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ORGANIZATIONAL COMPLEXITY AND INDUSTRIAL HEALTH SERVICES: A STUDY OF KWUN TONG

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ABSTRACT

The hypothesis concerning the relationship between organizational complexity and availability of health services in work-organizations is tested with data from a probability sample of 346 registered industrial establishments located in an industrial satellite town of Hong Kong in 1971. We discover that the relationship is strong and positive, and is independent of the pattern of ownership and of technological security.

We also find that foreign-owned industrial units provide more health services to workers than nonforeign-owned units, and that the lower the degree of technological security the more would the health services be available. To account for the variations in health services, organizational complexity is found to be statistically as important as ownership pattern and is much more important than technological security.

To interpret the relationship between complexity and health services, we argue that with increase in complexity, industrial firms may deliberately become more concerned with work-morale and thus provide more medical and health benfits to their workers. Our findings shed some lights to the general issue concerning the consequences of bureaucratization in modernizing societies.

Furthermore, since a substantial number of the industrial units studied are small-scale in nature, our findings also suggest that in most of the developing countries, small and large industries differ not only in terms of economic operations but also the availability of service programmes to their workers. Hence, a practical implication of this study is that health workers should reduce the medical deprivation by placing more emphasis on the supply of medical care to employees in small industrial undertakings.

ORGANIZATIONAL COMPLEXITY AND INDUSTRIAL HEALTH SERVICES: A STUDY OF KWUN TONG*

Societies undergoing the process of modernization are mostly characterized by the emerging bureaucracies in various spheres of life. The goals and functions of various social, political, and economic units become more and more specific, and the internal operations and activities tend to be increasingly formalized and differentiated. An important sociological problem then emerges: What are the effects of bureaucratization?

Many sociologists have contributed to our systematic understanding of the impact of bureaucracy upon social and personality changes, among whom we may include Weber (1946), Merton (1940), Lipset (1950), Blau (1956), Argyis (1960), Presthus (1962), Moore (1965), Eisenstadt (1966), Galbraith (1967), and Faunce (1968). To be selective, the present paper will place its focus on the influence of increasing bureaucratization upon the service orientation of work-organizations in industrializing societies. It is our general postulate that increasing bureaucratization gives rise to an increasing emphasis on services to organizational personnel.

A work-organization can be perceived as an entity with two main analytical components; namely, the functional and the service components. The functional component refers to those activities which are directly related to the process of goal-attainment, such as the production of particular goods in factories, the training of students in schools, the medical care for patients in hospitals, and the administration of public affairs in government agencies.

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* This paper is derived from a larger study directed by Victor Mok and designed to investigate the organizational components and economic operations of industrial undertakings in Hong Kong. The initial study was financially supported by the Harvard-Yenching Institute and was under the auspices of the Social Research Centre, The Chinese University of Hong Kong. I would like also to acknowledge the research assistance of Grace Y.C. Chiu in preparing this paper.

The service component refers to those activities of which the primary or stated purpose is to promote the general welfare of the personnel, such as recreational programs, loans, housing, and medical and health facilities. The contribution of service component to the operation of functional component cannot be disregarded because the availability of service programs promotes work-morale, and may thus generate positive, though indirect, feedbacks to the effective operation of the functional activities.

An added consideration is that although economic incentive may affect the morale of workmen, the role of service programs has become increasingly important in the process of modernization. A striking fact in most of the modernizing societies is that citizens will gradually receive more education, achieve a higher standard of living, and have more leisure time to spend. As a result, there exist increasingly pressing demands for higher quality and more extensive recreational, welfare, and health services. Economic incentive alone can no longer entirely account for the morale of workers; more important is the kind of services they can receive from work-organizations.

A basic reason for work-organizations to introduce bureaucratic model is the attempt to improve functional or production efficiency. Since work-morale is an important determinant of functional efficiency, it seems likely for bureaucratic organizations to provide various kinds of services to workers. In other words, the higher the degree of bureaucratization in work-organizations, the greater will be the extent of services likely to be available.

Since the concept of bureaucracy and of the availability of services are multi-dimensional, many specific propositions can be derived from the aforestated theoretical postulate. To delimit its scope, the present paper will focus on one type of services, i.e., the extent of health services.

It refers to the amount of medical care facilities the organizational unit provides for its personnel, such as the availability of health personnel and medicines, sickness allowance, and compensation for work-accidents. This type of services is important since the value of health has been of increasing concern to people in most modernizing societies.

It has been argued that organizational complexity is in effect a salient aspect of bureaucracy.[1] It refers to the degree in which there is a large number of different types of work activities in the organization. The extent of health services will then be analyzed in relation to the degree of organizational complexity.

On the basis of the theoretical postulate, we can hypothesize that the availability of medical and health services in work-organizations will be positively associated with the degree of structural complexity. In other words, the higher the degree of organizational complexity, the greater will be the extent of medical and health services provided to employees. Our units of study will be the registered industrial undertakings in a satellite town, named Kwun Tong, of Hong Kong.

However, there is no reason to assume that the extent of health services is only dependent upon organizational complexity. To provide a more critcial examination of the relationship, this paper attempts to introduce two control or "test" variables; they are (1) technological security, and (2) ownership of organization.

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[1] For a discussion on the importance of the concept "organizational complexity", and on some relevant literature, see Blau and Scott (1963: 222-232), Hall, Haas and Johnson (1967), Aiken and Hage (1968), and Blau and Schoenherr (1971: Chapters 3 & 4).

Ever since the empirical study of the long-wall coaling method by Trist and Bamforth (1951), many sociologists have demonstrated the crucial impact of technology upon the social structure of organizations.[2] The technological phenomenon, however, has been conceptualized in different ways. Let us now review a few examples. In her survey of 100 manufacturing firms in England, Woodward (1965) focuses on three modes of technical complexity; they are (1) unit or small batch production, (2) large batch or mass production, and (3) continuous flow or process production. Harvey (1968) groups the industrial organizations along the continuum from technical diffuseness to technical specificity. Perrow (1970) suggests a fourfold typology, with the types named craft, nonroutine, engineering, and routine technologies. Since the focus of the present study is on the problem of medical and health services, we feel that the security or safety aspect of technology would be more appropriate. Technological security refers to the extent of which the work activities in organizations are not harmful to the health of workers.

The reason for considering technological security is obvious. If the work activities in an organization are likely to produce illness or accidents, there should be a greater demand for medical care on the part of workers. Because of the differential demands for medical care, technically secure organizations would be less likely than insecure organizations to provide health services to employees.

Let us now turn to the factor of organizational ownership which denotes whether or not the capital resources of the organizational unit is primarily invested by entrepreneurs from foreign countries. Overseas investment

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[2] For a brief review of theoretical and empirical literature concerning technology and organizational structure, see Perrow (1967: 205-208).

(particularly from the United States, Japan, Britian, and Australia) has been a major input to the industries in Hong Kong. It was recently estimated by the Department of Commerce and Industry that the total amount of overseas investment is slightly over one billion Hong Kong dollars. At this juncture we are inclined to ask: Do the foreign-invested industrial units differ from the local-invested ones with regard to the service orientations?

It seems that in comparison with the local industrialists, the overseas investors generally have more capital resources and are more familiar with the scientific-managerial principles used in the developed countries of the Western World. They are then not only more concerned with the concept of providing services to workers, but are also financially more able to implement the idea.

In view of the above rationale, we can assert that both technological security and organizational ownership may have significant effects upon the provision of health services. Since the present paper is primarily concerned with the relationship between organizational complexity and health services, two important questions can then be asked: (1) Will organizational complexity have a relatively stronger impact than technological security and ownership upon the extent of health services? (2) How will the relationship between complexity and health services be explained or interpreted by technological security and ownership? These questions will be examined in this paper.

In summary, the present paper deals with the relationships among four major characteristics of industrial units in Hong Kong; they are organizational complexity (independent variable), the extent of health services (dependent variable), technological security and organizational ownership (control variables). The central hypothesis can be stated in this way: the extent of health services provided to workers in industrial undertakings is positively related to the degree of organizational complexity, but this relationship is affected by the degree of technological security and the pattern of ownership.

THE SETTING

For many years, Hong Kong has been one of the greatest commercial urban centres in Asia. There are now about 4 million people concentrating in an area of 400 square miles with the great majority of them being Chinese. Ever since the Communist take-over of Mainland China in 1949, Hong Kong has been undergoing a rapid process of industrialization. There are currently about 15 thousand industrial undertakings, employing about 600 thousand workers. However, most of these industrial undertakings are small-scale with less than 50 employees.

The district of Kwun Tong, located in the eastern coast of Kowloon Peninsula, Hong Kong, has developed into a major industrial town over the last 17 years. Presently there are about half million residents, living in an area of about 23 hundred acres. Over 2,000 industrial undertakings have been established, of which most are located in the coastal areas. With the exception of a few most of the industrial units in Kwun Tong are registered and they are the target population for the present study.

METHOD OF PROCEDURE

The Sampling Survey. This paper uses part of the data collected by Victor Mok in his Sampling Survey Study of Kwun Tong Factories in 1971. The major objective of Mok's study is to analyze the internal management of, and the inter-organizational linkages among, the registered industrial establishments in Kwun Tong. An industrial establishment refers to any premise or place (other than a mine or quarry) in which articles or materials are processed and transformed.[3]

According to the "Employment and Vacancies Statistics" on 31st May 1971, provided by the Labour Department of Hong Kong Government, there were a total number of 1,552 registered industrial establishments or factories in Kwun Tong. A stratified (in terms of major types of industry) random sample of 346 industrial establishments were drawn for the survey, and a structured questionnaire of 160 items, worded in Chinese, was developed to gather inform-ation about the socio-economic background of the owner, the history of the factory, the internal management and communication patterns, types of products, the extent of markets, the input or production factors, the relationship with Government and with other civic organizations, the attitude towards entre-preneurship, as well as health services provided. The data were collected through personal interviews in the factory setting within business hours in August 1971. Respondents were those holding a responsible position in each

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[3] For a detailed definition, see Section 2 - 1 of the Factories and Industrial Undertakings Ordinance, Hong Kong Government.

industrial establishment and with access to the "Company books". They were thus likely to be the owner or the manager, or his equivalent.[4]

Measurement and Variable-Description. The extent of health services is measured by three items in the questionnaire: (1) Are there medical care facilities in your industrial establishment? (2) If workers ask for sick-leave, does your industrial establishment pay them as usual? (3) If workers get injured in serious accidents, does your industrial establishment provide compensation?[5] Since we would like to reduce the data, to promote the level of conceptualization, and to increase measurement reliability, these three indicators are combined into a Likert-type scale of industrial health services, the scores of which range from 0 to 3. The distribution of industrial units along the scale is percentaged as below (N=317, excluding those with missing observations):

3 (High) = Have medical care facilities; definitely have paid sick-leave; and definitely have compensation for accidents
= 4.7%

2 = Have two of the three services stated above
= 33.7%

1 = Have only one of the three services
= 31.6%

0 (Low) = Have none of the three services
= 30%

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4 For a detailed description of Mok's study, see the progress report (August 1971) of the Kwun Tong Factory Survey prepared by Victor Mok and Louis Wong, Social Research Centre, The Chinese University of Hong Kong. It should be noted that the original sample was composed of 546 industrial establishments, i.e., 35% of the total population. The unsuccess rate was 36.6%, due to the removal or close-down of 70 industrial units, and to the rejection of interview by respondents of 30 industrial units. In view of the length of questionnaire and of the time and place of interview, the rejection rate was considered to be low.

5 The response categories for item (1) are yes and no; while those for items (2) & (3) are definitely, probably, and not at all. We find that among the industrial units studied, 16.1% had medical care facilities; 39.8% definitely paid sick-leave; and 58.3% definitely compensated for work-accidents.

Only a very small proportion (less than 5 percent) of the industrial firms studied have all three kinds of health services, while almost one-third provide none of them. In terms of the provision of health services to employees, industrial firms in Kwun Tong seem to be fairly "underdeveloped".

The degree of organizational complexity can be specified into three components: (1) organizational size, (2) departmental division of labour, and (3) authority hierarchy. Organizational size refers to the total number of personnel working in an industrial unit. It is measured by a questionnaire item: (1) What is the total number of personnel in your industrial establishment? The industrial units studied are grouped into four levels, and their distribution is percentaged as below:

0 = Less than 20 persons = 54%
1 = 20 to 99 persons = 30.5%
2 = 100 to 199 persons = 8.5%
3 = 200 and over = 7%

Obviously most of them are small or medium-sized industrial units. Only a small proportion are large-sized, employing 100 or more persons.

The degree of departmental specialization or division of labour refers to the number of divisions or departments dealing with different aspects of the organizational task. It is measured by the item: How many major divisions or departments are there in your industrial establishment? The industrial units under study are classified into four categories, and the distribution is percentaged as follows:

0 = No division = 50.7%
1 = 2 to 3 divisions = 22%
2 = 4 to 5 divisions = 18%
3 = 6 and over = 9.3%

Most of the industrial units studied show a low degree of departmental division of labour. About half of them have no departmental division at all.

The level of authority hierarchy refers to the number of strata which are vertically subdivided and arranged in terms of management responsbilities. It is indicated by the item: How many levels of management are there in your industrial establishment? The industrial units are divided into four levels and the distribution is percentaged as below:

0 = No stratification = 49.6%

1 = 2 to 3 levels = 29.9%

2 = 4 to 5 levels = 16.2%

3 = 6 or more = 4.3%

Apparently the industrial firms studied are mostly with very few levels of authority hierarchy. Almost half of them are without stratification. Only one-fifth of them show 4 or more levels of hierarchy.

The above description of size, division of labor, and authority hierarchy shows that most of the industrial establishments under study are small-sized units with simple structures. In a further analysis, we discover that these three components of organizational complexity are strongly and positively associated with each other (See Appendix A.). The Gamma values are .71 for the relationship between size and division of labor, .80 between size and hierarchy, and .71 between division of labor and hierarchy. These values are all statistically significant at the .01 level (two-tailed test). The overall concept of "Organizational Complexity" is thus measured by simply

summing up the scores of these three indices.[6] In other words, the total degree of organizational complexity of an industrial unit is defined by the expression:

Complexity = Size + Division of labor + Hierarchy

The resulted total scores, ranging from 0 to 9, are then recombined into 4 categories or levels of organizational complexity. The distribution of sample units on this new index is as below (N = 339, excluding those with missing observations):

3 (High)	= Combining the total scores 7,8,9	= 3%
2	= Combining the total scores 4,5,6	= 26.5%
1	= Combining the total scores 1,2,3	= 34.8%
0 (Low)	= The total score 0	= 35.4%

According to this new index, most of the industrial units in Kwun Tong are with a low degree of organizational complexity.

The ownership of the organization is measured by the item: To which of these categories does the ownership of your industrial establishment belong: foreign investment, local investment, or foreign-local combined? Among the industrial establishments studied (N = 340, excluding those with missing observations), 4.1% are primarily foreign-invested; 93.8% are primarily local-invested; and 2.1% are both foreign-and-local-invested. Hence, a very great

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6 It should be noted that some sociologists have objected to the use of size as an indicator of organizational complexity. For example, Hall, Haas, and Johnson (1967) suggested that "neither complexity nor formalization can be implied from knowledge of organizational size". However, since (1) increasing size may generate more complicated network of interpersonal relationships and (2) in the present study size is found to be strongly and positively related to other components (division of labor, and hierarchy) of organizational complexity, we decided to use it as an indicator of complexity.

majority of the industrial units under study are primarily with local investment. Since we are specially concerned with the pattern of health services of those industrial units which are primarily invested by foreign entrepreneurs, the concept of "Organizational Ownership" is measured by a "dummy variable of either foreign-owned (scored 1) or nonforeign-owned (scored 0; including both local only and local-foreign combined).

The degree of technological security is indicated by the reported rates of work accidents among all major types of registered industrial establishments in Hong Kong in the year 1970. In Mok's study, the industrial establishments in Kwun Tong are classified into 14 major types — (1) Food, Beverages & Tobacco; (2) Textiles; (3) Wearing Apparel & Leather Industries; (4) Wood & Wood Products, including furniture; (5) Paper & Paper Products, Printing & Publishing; (6) Rubber Products; (7) Chemicals; (8) Plastic Products; (9) Glass & Glass Products; (10) Iron & Steel Basic Industries; (11) Fabricated metal Products; (12) Machinery, Apparatus, Appliances & Supplies; (13) Other Manufacturing Industries; and (14) Service Industries, such as transport, storage & ware-house, and personal & household services. Table b-1 in Appendix B. presents the reported rates of work-accidents among these 14 major types of registered industrial establishments in the Colony-as-a-whole in the year 1970. According to the data on rates of work-accidents, industrial establishment in Hong Kong or in Kwun Tong can be clustered into 4 levels of technological security; they are, ranging from low to high: (I) Iron & steel basic industries, Service industries, Fabricated metal products, Wood & wood products, and Glass & glass products, (II) Food, beverages & tobacco, Machinery, apparatus, appliances & supplies, Textiles, and Other manufactory industries; (III) Plastic products, Chemicals, and Paper & paper products, printing & publishing, and (IV) Wearing apparel & leather industries, and Rubber products. It is found that of all the Kwun Tong industrial establishments under study, 22.3% (N = 77)

belong to Level I, 40.3% (N = 139) to Level II, 21.7% (N = 75) to Level III, and 15.7% (N = 54) to Level IV. In this study, these four levels are scored as follows: 0 = Level I, 1 = Level II, 2 = Level III, and 3 = Level IV.

After defining and describing the variables under study, we would like to proceed to presenting and analyzing our findings concerning the relationships between the extent of industrial health services (dependent variable), the degree of organizational complexity (independent variable), the pattern of ownership and the level of technological security (control variables).

As a statistical note, we would like to underscore that since the variables under study are skewed and are measured on ordinal scale, the statistical model of Gamma will be used to measure the associations. It is a non-parametric and symmetric measure of the association between two rank-ordered variables with a value ranging from -1 to +1, and can be interpreted as the proportional reduction of errors in prediction. Furthermore, since we are dealing with sample data and with assumed direction of relationship, we will also provide a non-tailed test of significance for each Gamma coefficient.

Furthermore, the partial Gamma will be used in measuring the relation-ship between two variables while controlling for a third. It is the weighted average of the amma values in various subgroups of the third variable.

FINDINGS

I. Independent and Dependent Variables

Table 1 - 3 present the relationships between the extent of health services and each of the three components of organizational complexity.[7] The statistical relationships are found to be strong and positive; moreover, they are all statistically significant at the .01 level. The extent of health services is hence positively and significantly associated with the organizational size (Gamma = .32), the departmental division of labour (Gamma = .33), and especially the authority hierarchy (Gamma = .47). In other words, the larger the number of employees, the more the internal division of labor, and the more the levels of authority hierarchy of the industrial establishments in Kwun Tong, the greater would be the extent of health services provided by these industrial units to their employees. But is the extent of health services related to the organizational complexity as a whole?

Table 4 shows that the overall relationship between the extent of health services and the degree of organizational complexity is positive and significant. The Gamma value (=.44) indicates that knowing the ranking on organizational complexity, we can reduce 44% of the errors in predicting the ranking on the extent of health services. We may hence conclude that the higher the degree of organizational complexity, the greater would be the extent of health services among the industrial units in the community.

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[7] Tables in Appendix C present the interrelations between the three indicators of health services and the three components of organizational complexity.

Table 1. The Extent of Health Services by Organizational Size

Size	Health Services (%)					(N)
	0 (low)	1	2	3 (high)	Total	
1 - 19	39.5	28.8	28.1	3.6	100	(167)
20 - 99	22.0	35.0	39.0	4.0	100	(100)
100 - 199	15.4	26.9	46.2	11.5	100	(26)
200 & over	4.7	42.9	42.9	9.5	100	(21)

Gamma = .32; $P < .01$

Table 2. The Extent of Health Services by Organizational Division of Labour

Division of Labour	Health Services (%)					(N)
	0 (low)	1	2	3 (high)	Total	
No Division	39.2	34.8	22.8	3.2	100	(158)
2 - 3	17.4	33.3	44.9	4.4	100	(69)
4 - 5	25.4	23.7	40.7	10.2	100	(59)
6 & over	16.7	26.7	53.3	3.3	100	(30)

Gamma = .33; $P < .01$

Table 3. The Extent of Health Services by Organizational Hierarchy

Hierarchy	Health Services (%)					(N)
	0 (low)	1	2	3 (high)	Total	
No Stratification	43.4	33.5	21.1	2.0	100	(152)
2 - 3	22.7	29.9	41.2	6.2	100	(97)
4 - 5	9.3	31.4	50.0	9.3	100	(54)
6 & over	7.7	23.1	61.5	7.7	100	(13)

Gamma = .47; $P < .01$

Table 4. The Extent of Health Services by Organizational Complexity

Organizational Complexity	Health Services (%)					(N)
	0 (low)	1	2	3 (high)	Total	
0 (low)	49.1	29.2	18.9	2.8	100	(106)
1	23.0	37.2	36.3	3.5	100	(113)
2	14.5	25.3	51.8	8.4	100	(83)
3 (high)	10.0	50.0	30.0	10.0	100	(10)

Gamma = .44; $P < .01$

II. Control Variables

To elaborate the relationship between complexity and health services, we would like to control for organizational ownership and technological security. In the process of elaboration, several questions have been considered: How are the control variables related to health services and to organizational complexity? Statistically, are the control variables more important than organizational complexity in accounting for the variations in health services? Will the relationship between complexity and health services remain strong and positive if the effects of ownership and technological security are isolated?

As indicated, the variable of organizational ownership in this study is a dummy one, where 1 = foreign-owned and 0 = nonforeign-owned. Table 5 shows that the relationship between the extent of health services and the pattern of organizational ownership is strong and positive, and statistically significant at the .01 level. The value of Gamma indicates that knowing the ownership pattern, we can reduce 45% of the prediction errors. In other words, the foreign-owned industrial units in Kwun Tong are more likely to have a greater extent of health services than are the nonforeign-owned.

From Table 6 we note that the pattern of organizational ownership also shows a positive and significantly strong relationship with organizational complexity. According to the Gamma value, we can reduce 70% of the errors in predicting the organizational complexity, if we have information about the pattern of organizational ownership. In other words, the foreign-owned industrial units in Kwun Tong are structurally more complex than are the nonforeign-owned.

Table 5. The Extent of Health Services by Ownership Pattern

Ownership	Health Services (%) 0 (low)	1	2	3 (high)	Total	N)
Foreign	16.7	16.7	50.0	16.7	100.1	(12)
Non-foreign	30.8	32.4	32.4	4.4	100	(299)

Gamma = .45; $P < .01$

Table 6. Organizational Complexity by Ownership Pattern

Ownership	Organizational Complexity (%)					(N)
	0 (low)	1	2	3 (high)	Total	
Foreign	7.2	21.4	50.0	21.4	100	(14)
Non-foreign	36.7	35.7	25.1	2.5	100	(319)

Gamma = .70; $P < .01$

Table 7. The Extent of Health Services by Organizational Work-Security

Work-Security	Health Services (%)					(N)
	0 (low)	1	2	3 (high)	Total	
I (low)	21.7	30.5	42.0	5.8	100	(69)
II	29.5	30.3	36.4	3.8	100	(132)
III	28.0	33.8	29.4	8.8	100	(68)
IV (high)	44.7	34.0	21.3	0	100	(47)

Gamma = -.18; $P < .05$

Table 8. Organizational Work-Security by Organizational Complexity

Organizational Complexity	Work-Security (%)					(N)
	I (low)	II	III	IV (high)	Total	
0 (low)	29.2	33.3	18.3	19.2	100	(120)
1	22.9	35.6	28.0	13.5	100	(118)
2	13.3	55.6	18.9	12.2	100	(90)
3 (high)	27.3	36.4	0	36.4	100.1	(11)

Gamma = .03; Not Significant

Let us turn to the variable of technological security. As indicated, all industrial units under study are classified into 4 levels of technological security. Table 7 shows that the extent of health services is negatively related to the degree of technological security. The relationship is statistically significant but somewhat weak. The Gamma value indicates that knowing the level of security, we can only reduce 18% of the prediction errors. Nevertheless, we may assert with reservation that the less secure the work of the industrial units in Kwun Tong, the greater would be the extent of health services provided to the employees.

Concerning the association between organizational complexity and technological security, Table 8 shows that it is positive but very weak. The Gamma value is .03. Hence, we find that industrial units with different levels of organizational complexity are not different from each other in terms of technological security.

An important concern in this study is to compare the statistical importance among the three organizational determinants of health services. As noted, the relationship of health services (1) to organizational complexity is .44, (2) to pattern of ownership is .45, and (3) to technological security is -.18. Obviously complexity and ownership are equally strong in determining the extent of health services, while the effect of technological security is relatively weaker.

Since ownership and technological security are found to be significantly related to complexity and/or health services, then how would they affect the original relationship between complexity and health services? In other words, would the relationship between complexity and health services remain strong and positive if we control for ownership and technological security?

We find that (1) controlling for ownership the partial Gamma for the relationship between complexity and health services is .41, and (2) controlling for technological security the partial Gamma is .47. Both partial correlations are strong and positive, and are statistically significant at the level of .01. It is reminded that the original zero-order relationship between complexity and health services is .45. Obviously the original relationship is lettle affected by ownership or technological complexity. It indicates that the relationship between organizational complexity and the extent of health services provided to employees is independent of the pattern of ownership and of technological security.

SUMMARY AND DISCUSSION

On the basis of the theoretical postulate that the availability of various kinds of services is dependent upon the degree of bureaucratization in work-organizations, we hypothesize that the higher the degree of organizational complexity the greater will be the extent of health services provided to workers in industrial firms. This hypothesis is examined by using the survey data from a random sample of 346 registered industrial undertakings in a newly developed industrial town (Kwun Tong) of Hong Kong.

The industrial undertakings studied are mostly with a low degree of organizational complexity. Moreover, many of them do not provide a large extent of health services to workers. Using the statistical model of Gamma, we have confirmed that there exists a strong and positive relationship between organizational complexity and health services. The relationship remains even if we separately control for the pattern of ownership and the degree of technological security.

We note, however, that the availability of health services is also dependent on the ownership pattern and technological security. Foreign-owned industrial firms provide more health services to workers than nonforeign-owned firms. It may be due to the fact that overseas investors are more knowledgeable of the importance of providing health services and are financially more capable to afford them. Moreover, it is confirmed that the lower the degree of technological security, the more are the health services available. It may be due to the stronger demand for medical care in technologically less secure industrial firms.

Evaluating the relative importance among the three determinants (complexity, ownership, and security) of health services, we find that statistically the impact of organizational complexity upon health services is as strong as that of ownership pattern, and is substantially stronger than that of technological security. In other words, the availability of health services is more dependent on organizational complexity and ownership than on technological security. A word of caution is needed: the criterion for evaluating relative importance is a statistical or quantitative one, rather than a theoretical or substantive one. It is possible that a variable is statistically less important, but theoretically more crucial than other variables.[8]

An essential question in the present study is: Why is complexity so strongly related to the provision of health services? As previously mentioned, an important reason could be the promotion of work-morale and production efficiency. In addition to economic incentive, the availability of health service programmes is a crucial mechanism to enhance the morale of workers in most modernizing societies which in turn would contribute to the effective functioning of production activities. Since the major purpose of increasing organizational complexity is to promote production efficiency, the complex industrial firms should be more deliberately concerned with improving morale than the small-scale units. They thus become more likely to provide more health services to employees.

However, there may be additional reasons. First, the large-sized and complex units generally have more capital resources. They are then able to supply more medical care programmes than small units.

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8 See Blalock (1961) for a discussion on the issue of statistical versus theoretical importance.

Second, the sheer number of workers in complex units is in general larger than that in less complex units. The more the people, the greater would be the demand for medical and health care.

Third, it seems that workers in large and complex units are more likely than those in small units to be members of trade unions in Hong Kong. Under the pressure of trade unions, the owners or managers of large firms may become more likely to provide medical benefits to workers.

The fourth, but by no means less important, reason is the conformity to industrial regulations. Government has established some ordinances governing industrial health. For instance, a factory employing more than 100 workers has to have at least one person trained in first aid; a worker is entitled to the payment of sickness allowance for not more than 12 days in a calender year; and it is required to provide compensation for personal injury or death by accident or occupational disease arising out of and in the course of employment. Furthermore it has been the policy of the Labour Department to encourage employers to establish medical care facilities in industrial undertakings. It seems that employers in large firms are more cooperative with, or conformative to, Government policies than those in small firms. Why? The educational standard of employers in large firms may be generally higher, and are therefore more aware of the industrial ordinances. Moreover, large-scale units usually have a sizable captial investment. Their owners would then be less willing to run the risk of violating Government regulations. This point becomes more essential in view of the fact that large firms are generally more visible than the small ones.

What are then the theoretical implications or limitations of our findings? In a way, our findings support the general postulate that increasing bureaucratization gives rise to the availability of more service programmes to employees in work-organizations. This postulate adds to our sociological understanding of the consequences of emerging bureaucracies in most of the modernizing societies. Although bureaucratization may produce negative effects such as inflexibility, impersonality, and alienation, it may nevertheless generate higher quality and more extensive services to people inside the bureaucracy.

The present study, however, is a cross-sectional survey of industrial units. There is an important limitation. It does not show that as the industrial units keep growing over time, whether or not the extent of health services offered to employees will be increased. To further examine this question, a longitudinal study is required.

Furthermore, this study focuses on organizational complexity and health services in industrial undertakings while other aspects of bureaucracy, other kinds of service programmes, and non-industrial organizations have not been taken into consideration. Instead of making a conclusive statement, we can at the best shed some lights on the aforestated postulate.

A "by-product" contribution of this study is our systematic understanding of the dynamics of the small-scale industries in most countries of the developing World. In the industrial sector of these countries, there usually exists a "dual"system of organizational activities. For the similar kind of economic production, some industrial units introduce sophisticated bureaucratic models, while a large number of them remain in a relatively non-bureaucratic setting. Many studies have pointed out the differences between small and large

industries in terms of economic structure and functioning (See Staley and Morse, 1965). Our findings suggest that they may also differ in terms of service orientations — in particular the availability of health services to workers. It is our conclusion that small industries generally provide less services to employees than larger ones.

Does the present study have any practical implication? It is our suggestion that industrial workers need to be protected against employment illness and injury. In a modernizing and industrializing community like Kwun Tong, employees in small industries are relatively more deprived of medical and health care than are those in large industrial firms. In order to reduce this medical deprivation, health planners and practitioners should (1) place greater emphasis on the supply of medical care to workers in small industrial units, and/or (2) educate, encourage and enforce the employers of small industrial units to provide more health services to their employees. Since a community hospital, named the United Christian Hospital, will soon be established in this community, it seems to be worthwhile for the Hospital to build up medical service connections with the industrial undertakings especially with the smaller ones.

To conclude this paper, we would like to underscore that an ideal pattern of industrial development should be a balanced growth in both productivity and services. As mentioned, better services will promote work-morale and improve human resources, which will then increase industrial productivity.

APPENDIX A.

Interrelations among the three components of Organizational Complexity

Table - 1 Organizational Size and Organizational Division of Labour

Size	Division of Labour				
	No Division	2 - 3	4 - 5	6 & over	N
1 - 19	138	26	17	2	183
20 - 99	30	33	24	17	104
100 - 199	2	13	21	9	45
200 & over	1	3	0	4	8
N	171	75	62	32	340

Gamma = .71; P .01 (Two-tailed Test)

Table a - 2 Organizational Size and Levels of Authority Hierarchy

Size	Authority Hierarchy				
	No Stratification	2 - 3	4 - 5	6 & over	N
1 - 19	139	36	7	1	183
20 - 99	25	47	27	5	104
100 - 199	1	20	19	4	44
200 & over	0	0	3	5	8
N	165	103	56	15	339

Gamma = .80; $P < .01$ (Two-tailed Test)

Table a - 3 Organizational Division of Labour and Authortiy Hierarchy

Hierarchy	Division of Labour				
	No Division	2 - 3	4 - 5	6 & over	N
No Stratification	139	17	13	1	170
2 - 3	26	35	31	11	103
4 - 5	8	19	15	14	56
6 & over	2	5	2	6	15
N	175	76	61	32	344

Gamma = .71; $P < .01$ (Two-tailed Test)

APPENDIX B

Table b - 1 Reported Work-Accidents by Major Types of Registered Industrial Establishments in Hong Kong, 1970.@

Types of Industrial Establishments	No. of Accidents	Total Labour Force (Mar. 1970)	Rate of Work Accidents(%)*
Manufacture of Food, Beverages & Tobacco	431	23,067	1.87
Manufacture of Textile	2,284	124,871	1.83
Manufacture of Wearing Apparel and Leather Industries	711	109,470	0.65
Manufacture of Wood & Wood Products, including Furniture	203	8,732	2.32
Manufacture of Paper & Paper Products, Printing & Publishing	258	22,677	1.14
Manufacture of Rubber Products	24	11,934	0.20
Manufacture of Chemicals	59	4,210	1.40
Manufacture of Plastic Products	1,133	71,801	1.58
Manufacture of Glass & Glass Products	61	2,908	2.10
Iron & Steel Basic Industries	324	3,013	10.75
Manufacture of Fabricated Metal Products	1,339	46,182	2.90
Manufacture of Machinery, Apparatus, Appliances & Supplies	1,394	75,541	1.85
Other Manufacturing Industries	660	37,036	1.78
Services Industry	1,023	24,776	4.13

@ The data were compiled by Louis Wong from the Annual Report of the Labour Department, 1970 - 71.

* $$\text{Rate} = \frac{\text{No. of Accidents}}{\text{Total Labour Force}} \times 100$$

APPENDIX C

Indicators of Health Services by Indicators of Organizational Complexity

Table c - 1. Health Facilities, Paid Sick-Leave and Accident Compensation by Organizational Size

	Organizational Size (%)			
Health Facilities	1 - 19	20 - 99	100 - 199	200 & over
Yes	10.9	15.5	37.5	34.8
No	89.1	84.5	64.3	65.2
Total	100.0	100.0	100.0	100.0
(N)	(183)	(103)	(28)	(23)
Paid Sick-Leave				
Yes	38.3	41.7	46.4	36.4
No	61.7	58.3	53.6	63.6
Total	100.0	100.0	100.0	100.0
(N)	(175)	(103)	(28)	(22)
Accident Compensation				
Yes	49.1	65.7	71.5	87.0
No	50.9	34.3	28.5	13.0
Total	100.0	100.0	100.0	100.0
(N)	(169)	(102)	(28)	(23)

Table c - 2. Health Facilities, Paid Sick-Leave, and Accident Compensation by Organizational Division of Labour

Health Facilities	Division of Labour (%)			
	No Division	2 - 3	4 - 5	6 & over
Yes	12.6	15.1	21.0	28.1
No	87.4	84.9	79.0	71.9
Total	100.0	100.0	100.0	100.0
(N)	(174)	(73)	(62)	(32)
Paid Sick-Leave				
Yes	33.3	45.4	47.5	46.6
No	66.7	54.6	52.5	53.4
Total	100.0	100.0	100.0	100.0
(N)	(165)	(75)	(61)	(30)
Accident Compensation				
Yes	45.3	74.0	68.3	71.0
No	54.7	26.0	31.7	29.0
Total	100.0	100.0	100.0	100.0
(N)	(161)	(73)	(60)	(31)

Table c - 3. Health Facilities, Paid Sick-Leave and Accident Compensation by Authority Hierarchy

Health Facilities	Authority Hierarchy (%)			
	No Stratification	2 - 3	4 - 5	6 & over
Yes	11.8	16.7	21.8	42.9
No	88.2	83.3	78.2	57.1
Total	100.0	100.0	100.0	100.0
(N)	(170)	(102)	(55)	(14)
Paid Sick-Leave				
Yes	31.0	44.0	57.2	42.8
No	69.0	56.0	42.8	57.2
Total	100.0	100.0	100.0	100.0
(N)	(161)	(100)	(56)	(14)
Accident Compensation				
Yes	41.9	68.3	80.0	85.7
No	58.1	31.7	20.0	14.3
Total	100.0	100.0	100.0	100.0
(N)	(155)	(101)	(55)	(14)

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