendix A

QUALITY OF LIFE INDICATORS, VARIABLE WEIGHT AND EFFECT

Effect/Weight

Component and Variables

Effect/Weight	Component and Variables
	I. Social Component (24.0)
+ (1.20)	A. Satisfaction of Basic Human Needs: Standard of Living
+ (1.31)	1. Occupied Housing Units per 1,000 Population
+ (0.69)	2. Steel Consumption per capita
+ (1.31)	3. Energy Consumption per 1,000 Population
+ (0.69)	4. Cement Production per 1,000 Population
+ (1.31)	5. Net Food Supplies of Calories per capita/day
+ (1.31)	6. Net Food Supplies of Protein per capita/day
+ (1.31)	7. Wool and Cotton Consumption per 1,000 Population
+ (0.69)	8. Motor Vehicles in Use per 1,000 Population
+ (0.69)	9. Rail Traffic Passenger Kilometers per 1,000 Population
- (0.69)	10. Relative Living Cost Index
+ (0.78)	B. Informed Citizenry with Modern Conveniences
+ (1.00)	1. Television Sets per 1,000 Population
+ (1.00)	2. Telephone Sets per 1,000 Population
+ (1.00)	3. Radio Sets per 1,000 Population
+ (1.00)	4. Pieces of Domestic Mail Sent per 1,000 Population
+ (1.00)	5. Newspaper Circulation per 1,000 Population
+ (1.02)	C. Welfare and Independent Status
+ (1.00)	1. Social Security and Insurance System
+ (0.80)	2. Population Independent Status
- (1.24)	a. Economically Inactive to Economically Active Population
- (0.76)	b. Life Expectation at Birth: Female to Male Ratio, Absolute Value
	II. Economic Component (20.0)
+ (1.27)	A. Individual Economic Well-Being
+ (1.00)	1. National Income per capita Adjusted by Cost of Living Index
+ (1.00)	2. Individual Wealth Status
+ (1.34)	a. Occupied Housing Units per 1,000 Active Population
+ (0.66)	b. Motor Vehicles in Use per 1,000 Active Population
+ (0.73)	B. Economic Structure and Productivity
+ (1.00)	1. Value Added per Manufacturing Worker Adjusted by Cost of Living Index
+ (1.00)	2. Cereal Grains Production per 1,000 Active Population
+ (1.00)	3. Electrical Energy Production per 1,000 Active Population
+ (1.00)	4. Cement Production per 1,000 Active Population
+ (1.00)	5. Meat Production per 1,000 Active Population
+ (1.00)	6. Cotton Yarn Production per 1,000 Active Population

*Effect/Weight**Component and Variables*

	III. Health and Education Component (22.0)
+ (1.32)	A. Individual Health Status
+ (1.00)	1. Life Expectation at Birth—Male
+ (1.00)	2. Life Expectation at Birth—Female
- (1.00)	3. Infant Mortality Rate per 1,000 Births
+ (0.86)	B. Community Health Conditions
- (0.49)	1. Persons per Hospital Bed
- (0.49)	2. Persons (1,000) per Physician
- (1.02)	3. Crude Death Rate per 1,000 Population
+ (0.82)	C. Educational Attainment
+ (1.42)	1. Students to Teacher Ratio
- (1.00)	a. Elementary
- (1.00)	b. Secondary
+ (1.02)	2. Per capita Public Expenditures on Education Relative to Income per capita
+ (0.78)	3. Literacy—Pieces of Domestic Mail Sent per capita
+ (0.78)	4. Newspaper Circulation per 1,000 Population
	IV. Environmental Component (15.0)
+ (1.16)	A. Natural Environment
+ (1.00)	1. Arable Land, Acres per capita
+ (0.84)	B. Man-Made Environmental Problems
- (1.00)	1. Population Density
- (1.00)	2. Percentage of Manufacturing Workers to Total Economically Active Population
- (1.00)	3. Number of Motor Vehicles in Use per Square Mile
	V. National Vitality and Security (19.0)
+ (1.16)	A. National Carrying Capacity
+ (1.14)	1. Human Capital: Percentage of Economically Active Population
+ (1.00)	2. Natural Resources: Acres of Arable Land per capita
+ (1.04)	3. Technology: Electrical Energy Production per capita
+ (0.82)	4. Market Stability and Price Mechanism:
- (0.84)	a. Domestic Price Stability: Percent Change in Consumer Price Index, 1970–1975
- (0.63)	b. Weighted Relative Living Cost Index
+ (1.00)	B. Political Stability and National Security
+ (1.10)	1. Numbers of Tourists Received per 1,000 Eco- nomically Active Population
+ (1.20)	2. Armed Forces per 1,000 Population
+ (0.75)	3. Military Expenditure as Percent of National Income
+ (0.95)	4. Export to Import Ratio

NOTES

1. For instance, see U.S. Bureau of the Census, *U.S. Statistical Abstracts, 1977 Comparative International Statistics Section*, (Washington, D.C., U.S. Government Printing Office 1977).

2. It has been pointed out often enough that environmental pollution represents a long unpaid debt to nature. It is reasonable to attribute partially the

economic growth in the U.S. since 1946 to the enlargement of that tangible debt. For this argument, see Barry Commoner (1972).

3. Nevertheless, these problems do not seem to prohibit developing useful social indicators. Research in classifying and quantifying QOL in this country has already stimulated great interest in this type of investigation. For instance, the *U.S. Social Indicators 1975* has been recently released; the Japanese also published *White Paper on National Life*; the British published *Social Trends*; the Canadian, the *Perspective Canada*; the Chinese, *The Social Welfare Indicators*; the French, West German, and many western governments have also produced similar documents.

As has been pointed out, it is difficult to develop a composite list of QOL components or factors which is both totally inclusive and nonredundant. In a survey conducted to determine the pattern of human concerns, Cantril (1965) found that people in the western world are most concerned about their own health; next is a decent standard of living; and children, housing, and family life are other important concerns. Dalkey and Rouke (1971) used 48 factors to characterize QOL; 50 factor items were proposed by Livingston (1973) to serve as points of departure in the QOL Concept Conference sponsored by U.S. EPA; Smith (1973) employed some 47 variables to assess the social well-being by state in the U.S.; and Liu (1973, 1975a) organized more than 100 QOL input factors to rate the livability of 50 states and 243 U.S. metropolitan areas.

4. Due to data problems, only 32 of 36 developed countries were employed. The variables were selected on the basis of the following criteria:

1. *Commonality*: Sufficiently universal that the fundamental principles would generally be agreed upon by and apply to the majority of people.

2. *Simplicity*: Commonly understood and have policy bearing which can be realistically and efficiently implemented.

3. *Adaptability*: Flexible enough to account for lifestyle input variations over space and time and easily adaptable to changes in a dynamic society.

4. *Neutrality*: Neutral as to unit of measurement and open to verification according to a recognized scientific approach; able to be updated.

5. *Utility*: Indicative, meaningful, and useful to public and private decisionmakers.

5. However, "standard of living" should not be confused with the "cost of living" even though these two may tend to go hand-in-hand in many countries.

6. Given that individual concerns vary in interpretation from country to country and that not all of the concerns are directly comparable, some of these averaged weights were inevitably the product of author prerogative. The assignment of averaged weights to each variable, however, is within reason and seems to be generally acceptable. For example, variables representing basic human needs, such as housing units and food intake, received a weight nearly twice that representing a higher standard of living, such as steel consumption and cost-of-living index, *i.e.*, 1.31 versus 0.69. Among the three categories within the social component, (WI) was given a lighter weight than (SL) but a heavier weight than (IC). The weights derived for these three categories were, respectively, 1.02, 1.20, and 0.78. After the categorical indicators were constructed from the standardized variables, these weights were applied individually to the categorical indicators and then added to generate the overall social component indicator.

7. Some variables used in this study are themselves composite variables. For instance, all variables measured by national currency were first converted to U.S. dollars; the first variable used in the economic component was further deflated by the cost-of-living indexes so that it could represent realistic purchasing power rather than the nominal measure, national income per capita; and economic productivity was measured on a basis of per 1,000 "active" population. These adjustments were attempts to improve precision so that the international comparisons made in this study would be more meaningful than the conventional gross comparisons.

For each QOL component, attempts were made to account for factors that explain individual as well as community QOL. In addition to the collective variables, institutional phenomena such as domestic price stability and armed

forces per 1,000 population were employed as determinants for national vitality and security. Trade-offs among variables are also present; e.g., while the number of motor vehicles in use per 1,000 active population is considered a positive measure of individual wealth status, the number of motor vehicles in use per square mile is deemed negative because of related environmental problems.

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Conference on Capital Punishment

THE DEPARTMENT OF PHILOSOPHY of Georgia State University announces a call for papers for an Interdisciplinary Conference on Capital Punishment, to be held in Atlanta, Ga., on April 18 and 19, 1980. Fields represented will include philosophy, religion, sociology, criminology, law, psychology, political science and economics.

Papers may be on any aspect of capital punishment, pro- or con-, and may involve any method or approach. They may be of any length but reading time (of abstracts or summaries, if necessary) will be limited to 30 minutes. Papers submitted should be typed, double-spaced, and in duplicate. Selected papers may be published. Deadline for submission is December 15, 1979. Selections will be announced by February 1, 1980. Send papers or inquiries to: Professor C. G. Luckhardt, Dept. of Philosophy, Georgia State Univ., University Plaza, Atlanta, Ga. 30303. [From Professor Luckhardt.]