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STRUCTURAL CONDITIONS OF INTRAORGANIZATIONAL POWER

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The strategic contingencies theory of intraorganizational power proposed by Hickson et al. (1971) hypothesizes that the power of subunits results from contingent dependences among them created by unspecified combinations of coping with uncertainty, workflow centrality (immediacy and pervasiveness), and non-substitutability. This paper reports the devising of methods to test this theory with alternative forms of data on seven organizations, or power systems, of four subunits each. The theory is refined by the exploration of different patterns of variables related to successive levels of power, and the tentative ordering of these variables in terms of their consequences for power.
The nineteen sixties saw a fresh perspective in organization theory which regarded organizations as decision making power systems interacting with their environments in conditions of uncertainty. It is a perspective which can be most simply traced from the examination of dysfunctions and cognitive rationality by March and Simon (1958), through the study of organizational decision processes by Cyert and March (1963), to the attempt by Thompson (1967) to more thoroughly spell out its theoretical implications.

Since organizations are control systems in which power is perpetually omnipresent, the implications of the above perspective for the understanding of power must be worked out. Hopefully, it may add dramatically to the comprehension of this contentious concept. Crozier (1964) was quick to grasp the opportunity by explaining the apparent power of sections of maintenance engineers by their control of uncertainty. However, the difficulties with this explanation were such that Hickson et al. (1971) were stimulated to develop the idea itself into a wider explanation of subunit power which they put forward as a strategic contingencies theory. The project reported here is an attempt to test this theory against data.

Theory of power

The theory proposed in detail by Hickson et al. (1971) is simple in essence and is summarized in Figure 1 reproduced from their paper.

Figure 1 here
They argue that the concept of coping is crucial to understanding any relationship between uncertainty and power, for it is not the uncertainty, but what is done about it that in some way confers power. Together with centrality of workflows and substitutability of activities, coping with uncertainty gives rise to dependences of one subunit upon another because the activities performed by one are contingencies for the activities of another. Some combinations of uncertainty, coping, centrality, and substitutability bring these contingencies to strategic intensities which differentiate power. As Hickson et al. (1971: 222) put it: 'The independent variables are each necessary but not sufficient conditions for control of strategic contingencies, but together they determine the variation in interdependence between subunits'.

Any relationship between coping with uncertainty and power must in some degree rest upon the centrality of that coping to the outputs of the rest of the organization. Hickson et al. (1971) provisionally dissect centrality into two further concepts, immediacy and pervasiveness. As an example of low immediacy, a research department may solve a technical uncertainty yet the consequences for production of finished goods are so remote that this successful coping brings little power. Likewise, power rests in some way upon the pervasiveness of a subunit's links with other subunits. For example, the tentacles of a finance department may reach everywhere to increase its power. At the same time, Hickson et al. (1971) stress substitutability, pointing out that the maintenance engineers noticed by Crozier (1964) might not have been so powerful had it been possible to contract maintenance work to external engineering firms, that is, to substitute another means of its performance. They also cite the power of the engineers to expose the fallacy of assuming that a power distribution in accord with the strategic
contingencies theory is necessarily efficient, or rational, or functional for an organization. The power of the engineers to impede the introduction of routinized programmed maintenance was presumably none of these.

Routinization is introduced into the theory in two ways. It is thought to indirectly affect power either by reducing uncertainty or by increasing substitutability. Routinization is therefore either 'of coping by prevention, which prevents the occurrence of uncertainty' (Hickson et al. 1971: 224), for example long term sales contracts which stabilize orders, or 'of coping by information or absorption which define how the uncertainty which does occur shall be coped with' (Hickson et al. 1971: 224), for example routine task instructions which enable replacement personnel to cope.

The theory focuses on structural sources of power and is not concerned with psychological attributes of members as explanations of power differences. As Hickson et al. (1971) recognize, structural sources are considered to have unique explanatory power, regardless of individual differences in psychological dispositions and other excluded factors.

The design of the study now to be described follows Hickson et al. (1971) not only in treating power as the dependent variable to be explained but in applying the theory specifically to subunits of work organizations. These particular units of analysis exist by definition within bounded interactive organizational systems. Research on subunits avoids the obstacles which beset studies of power in communities where the institutions which make up the geographical community do not necessarily constitute an interrelated power system.

Sample

Dealing with a unique set of variables with few previous guides to operationalization demands exploratory work and empirical simplicity.
Having a formal theory leads to a hypothesis testing research design. With both together insight from a close knowledge of the units studied is needed and also precision of sampling and measurement. The research design was accordingly a cross between systematic, comparative research and case study analysis.

The accounting, engineering, marketing and production sub-units of manufacturing organizations were selected where these were the only departments, that is, 100 percent samples of population of four sub-units in each of several comparatively simple social systems. Each system was completely interactive, that is, each sub-unit interacted with all three others.

An explicit theory suggests crucial variables on which to sample: in this case, uncertainty. The primary variation in uncertainty was taken as likely to occur between the sub-units within each organizational system, as indeed it did, though no prior data were available to predict its range. Secondly, attempts were made to select organizations so as to vary the uncertainty faced by the marketing sub-units in each, that is, pre-selected across-organization variation for one type of sub-unit. But environmental uncertainty has no publicly available unequivocal empirical referent to rely on for sampling purposes, and secondary and tertiary indicators may be unreliable. Even so, public regulation and market conditions were hopefully used as prior indicators of uncertainty.

Case-study conditions were met most nearly by three branch breweries in Western Canada, each with less than 100 employees. This gave twelve sub-units. Three breweries were chosen because they all operated in the same market prescribed by and controlled by public regulation, with a simple product (beer alone) and almost identical technologies and sizes. So in three closely similar systems the likeness and differences within and between them might be followed, and critical factors
stand out. A fair knowledge of each was acquired, and measures developed on them.

To provide a contrast of greater environmental uncertainty, two further breweries were selected from mid-west American States where market conditions are less officially controlled. One employed 300, the other 60. But when data collection was almost complete it became apparent that in these States there was hardly more uncertainty, since overall consumption was linked more to steady population trends than to governmental restraints. A second and more successful attempt to increase the range of environmental uncertainty added two semi-autonomous divisions of an organization in the Canadian container packaging industry, employing 300 people. One division manufactured folding cartons, the other corrugated cases, two distinctive products and markets. Each had production and marketing subunits, but used the services of common engineering and accounting subunits. Data on the latter were collected appropriate to each division, to give two systems of four subunits each. Outputs of both were geared to largely jobbing orders in highly competitive markets.

Thus the final data covered twentyeight subunits, seven of each function (counting engineering and accounting in the container divisions twice each as appropriate to the divisions), constituting seven systems of four subunits each.

Data collection methods

Following on from the aim of hypothesis testing and case analysis, the strategy for data collection was multimethod and multi-measure. By using more than one data collection method, it was hoped that coverage of the empirical phenomena would be extended. The same
aim led to the use of different measures of each variable.

Initially, prolonged exploratory interviews with chief executives and department heads in the Canadian breweries were held to obtain a 'feel' for these organizations. In all organizations semistructured but open-ended interviews based on a standard schedule were then carried out. The schedule covered information on every variable in the theory except routinization (Table 1).

<table>
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| A further data set was collected by means of a questionnaire. This obtained information on every variable, including routinization, being completed by the head of each subunit (in each organization). All questionnaire items are 'perceptions of facts', asking each respondent for his perceptions of uncertainty, immediacy, power, etc., not for his attitudes.

Thus there are two data sets, one from interviews, giving comparatively impersonal and extensive information, and the other from questionnaires, giving 'perceived' data. As Gilmartin and Brown (1970) point out, too often perceptual data collection via questionnaires is used to denote conditions of social systems, when the relationship between this kind of data and more 'objective' data has not been shown.

An advantage of studying small organizations was that department heads had a good enough knowledge of all subunits to provide the kind of nonpersonal data required.

With regard to the questionnaire data, a mean score for each subunit in each organization was constructed from the responses of the four department heads. Each responded on his own and the other three departments in the organization, using five category response sets as
summarized in Table 1. The scores given a department by its own head did not differ consistently from those given by other heads; except on power where all heads rated their own departments slightly higher than others did. Since this latter bias was consistent it did not differentially affect total scores.

As has been pointed out, these data are not attitude data but perceptions of a supposed reality. It is important to look for consistency of responses as an indication of their validity as representations of inter-subunit systems. The aim is agreement between respondents on discrimination between subunits, not discrimination between respondents.

Checks were carried out on each set of four responses on the independent variables:

(a) A visual check item by item to see whether the four respondents perceived the scores and/or orderings of the subunits in the same direction.

(b) A check to see whether there was substantial disagreement on any one subunit, assuming the ideal to be all four respondents giving the same score to any single subunit.

(c) Scores were converted to rank orders and examined for differences in scoring levels characteristics of individual respondents.

There were negligible divergencies shown by these checks, having no systematic effect on the data. Thus there was substantial agreement between respondents both within and between organizations. They were agreed on the ordering of the subunits in their organizations on each variable, and on the levels of scores attributed to each. Therefore summed questionnaire responses were taken as expressing a common perception of each subunit.
Finally, the utility of the data yielded by the questions was examined:

(a) Responses from each respondent were examined for non-discrimination, that is, scoring all four subunits the same. 18 of the 161 response sets did not discriminate and these were distributed throughout all seven organizations. Eliminating them would not have affected the mean scores so no action was taken.

(b) Responses to each question were compared. The question on coping with uncertainty was rejected because respondents had simply inverted their answers to the preceding question on uncertainty, high uncertainty always equalling low coping and vice versa.

These checks were carried out because each respondent was dealing with all subunits in his organization. Such checks were not necessary for the interview data as each interviewee was dealing only with his own department.

**Operationalization**

With the bulk of the data from interview and records, multiple representations of each variable were achieved, so that there is at least one interview measure and one questionnaire measure for each variable. An attempt was made to deal with a number of aspects of each variable, to examine the interrelationships between the different measures, and, where appropriate, to select the best measure(s).

In a project working with novel variables, exploratory operationalization by multiple sets of data and multiple representations of variables, emanating from close acquaintance with particular organizations, gives confidence in its empirical base. At the same time, it is
thereby limited in another direction. Normal scaling procedures were rules out for two reasons. First, the number of subunits available was inadequate for such techniques. Second, though several tentative ordinal scales are proposed and used, on some indicators there was no standardization of items between subunits. The use of terms such as 'measure' or 'score' is therefore for conventional simplicity but is not always to be taken at its full value.

At some points, correlations are used as an economical summary. These correlations are for data on twenty brewery subunits only, and do not include the subunits from container organizations. Brewery sub-units are in very similar organizations and for correlation may be regarded, provisionally, as being drawn from a population of subunits in such organizations. The introduction of container subunits would introduce an unknown additional effect without justifying any pretence of a broad representation of work organizations. The data on each variable are described at some length since they are unfamiliar and exploratory as follows.

**Substitutability**

Substitutability is the ability of the organization to obtain alternative performance for the activities of a subunit. A standard set of items was used to measure this dealing with how easy or difficult it is to obtain personnel, both in previously experienced and in hypothetical terms. A distinction can also be made between the substitutability of managers, covering the head of department and his immediate supervisory deputies, and staff, meaning the technical, administrative and manual personnel in the department.

Interview data were collected on five items for actual substitutability: level of formal education required for the job;
length of experience and training required; difficulties of hiring in the current labor market; existence of legal restrictions; number of tasks contracted out. The first four items were used for managerial substitutability, and all five for staff. Three further items dealt with hypothetical substitutability on the assumption that the degree to which subunits might be substituted for, even if this has never yet occurred, may affect power. The items were internal substitutability, the possibility of particular tasks being done by other members of the same department; departmental substitutability, whether other subunits could carry out any of the tasks; and external substitutability, whether tasks could be done from outside the organization.

As a guide to their potentialities, these items, seven for managers, and eight for staff, were examined for unidimensionality by Guttman cumulative scaling procedures. This resulted in two sets of items, representing overall managerial substitutability, and overall staff substitutability.

The questionnaire item is shown in Table 1.

**Workflow pervasiveness**

Pervasiveness, an aspect of centrality, is the degree to which the workflows of a subunit are linked to the workflows of other subunits. It describes the extent of task interconnections between subunits. For all subunits in an organization it amounts to the flow-chart of a complete systems analysis.

For each type of subunit (that is, for accounting, engineering, marketing, and production departments) a set of inputs and outputs was gathered by interview. Data on where inputs came from and outputs went to, and their frequency, gave a matrix of interconnections of each subunit with every other subunit, parent companies, suppliers, customers,
government agencies, etc.

From this data numerous counts and ratios are possible, and seventeen kinds of measures were examined. These are best represented by the five included in Table 2.

Table 2 here

The correlations in Table 2 show that pervasive subunits are pervasive in all ways, that is, inwards, outwards, internally, externally, etc., and that one measure can be used to represent all. Total links with other subunits in the organization were selected as closest to the inter-subunit power system.

Two measures were derived from the questionnaire item (see Table 1), perceived pervasiveness of the subunit as seen by its own head, and perceived pervasiveness as seen by the heads of other subunits. The correlation between the two was low, so pervasiveness as seen by other heads was selected for the full analysis since it best represented the concept with the most data: subsequently, it was found to have a stronger relationship to power.

Workflow immediacy

Immediacy, a further aspect of centrality, is the speed and severity with which the workflows of a subunit affect the final outputs of the organization. This was operationalized as the effect of activities of a subunit on the organization's output of finished goods. The definition solves the problem of separating the activities of a production department from the output of an organization, a distinction which has to be made if production departments are to be analyzed along with the other subunits. It can then be asked
how long the shipping of finished goods (such as bottles and casks of beer) could continue if particular tasks in the various subunits were not done. Each department has outputs which have greater or lesser effect on this. Accounting sends cash returns to head office, engineering has to repair machinery, marketing prepares sales forecasts, and production (in a brewery) brews beer. Every output dealt with in pervasiveness was examined and classified in terms of having an immediate effect (within a few weeks), a long run effect (within a few months) or no effect. This scale of immediacy (speed) produced a total score for the outputs of each subunit.

A second measure of immediacy (severity) was attempted also from the interview data. As an example of the difference between severity and speed, lack of a cash forecast may not affect finished goods for many months, but eventual lack of cash could cripple everything. A machine breakdown may be immediate in terms of speed, but can be put right within the hour having a very limited effect. Each subunit output was rated on severity, but doubt persisted over the adequacy of the data particularly since it did not include direct financial comparisons of consequences. As speed correlated much higher with power, the severity measure was not carried into the final data analysis important though the notion may be.

The questionnaire item is shown in Table 1.

Uncertainty

Uncertainty is a lack of information about future events, so that alternatives and their outcomes are unpredictable. Here the data concern present uncertainty about future variability, derived from known past variability. It is assumed that the greater the variability
previously experienced, the greater the inherent uncertainty for any department. Such an operationalization separates the nature of the environmental and task situation facing each department from the personal anxieties of its members. But it cannot include any anticipation of some totally unprecedented event, though no such anticipations were found in the organizations studied.

From the interviews a list of ten inputs to the organizations was compiled, being only those inputs which varied and as such had degrees of unpredictability of occurrence in the organizations studied. They ranged over such variable organizational inputs as market share, capital supply, equipment operation, and quality of raw materials (see Table 3).

These inputs were then examined for patterning, defined as the degree of constancy or variability in three elements, trend, range, and regularity. The basic element is trend, for so long as some direction can be discerned then a pattern exists and in principle could be projected into the future. Add some constancy of range around the trend line and there is more pattern present; if in addition the variations within the range are regular, there is complete patterning and prediction is possible. Thus variation does not necessarily mean uncertainty if the variation is patterned and predictable.

Table 3 here

From this a six-category scale of unpatterned variability was devised (Table 3). It is a first attempt at dealing with this concept leaving definition imprecise and several problems unresolved. The categorization does not explicitly include time, either in recency of variations or their duration. Nor is the relative size of variations
explicitly included. But the scale does provide useful discrimination
with inputs in the organizations studied falling into categories one toive. There is some bunching around 'Infrequent variation from regularity
or range, trend constant' which is to be expected due to the government
control of breweries' markets, and batch production with a high degree
of technological stability.

The unpatterned variability scores of the inputs in each sub-
unit's area were summed to give a subunit score derived both from the
number of relevant inputs entering the scale and from their scores on
it. The range is from an accounting department facing no uncertainty,
to a marketing department facing frequent variations in various aspects
of demand such as market share, volume, and order mix.

Following Lawrence and Lorsch (1967) a further indicator of
uncertainty was 'definitive feedback', assuming that the less the feed-
back to a subunit on its results, the more likely it is to be working
in a vague, unknown, unpredictable task area. A measure of feedback
assurance was derived from three binary items; causal knowledge, the
degree to which the results that occur are known to have been produced
by the department's activities; specificity, the degree to which a
department's own activities are the sole determinant of feedback data;
speed, the length of time elapsing before a subunit receives feedback
on its activities. Production and engineering departments have causal
knowledge, the feedback they get on what they do is least contaminated
by the effects of what other department do, and their feedback is fast.
Marketing departments have least assurance in these respects. It was
found that feedback assurance correlated with unpatterned variability
and with power measures, so like the severity aspect of workflow
immediacy it was not carried into the final analysis though of itself
Coping may well be a useful idea and a likely operationalization.

The questionnaire item is shown in Table 1.

Coping is defined as effectively dealing with uncertainties. Each subunit is faced with uncertainties which it must deal with, and in so doing it provides pseudo certainty for other subunits in the organization. For each variable input (as previously used for measuring uncertainty), information was collected on what the relevant subunit(s) did about it, building up a list of coping responses for each subunit.

The engineering department in one brewery coped with uncertainties in equipment operation by forecasting parts and replacements needs, by routine maintenance and by having a maintenance crew for breakdowns. A marketing department coped with market share uncertainties by an explicit marketing policy, regular market share forecasting, and selective advertising directed at a specific market segment.

These coping activities were divided into three categories:

(a) coping by prevention, activities which reduce the probabilities of variations occurring in the organization's inputs.

(b) coping by information; activities which provide forewarning of probably variations occurring in the organization's inputs.

(c) coping by absorption; activities which offset the effects of those variations which occur in the organization's inputs.

A quantification of number of coping mechanisms for each subunit was arrived at by adding them. Coping by absorption was given double weight, because this is a positive response to variations which are no longer hypothetical. In an exploratory study, alternative manipulations of data were tried, and this particular quantification was justified.
as an attempt to see whether its outcome had any relationship to anything else.

But this figure takes no account of the amount of uncertainty faced by each department. The theory states that the relationship between coping and uncertainty is important for power. Strategic contingencies arise in part from uncertainty, and control of them arises from coping. A measure of coping with uncertainty is necessary.

For this unpatterned variability was divided into quartiles of low, lower middle, upper middle, and high. A similar procedure was followed for number of coping mechanisms, and the two sets of categories were combined. The categories range from high patterned variability with high coping to low patterned variability with low coping. The resulting categories were then ordered, adopting the principle that any moderate coping with high uncertainty was of more consequence to the organization than fuller coping with less uncertainty. To the sixteen possible categories a seventeenth was added to deal with a department facing high patterned variability but having no coping. There were subunits in ten categories, which were scored one to ten.

Routinization

Routinization, the process of rationalization and proceduralization, is linked to the theory in two ways, according to whether it is preventive or coping. As it was beyond the resources of the project to collect interview data on the detailed mechanisms of routinization, it is the only variable represented by questionnaire data alone. The three questions asked are shown in Table 1: they do not distinguish between preventive and coping routinization.

Responses to questions (b) and (c) were combined into a single perceived procedures score, justified by their 0.90 correlation.
Question (a) correlated 0.73 with both (b) and (c), but also 0.70 with the uncertainty question. Since its wording on 'circumstance change' might refer as much to uncertainty as to routinization it was abandoned as not being clearly either.

**Power**

Power is defined by Hickson et al. (1971) as the behavior of one social unit by another. Following Kaplan (1964) it is seen as having three dimensions, weight (or amount), scope (or ranges over behaviors) and domain (number of persons or collectivities whose behavior is determined). In this research domain is constant, since for any one subunit it is the three other subunits in the organization.

Due to controversy over the measurement of power (for example Clark 1968), the multimethod, multimeasure strategy is especially appropriate for this variable. From the interviews data were collected on position power, that is, formal, legitimate authority, and participation power, that is, involvement in four postulated stages of decision: initiation, information provision, choosing the course of action, and implementing action. From the questionnaires, perceived power data were collected, that is, influence reputed to the subunit.

Recognizing complexity of power in internally fragmented organizations and the likely invalidity of respondents generalizing across unstated areas, power data were gathered with the use of a list of seventeen 'issues' (amended to eighteen issues for container organizations).

These are listed in Table 4.
They form as comprehensive a statement as possible of (all those) recognized and recurrent problem areas in the organizations studied in which more than one department was usually involved. The list was compiled from exploratory interviews in breweries and checked with all chief executives. All four areas of finance, sales, engineering and production are represented. The aim/was to produce a set of issues which would allow statements to be made about power over the most central and frequent problems.

From the data on position power two measures were extracted, position power (scope) and position power (status). The former is the number of issues from among the seventeen over which a subunit has formal authority as defined by the chief executive. The latter is the hierarchical status of the department heads, scoring through levels from vice-president down to being subordinate to one of the other department heads.

For participation power each department head was asked about the role that his department and the others played in each of the four postulated stages of decision on each issue. From the accounts of the four heads a composite story was derived through cross-checking. In these small systems of four subunits each, the accounts tallied overwhelmingly. Questionnaire data on perceived power were collected using the format developed by Tannenbaum (1968), as shown in Table 1.

In all, nine main measures were developed, as defined in Table 8. The third, sixth and seventh of these on 'net deviation' require additional explanation. The theory suggests that by control of contingencies a subunit may gain power over the issues which are formally in the area of another subunit. The three measures deal with this by counting how often a subunit participates outside its area, offset by any participation of others in its area. Issues were
allocated to functional areas as shown in Table 5.

Table 5 and 6 here

Table 5 is an example of the perceived power (weight) scores of the four subunits in one brewery, showing both scores on each decision issue and the overall means which are the scores used in the full data analysis with the other variables. The underlinings emphasize how the production subunit has power right across the board whereas marketing, for example, whilst powerful in its own area, has a lesser place outside that. It is this kind of picture which the issues list was designated to reveal, rather than to leave it obscured behind a single question.

Finally, Table 6 shows the scores obtained on those measures selected from many operationalizations for the exploratory analysis of relationships between variables.

Methodology

A methodological objective of the project was to represent every concept by more than one measure, the measures to cover at least two broad classes of data, questionnaire and non-questionnaire. This was achieved for all concepts except coping and routinization. The results on the other principal independent variables are summarized in Table 7. Here and with subsequent correlation levels of confidence are not given: with a small n, the correlations are looked to primarily for guidance.

Table 7 here
The question is what equivalence there may be between the dual measures, questionnaire and non-questionnaire? There are the known differences not only in data collection method but in form of operationalization. Unpatterned variability, the past variation in organization inputs in the subunit task area, differs markedly from the question on 'uncertainties' with which it is compared: non-substitutability of managerial members differs from responses to a general question on how easy it would be 'to replace (a) closed department'. The other dual measures match more exactly. Workflow immediacy, calculated on speed of subunit effect on organization output of finished goods, goes with questionnaire responses on precisely that: workflow pervasiveness calculated on activity links between subunits goes with responses on 'connections'.

Whatever the prior presumptions of equivalence, the correlations obtained are of moderate magnitude. This implies that in research designs neither of these forms of data alone should be casually taken to fully indicate a variable, as they so often are. In particular, results are taken to be the 'whole truth' when they are derived solely from questionnaire responses. This is not a case for multiple forms of data in all research, but for frank acknowledgement in projects that any one form of data used is unlikely to be the only data available and meaningful. In the present project, Table 7 may be interpreted in two ways. On the one hand, there is not sufficient equivalence to justify dropping one or other set of measures; impersonal data is contributing something different from individual perceptions. On the other hand, there is sufficient equivalence to infer that fundamental organizational variables common to both measures are indicated; and to sustain an assumption of their mutual validation which gives a much stronger overall data base for the project than would be provided by either form of data alone.

Larger correlations are obtained between most of the nine measure of power in Table 8. A more detailed analysis of alternative measurements of power is to appear in Hinings et al. (1973), but even a superficial glance at Table 8 shows the wide agreement between the measures used. Questionnaire and non-questionnaire measures are highly correlated, perceived power (weight) correlating 0.92 with participation power (involvement) and 0.80 with position power (scope).
So participation in stages of the decision process is more often than not tantamount to exercising power, at least as power is seen by those involved. The breweries are shown to be stable power systems in which actual power as seen by subunit heads is close to authority (positional power) as defined by the chief executive.

The following analyses will focus on the three measures mentioned above, perceived power (weight), participation power (involvement), and position power (scope), which though highly intercorrelated nevertheless indicate three different aspects of power with correspondingly different operationalizations.

Correlational analysis

A previous paper (Hickson et al. 1971) defined the research task as elucidating which combinations of values of the independent variables might lead to power. The data available allow first interpretations towards this end.

It is possible to analyse the data both across organizations and within organizations. The results will be examined first in the form of correlations across organizations (on twenty brewery subunits).

Table 9 shows the correlations between the main independent variables and nine measures of power. It is immediately obvious that with a few exceptions, each independent variable relates to any or all
the power measures to much the same extent. Thus for exploration
towards explanation, little is to be gained by fine distinctions among
the full range of power measures, for the three measures suggested
above will suffice. In particular, in these small and stable organiza-
tions the idea that power in the nominal spheres of others is crucial is
not borne out by the correlations with net scope deviations.

However, though each independent variable relates consistently
to power, a second and equally obvious consistency in the correlations
is that non-questionnaire data correlates more highly with all data on
power than does questionnaire (perceived) data. The difference is not
great enough to suggest that the questionnaire data may be ignored, and
both sets of measures will continue to be used. But, if anything, non-
questionnaire data tends to give the most favorable test of the theory.

The exception is workflow pervasiveness, where the perceived
measure correlates highest with power. Any interpretation is speculation
when first using crude measures of the kinds devised, but this difference
with pervasiveness suggests that perceptions recorded on questionnaires
might reflect 'informal organization' in the form of interpersonal inter-
action, which could be important to subunit power but is not covered by
the non-questionnaire counts of workflow links.

Only two variables do not relate positively to power. Perceived
procedures (non-routinization) shows inconsistent and negligible coefficients.
The use of merely two questionnaire items to represent so complex a concept
as routine would seem to have failed. The same reservations must be made
about the single item scored for perceived uncertainty, which also gives
very small correlations. There is the extra difficulty that this question
may be picking up an unknown proportion of the personal uncertainties
of respondents - their anxieties and insecurities.

Unpatterned variability, coping with uncertainty, immediacy,
non-substitutability, and pervasiveness all relate positively to power as the theory predicts. Coping correlates most highly with power, a result predicted by the theory of organization survival in uncertainty. Since the coping with uncertainty score includes unpatterned variability, this latter measure can now be dropped.

Thus the correlations accord with an interpretation that coping plays the lead in power, supported by immediacy, non-substitutability, and pervasiveness in that order.

This interpretation is reinforced by the partial correlations in Table 10, using those measures most highly correlated with power.

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Table 10 here

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Coping's relationship with power (r = 0.81) is affected more by holding immediacy constant (p = 0.65) than it is by holding non-substitutability constant (p = 0.74). The relationship of immediacy with power falls when it is isolated from that of coping, but in turn immediacy appears to overwhelm the relationship between non-substitutability and power. Coping's leading role is underlined by its correlation with power when both the other variables are held constant. Though too much should not be read into correlations on a small n, trial multiple regressions suggest the same interpretations, with coping having the major effect upon coefficients with power. Taking these analyses overall, immediacy and non-substitutability would appear to play secondary and possibly interdependent parts, with pervasiveness a weak third.

Further corroboration appears from the groupings of variables by successive magnitudes of correlation in hierarchical linkage analysis.
Hilgendorf et al. (1967) argue that this technique as developed by McQuitty (1964) is useful for offering hints about the comparative strengths of interrelationships, and about likely causal patterns. Hierarchical linkage analysis may clarify linkages between clusters of variables, an improvement upon elementary linkage analysis (McQuitty 1957). Again, coping stands out in such an analysis, with immediacy and non-substitutability of managerial staff appearing to act together in its support.

The data were also subjected to regression analysis which produced the same result as the linkage analysis and pointed to the possible interactive relationships between the main variables. Again such analysis with this data can only be regarded as suggestive.

**Non-correlational analysis**

Analyses so far have relied on correlation of the scores of twenty subunits irrespective of the organizations in which all subunits are parts. Since the brewery organizations and their subunits were so alike in product and in function, it is possible to draw guidance from these correlations with the implicit assumption of a sample from a homogeneous population of subunits. But from another point of view, such analyses can be challenged. Power exists among interrelated units, that is, within power systems. Since the four subunits from each organization are 100 percent samples of the subunits in that power system but do not necessarily have a power relationship with other subunits in other systems, the most valid measure of a subunit's power should be its relative power ranking solely within its own system of four subunits. This further analysis within each organization therefore was carried out independently by a member of the research team who was not familiar with the correlation results.
An advantage of this analysis was that the available data could be enlarged by the inclusion of the two divisions of the container organization, since these could be examined separately from the breweries and not merged with them as correlation would have required. This also tested the theory in a second and different industrial situation. Whereas the breweries were branches of large combines and in predictable markets with detailed public regulation, the container organization was a remaining independent survivor in a rapidly changing industry with unpredictable supply and demand and comparatively much less governmental restraint. The two divisions of the container firm were treated as two systems of four subunits each. Though the accounting and engineering subunits were common to both (that is, an actual total of six subunits), separate data were obtained from and on these subunits for each division where appropriate.

An analysis of seven small organizational power systems of four subunits each can be done almost case-study fashion, case by case, as the project design intended. Comprehension was visually aided by the comparison of profiles of scores.

Profiles put flesh and blood on the probabilities of correlational analyses. They show whether or not apparently coincidental variables do in fact come together in specific cases, and encourage greater confidence in causal suppositions from their occurrence in specific combinations with power.

Five recurrent strategic profiles appeared. To visually highlight the differences between them, their simplified outlines are given in the first row of Figure 2 where they are called initial-types to indicate that they are intended for continual alteration by further empirical research.
These types appear in Figure 2 alongside three sets of examples which illustrate most of the variations found.

Both forms of data (questionnaire and non-questionnaire) are plotted, and profiles pass through midpoints between scores if these differ. The points plotted are the orderings of each subunit in first, second, third or fourth place within its organization on each measure, which standardizes for comparison. The procedure was to rank the sub-units within each organization on power (two measures used here), and then to see whether any uniformity of patterns appeared at each power level among the strategic contingencies variables. Table 11 shows the numbers of subunits with profiles of each type.

First rank top power (both power scores in first place) is achieved only with strategic profile A, that is, top scores on all strategic contingencies variables. Nothing less than top rank coping with uncertainty, and immediacy, and non-substitutability, and pervasiveness will do for dominant power.

However, this says that if you have everything, you get everything! Equally interesting is the question how much do you get if you have something but not everything? It is clear that coping with uncertainty alone does not give first rank power, but it does occur in profile B with second rank power (see especially the profiles of the first and third of the three marketing subunits in Figure 2. The importance of coping to high power is implied when it is realized that all subunits
in the first and second power ranks have first or second rank coping, but none of the others do.

Strategic profile C shows high non-substitutability, with moderate immediacy and coping, and it occurs with power scores spanning the second and third ranks. Speculatively, it suggests a subunit at a point where with just a little more coping and immediacy it might approach top rank power.

Profile D is a weak pattern with lower coping than more powerful subunits, and little or no compensation from other variables. It goes with third rank power.

Finally, profile E typifies subunits in the fourth rank of power, or those with one power score in each of the third and fourth ranks. The feature of this least powerful profile is high pervasiveness, as high as the pervasiveness of the most powerful subunits. This suggests that pervasiveness on its own is of little or no consequence. More than that, by itself it appears to relate negatively to power, a burden of task links without reward in power terms. The analogy is plain with the powerful guy who has contacts everywhere through which he exercises his other sources of power, versus the powerless guy who has contacts everywhere but not other sources of power so he remains 'all talk'.

Figure 2 also shows an engineering subunit which has only fourth rank power despite its highly ranked immediacy and non-substitutability. This case appears to have a particular explanation. Though organizations were selected to minimize the risk of major kinship or other individual effects, in this case the head of the production subunit acted beyond this subunit in a general manager role. Through his dominant personal position he limited the range of activities of the engineering subunit
in the planning, obtaining, and maintaining of equipment, thereby limiting its coping score and its power.

From 28 subunits (see Table 11) this leaves three other low-power engineering subunits similar to the above case but unexplained (the engineering subunit of organization BC in Figure 2 is one of these, being omitted from the figure for simplification). Despite their high immediacy and non-substitutability, they are among the least powerful. Why? One possibility is that the result is due to especially inadequate coping data. Their scores on the questionnaire item on perceived uncertainty are exceptionally high, as if they do face more uncertainty than the coping with uncertainty scores indicate, yet cope with it less than is indicated. If so, this would be a weak position.

In summary, the strategic contingencies' theory variables explain 24 of 28 subunit power rankings. The profiles suggest that high scores on all variables in combination are essential to top power: coping is foremost in importance to all high power, with immediacy frequently contributing to second rank power: non-substitutability appears in the top power combination, but thereafter contributes mainly to second/third rank power: pervasiveness above a general minimum is a necessary condition of top power but is by itself an impediment.

Table 11 summarizes from Figure 2 which subunits have which initial-type profiles and what power rankings. The powerfulness of production subunits and the powerlessness of accounting subunits is conspicuous in these brewery and container organizations. In the latter, which make and sell packaging mostly to order, marketing might have been anticipated to rival production. Since the production subunits could do little until the marketing subunits had obtained and fed in the orders, since the marketing subunits influenced design order by
order, and since without orders the main production workflows would cease, marketing were in a vital position. This was reflected in higher workflow immediacy scores than the brewery marketing subunits obtained (see Figure 2 marketing subunits with second rank power) for in brewing production was not to order and the marketing departments were less immediately relevant to it. In line with the contrasting economic environment for which the container-divisions were selected, marketing had higher coping with uncertainty scores than in the breweries. Yet as the marketing subunit in the container organization in Figure 2 shows clearly (Figure 2, organization BC), marketing were still too substitutable and not sufficiently pervasive to match production's power. Marketing staff picked up the job without the technical training required for brewers, nor did they inherit the almost mystical image of an age-old skill which still attached to brewing: and they lacked the all-pervasive involvements with the engineering and accounting subunits which were characteristic of production whose equipment had to be maintained and whose every activity had to be recorded and costed.

Unfortunately, there are no obvious clues from the data, which when quantified is in non-equal interval form, as to how close to production's power the marketing subunits came. Were they closer in container organizations than in breweries? It is clear only that five came into second place.

The weakness of accounting departments may be held to follow from what they did. They kept records of everything, and sent reports to and collected information from everyone (see Figure 2, high pervasiveness of accounting subunits with third to fourth rank power), but took no action on this themselves and hence influenced no-one.
It must be emphasized that there can be no generalizing from Table 11 that production subunits are the most powerful in all manufacturing organizations. For example, Perrow (1969) found that marketing subunits dominated the American firms he studied. The project reported here was designed for refining theory rather than for descriptive generalizations. Only far more extensive samples can tell how much power given kinds of subunits do have, as well as whether the patterns continue to accord with the theory now developed.

Conclusion

The results of an exploratory empirical study accord with the plausibility of the strategic contingencies explanation of power within organizations. The design for this project aimed at offsetting sample limitations with comparatively intensive data. On the one hand, confidence is restrained by the coverage of only two kinds of organization, and these both industrial. On the other hand, the sample covers seven complete (small) power systems; variables have multiple representation in forms of data and in measures; and the data are consistent in successive correlational analyses across organizations and in profiles organization by organization.

Refinement of the theory comes from the examination of combinations of variables and of the apparent relative contribution of each. Strongest support for the theory is from the evidence that only a combination of high values on all the variables postulated by it gives dominant first rank power. With this combination, a subunit's activities become contingencies for others upon which they are critically dependent. Unless it copes, they suffer the uncertainty: what it does has immediate consequences for the ultimate common outputs: the other subunits cannot
look elsewhere for alternatives: and much or most of what they do is linked to what it does.

Neither coping alone (that is, combined with low values of other variables), nor immediacy with non-substitutability, gives such power. Immediacy of activities makes its greatest impression upon power when the activities fend off the impact of uncertainty from others; and non-substitutability is of little consequence if the non-substitutable activities absorb little uncertainty and are not immediate. Pervasive task links are a necessary condition for the powerful combination of the other variables, but by themselves are at best irrelevant; at worst a hindrance to power.

In importance to power, the strategic contingencies variables are probably 'weighted' or ordered with coping first, then immediacy, then non-substitutability, and lastly pervasiveness.

Up to a point, this is in line with Crozier's (1964) stress on uncertainty. Coping with uncertainty is the variable most critical to power, and is the best single predictor of it. But it is far from being the only factor contributing to power: the maintenance engineering sections studied by Crozier (1964) must presumably have obtained power with a strategic profile A (high on all variables) or, more likely, Crozier was inferring not first rank power but unexpectedly high second rank power with a high-coping profile B (Figure 2).

Clarification of the likely parts played by the variables included in the theory exposes the need for direct operationalization of the contingencies concept, defined by Hickson et al. (1971: 222) as 'a requirement of the activities of one subunit which is affected by the activities of another subunit'. The project reported here did not attempt this, and so has no measures directly describing the risks and
consequences of each subunit's performance for the others. How do work activities vary in their effects on other activities? The project relies on inferences from the values of variables which appear to make such contingencies strategic for power by creating dependences (Emerson 1962).

To switch the perspective, future research might create from the strategic contingencies theory, which is an hypothesized theory of why power is differentiated in an organizational power system, models of how the power system works. In other words, it should be possible to use this explanation of power to trace the processes by which power is won in the 'power game'. The implications of the refined theory for models of power attainment can be brought out with a touch of melodrama: if you want dominant power, go for everything - take advantage of immediacy, reduce your substitutability, and then make a bid for a decisive area of uncertainty - or alternatively, first go for the vital high coping with uncertainty, though this carries a risk of being left frustrated in second place unable to increase immediacy and decrease substitutability sufficiently to move up - but whatever you do, don't get involved in a network of interaction links before you can dominate it, or it may hold you down.

Speculative though this language may be, it suggests two models of routes to power as in Figure 3,(a)and (b). Of course, there will be more. These two are no more than guesswork inspired by a descriptive knowledge of the subunits studied.

Figure 3a and b here
Model (a) assumes a fortuitous allocation to a subunit of activities having high immediacy. Whether this happens is outside the control of the subunit, for example it is decided by prior action of a group headquarters on product technology and on organization structure. After this, the subunit itself can determine more of the process. It seeks and copes with uncertainty, and attempts to ensure its non-substitutability and to extend its pervasiveness. Such may have been the case with the marketing subunit in the container organization described earlier (Figure 2, organization BC). Semi-judgment production put it in a highly immediate task position by its responsibility for orders. It then faced a comparatively unpatterned and variable market in corrugated packaging. However, its opportunity to tackle even greater uncertainties was confined to modifying box designs, and its substitutability and pervasiveness would not have been easily altered in a more powerful direction. Hence its strong second rank power; but no more than that.

There were three engineering subunits with second to third rank power and with strategic profiles type C. One of them is shown in Figure 2, the engineering subunit of organization 6. It has high immediacy as power model (a) requires, but appeared to have no chance of taking the next step into a high uncertainty area. In a completely mechanized, partially automated, brewing plant routine maintenance was virtually all that was needed, with no openings for innovative modifications nor crises to deal with. The subunit therefore could not use the model (a) route to increase its power further.

In model (b), the subunit's own initiative in entering an area of greater uncertainty is the starting point. Alternatively, it may fortuitously find itself faced with such a situation. This was probably the case for the marketing subunits in each of three
competing breweries. The trend of overall beer consumption was extremely stable, so that any market uncertainty would arise from shifts of brand allegiance within the total. When the third of the breweries entered this market, its marketing subunit (also referred to earlier) adopted an explicitly thought-out range of coping activities, including deliberate utilization of market research information, aiming for one sector of the market rather than others, and advertising carefully designed for that aim. Hence the subunit's high coping in Figure 2, organization L. But in terms of model (b), the subunit appeared unable to raise its immediacy (this is where the model requires fortuitous circumstances to support the subunit's power) to decrease its substitutability or to extend its pervasiveness enough to rival production's power. Though its forecasts were followed by production, this was not with the order by order immediacy of a jobbing firm: sales staff were comparatively easy to find and so to substitute: and its contacts with the engineering and accounting subunits were minimal.

The theory implies that different subunits will travel such routes to power at different times as the circumstances in and around organizations change. Indeed, resistance to change or advocacy of change may stem from intuitive understanding of its impact upon power in terms of theory. Changing fields of operation (markets), changing technologies, changing outputs, will all affect power. In this continual shifting of power, uncertainty plays a role which places the strategic contingencies theory firmly in what Thompson (1967) called the new tradition of analyzing organizations as systems in indeterminacy.
Table 1

EXAMPLES OF STRUCTURED INTERVIEW TOPICS AND QUESTIONNAIRE ITEMS

INTERVIEW TOPICS (for guidance only; interviewers were not required to follow standard wordings)

Unpatterned Variability of Organization: Inputs (and see Table 3)

Does this input ever vary from normal previous experience?
How do you try to deal with this variation?
Is it possible to adopt any routines for dealing with this?
How, and how quickly, is it possible to evaluate success in (subunit activities)?

Workflow Pervasiveness and Immediacy of Subunit Inputs and Outputs

Where does each come from/go to (that is, to which department or organization)?
How often does it occur?
How quickly would the shipping of finished goods be affected if this was not done?

Substitutability

How easy or difficult is it to obtain people for this job?
What training/experience/formal education, if any, is required?
In principle, how easy or difficult would it be to hire agents, consultants, etc., to do the work in this job category?

Participation Power

Stages of decision process:

i. Who raises the issue or initiates discussion?
ii. Who is involved in providing information or services?
iii. Who chooses the final course of action taken?
iv. Who implements physical action or keeps track of paperwork?
Who carries out the action?

Position Power

Which department has primary formal authority for this (problem)?

QUESTIONNAIRE ITEMS (each item followed by the title of four departments in standard alphabetical order, that is, accounting, engineering, marketing, production)

Perceived Uncertainty

How many uncertainties does each of the following departments, including your own, have to cope with in the course of its work?

5 points: Very many uncertainties ... to ... Almost no uncertainties

/continued
Table 1 (continued)

Perceived Workflow Immediacy

How quickly would the closing of each of the departments affect the shipping of finished goods from the plant?

5 points: Instantly ... In a few hours/days/weeks ... Not for a long time

Perceived Workflow Pervasiveness

How far is the flow of work of your own department connected to the work of each of the following departments?

5 points: Very many connections ... to ... Almost no connections

Perceived Non-substitutability

How easy would it be to replace (a) closed department - by any means - for example, by new recruitment within the company, or externally, or by hiring agents or consultants?

5 points: Easy ... through ... Difficult ... to ... Impossible

Perceived Procedures (non-routinization)

How far do circumstances change from day to day in each of the following departments?

5 points: Very often change ... to ... Seldom change

How much of the work follows set procedures in each of the following departments?

5 points: Almost none ... to ... Most

How far does each of the following departments do the same work in the same way every day?

5 points: Seldom the same ... to ... Very often the same

Perceived Power

How much influence do you think each of the following departments has on problems about product packaging?

5 points: Very great influence ... to ... Little influence

* Question repeated for each of 17 (or 18) issues (see Table 4)
### Table 2

**Workflow Pervasiveness: Intercorrelations of 5 Sets of Non-Questionnaire Interview Data**

$n = 20$ subunits

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total links with other subunits</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Total links with other subunits and chief executive</td>
<td></td>
<td>.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Total links with other subunits, chief executive and external to organization</td>
<td></td>
<td>.83</td>
<td>.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Total input links</td>
<td></td>
<td>.73</td>
<td>.81</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>5. Total output links</td>
<td></td>
<td>.76</td>
<td>.88</td>
<td>.89</td>
<td>.62</td>
</tr>
</tbody>
</table>


Table 3

UNPATTERNED VARIABILITY OF ORGANIZATION INPUTS
(non-questionnaire interview data)

<table>
<thead>
<tr>
<th>Organization inputs used in the measurement of Unpatterned Variability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demand: market share</td>
</tr>
<tr>
<td>2. Demand: volume</td>
</tr>
<tr>
<td>3. Demand: order mix</td>
</tr>
<tr>
<td>4. Demand: design requirements</td>
</tr>
<tr>
<td>5. Materials: quality</td>
</tr>
<tr>
<td>6. Equipment and parts: supply</td>
</tr>
<tr>
<td>7. Equipment: operation</td>
</tr>
<tr>
<td>8. Utilities: supply</td>
</tr>
<tr>
<td>9. Capital and/or cash supply</td>
</tr>
<tr>
<td>10. Customer creditworthiness</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale of Unpatterned Variability applied to each input:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No variation</td>
</tr>
<tr>
<td>2. Patterned variation: regularity of occurrence within constant range and trend</td>
</tr>
<tr>
<td>3. Infrequent variation from regularity or range, trend constant</td>
</tr>
<tr>
<td>4. Frequent variations from regularity or range, trend constant, that is, incipient change of pattern around trend</td>
</tr>
<tr>
<td>5. Variation in trend: irrespective of regularity and range, basic trend changes</td>
</tr>
<tr>
<td>6. Unpatterned variation: no trend</td>
</tr>
</tbody>
</table>
Table 4

ISSUES USED IN THE MEASUREMENT OF POWER
(non-questionnaire and questionnaire data)

Brewing Organizations
a. marketing strategies
b. introduction of new products
c. product packaging
d. interpretation of liquor regulations
e. price
f. obtaining raw materials
g. obtaining equipment
h. operating performance of equipment
i. product quality
j. production efficiency
k. overall production plan
l. overall capital budget
m. overall non-capital budget
n. reviews of the non-capital budget
o. salary revision
p. personnel training and development
q. personnel and labor relations

Container Organizations
Changes as follows:
Issue c. changed to product design
Issue d. omitted
Two issues added in response to emphasis by organization members in interviews:
1. personnel recruitment
2. cost control
<table>
<thead>
<tr>
<th>Personnel and Labor</th>
<th>Personnel Training</th>
<th>Salary Revision</th>
<th>Overall Capital Budget</th>
<th>Overall Non-Capital Budget</th>
<th>Production Efficiency</th>
<th>Product Quality</th>
<th>Operating Performance</th>
<th>Engineering Area</th>
<th>Marketing Strategies</th>
</tr>
</thead>
</table>
| Relations           | Development        | Reviews of the non-capital budget | Production plan | Obtaining raw materials | Obtaining equipment of equipment | Interpretation of price regulations | \( \text{Overall Average} = \text{Mean} \) of every item on each of 17 Issues (see Table 4) of the questionnaire ratings (see Table 2) of every

**TABLE 5**  PERCEIVED POWER (WEIGHT) OF 4 SOURCES IN ORGANIZATION S (BREWERY)

*Note: Issues are allocated to task areas (or functions)*

The table shows the overall average of each area, obtained by taking the mean of the product ratings. It is calculated as the mean of the questionnaire ratings for each issue, as indicated in Table 2 of the study.
Table 6

SCORES OBTAINED ON SELECTED MEASURES
(non-questionnaire and questionnaire 'perceived' data)

n = 20 subunits

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Range</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unpatterned Variability</td>
<td>5.8</td>
<td>0 - 12</td>
<td>3.0</td>
</tr>
<tr>
<td>Perceived Uncertainty</td>
<td>3.0</td>
<td>2.0- 4.3</td>
<td>0.8</td>
</tr>
<tr>
<td>2. Coping with Uncertainty</td>
<td>5.5</td>
<td>1 - 10</td>
<td>3.1</td>
</tr>
<tr>
<td>3. Workflow Immediacy (Speed)</td>
<td>10.9</td>
<td>3 - 19</td>
<td>4.1</td>
</tr>
<tr>
<td>Perceived Workflow Immediacy</td>
<td>2.8</td>
<td>1.5- 4.3</td>
<td>1.1</td>
</tr>
<tr>
<td>4. Non-Substitutability (overall managerial)</td>
<td>3.0</td>
<td>0 - 6</td>
<td>2.1</td>
</tr>
<tr>
<td>Perceived Non-Substitutability</td>
<td>2.6</td>
<td>1.5- 3.5</td>
<td>0.6</td>
</tr>
<tr>
<td>5. Workflow Pervasiveness (links with other subunits)</td>
<td>22.8</td>
<td>12 - 33</td>
<td>7.8</td>
</tr>
<tr>
<td>Perceived Workflow Pervasiveness (perceived by others)</td>
<td>3.2</td>
<td>2.0- 4.3</td>
<td>0.8</td>
</tr>
<tr>
<td>6. Perceived Procedures (non-routinization)</td>
<td>1.9</td>
<td>1.3 - 3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>7. Perceived Power (weight)</td>
<td>2.9</td>
<td>2.1 - 3.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Participation Power (involvement)</td>
<td>30.2</td>
<td>3 - 56</td>
<td>12.6</td>
</tr>
<tr>
<td>Position Power (scope)</td>
<td>4.3</td>
<td>3 - 6</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpatterned Variability with Perceived Uncertainty</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workflow Immediacy (speed) with Perceived Workflow Immediacy</td>
<td>0.64</td>
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<td></td>
</tr>
<tr>
<td>Non-substitutability (overall managerial) with Perceived Non-Substitutability</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workflow Pervasiveness (links with other subunits) with Workflow Pervasiveness (perceived by others)</td>
<td>0.38</td>
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</tr>
</tbody>
</table>

Table 7
INTERCORRELATIONS OF SELECTED MEASURES OF INDEPENDENT VARIABLES USING NON-QUESTIONNAIRE AND QUESTIONNAIRE ('PERCEIVED') DATA

n = 20 subunits
TABLE 3.  INTERCORRELATIONS OF 9 MEASURES OF POWER  

n = 20 subunits

<table>
<thead>
<tr>
<th>PERCEIVED POWER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Scope</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Net Scope Deviation</td>
<td>.61</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARTICIPATION POWER</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Involvement</td>
<td>.92</td>
<td>.34</td>
<td>.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Scope</td>
<td>.86</td>
<td>.76</td>
<td>.59</td>
<td>.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Net Involvement Deviation</td>
<td>.73</td>
<td>.62</td>
<td>.48</td>
<td>.87</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>7. Net Scope Deviation</td>
<td>.47</td>
<td>.38</td>
<td>.33</td>
<td>.60</td>
<td>.59</td>
<td>.68</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSITION POWER</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Scope</td>
<td>.80</td>
<td>.71</td>
<td>.44</td>
<td>.86</td>
</tr>
<tr>
<td>9. Status</td>
<td>.55</td>
<td>.50</td>
<td>.33</td>
<td>.66</td>
</tr>
</tbody>
</table>

---

1. Mean rating across 5 points by heads of 4 subunits, including "self-rating", on each of 17 issues.

2. Number of issues on which subunit rated at or above mean score for all subunits in organization.

3. Number of issues outside own task area, as in Table 5, on which subunit rated at or above mean, less issues in own area rated below mean.

4. Number of decision stages in which subunit participated in each of 17 issues, weighting as 2 any mentions in the "choosing action" stage.

5. Number of issues in which subunit participated, irrespective of which stage of participation.

6. Number of decision stages outside own task area (See Table 5) in which subunit participated, less stages in own area in which it did not participate: weighting as 2 any mentions in the "choosing action" stage.

7. Number of issues, calculated as 6 above.

8. Number of issues for which subunit has formally allocated responsibility.

9. Height of level of hierarchy to which subunit is attached.
**TABLE 9. CORRELATIONS OF SELECTED MEASURES OF INDEPENDENT VARIABLES* WITH POWER**

*n = 20 subunits

|                          | Perceived Power | Participation Power | Position Power |
|--------------------------|-----------------|---------------------|               |
| 1. Unpatterned Variability: |                |                    |               |                    |          |                  |            |          |
| Perceived Uncertainty:   | 70              | 35                 | 33            | 70                 | 70       | 64               | 27          | 78        |
|                          | 12              | -02                | -18           | 12                 | 13       | 10               | 15          | 22        |
| 2. Coping with Uncertainty: |                |                    |               |                    |          |                  |            | 44        |
|                          | 61              | 69                 | 54            | 74                 | 73       | 64               | 44          | 44        |
| 3. Workflow Immediacy (Speed): |                |                    |               |                    |          |                  |            | 44        |
| Perceived Workflow Immediacy: |              |                    |               |                    |          |                  |            | 24        |
|                          | 73              | 75                 | 68            | 65                 | 54       | 52               | 40          | 44        |
|                          | 55              | -07                | 46            | 28                 | 24       | 22               | 23          | 23        |
| 4. Non-Substitutability (Overall Managerial): | | | | | | | | |
| Perceived Non-Substitutability: |          |                    |               |                    |          |                  |            | 23        |
|                          | 60              | 56                 | 61            | 40                 | 31       | 24               | 18          | 17        |
| 5. Workflow Pervasiveness (links with other subunits): | | | | | | | | |
| Perceived Workflow Pervasiveness (perceived by others): | | | | | | | | |
|                          | 27              | 32                 | 39            | 31                 | 26       | 23               | 52          | 01        |
|                          | 52              | 52                 | 54            | 45                 | 36       | 26               | 08          | 12        |
| 6. Perceived Procedures (non-routinization): | | | | | | | | |
| (non-routinization): | 02              | -20                | -26           | 04                 | 05       | 02               | 02          | 17        |

*Correlations with questionnaire data underlined
### Table 10

**PARTIAL CORRELATIONS OF INDEPENDENT VARIABLES (NON-QUESTIONNAIRE DATA) WITH PERCEIVED POWER (WEIGHT)**

<table>
<thead>
<tr>
<th>Variable correlated with power</th>
<th>Zero order</th>
<th>Correlation, holding constant</th>
<th>First order *</th>
<th>Second order **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping with Uncertainty</td>
<td>.81</td>
<td>Workflow Immediacy (speed) .65</td>
<td></td>
<td>.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-substitutability (overall managerial) .74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workflow Immediacy (speed)</td>
<td>.73</td>
<td>Coping with Uncertainty .46</td>
<td></td>
<td>.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-substitutability (overall managerial) .55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-substitutability</td>
<td>.60</td>
<td>Coping with Uncertainty .44</td>
<td></td>
<td>.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Workflow Immediacy (speed) .22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* One variable held constant

** Both variables held constant
Table 11

**SUBUNITS APPROXIMATING TO INITIAL-TYPE PROFILES**

**PROFILE** *

<table>
<thead>
<tr>
<th>Type</th>
<th>Rank</th>
<th>Subunits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>1st rank power</td>
<td>7 production subunits</td>
</tr>
<tr>
<td>Type B</td>
<td>2nd rank power</td>
<td>5 marketing subunits</td>
</tr>
<tr>
<td>Type C</td>
<td>2nd/3rd rank power</td>
<td>3 engineering and 2 marketing subunits</td>
</tr>
<tr>
<td>Type D</td>
<td>3rd rank power</td>
<td>2 accounting subunits</td>
</tr>
<tr>
<td>Type E</td>
<td>3rd/4th and 4th rank power</td>
<td>5 accounting subunits</td>
</tr>
</tbody>
</table>

Total: 24 subunits (plus 4 engineering subunits unexplained)

* as in Figure 3
Figure 1: The Strategic Contingencies Theory and Routinization

(From Kidson et al., 1971: 229)
**Figure 2. Initial-Type Strategic Profiles and Power**

**Key**: 0 marks score on questionnaire data  X marks score on non-questionnaire data  * marks rank orders of subunit scores within each organization

<table>
<thead>
<tr>
<th>VARIABLES (four factors at 4 levels)</th>
<th>INITIAL-TYPE STRATEGIC PROFILES</th>
<th>ORGANIZATION CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping with Uncert.</td>
<td>A</td>
<td>L (brewery)</td>
</tr>
<tr>
<td>Immediate</td>
<td></td>
<td>LK (brewery)</td>
</tr>
<tr>
<td>Non-Substitutability</td>
<td></td>
<td>BC (brewery)</td>
</tr>
<tr>
<td>Pervasiveness</td>
<td></td>
<td>1 2 3 4 1 2 3 4</td>
</tr>
<tr>
<td><strong>1st RANK POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping with Uncert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Substitutability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pervasiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2nd RANK POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping with Uncert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Substitutability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pervasiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3rd RANK POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping with Uncert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Substitutability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pervasiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4th RANK POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping with Uncert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Substitutability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pervasiveness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Variables**:
- Coping with Uncert. = Coping with Uncertainty
- Immediate = Workflow Immediate (Speed) and Perceived Workflow Immediate
- Non-Substitutability = Non-Substitutability (Overall Perceived) and Perceived Non-Substitutability
- Pervasiveness = Workflow Pervasiveness (total links with other subunits) and Perceived Workflow Pervasiveness (as perceived by others)
- POWER = Participation Power (Involvement) and Perceived Power (Weight)
Division of tasks brings allocation of activities having high immediacy

take opportunity to enter area of high uncertainty

cope with uncertainty

become powerful

Avoid substitutability (e.g. acquire special skills)

Simultaneously extend work links pervasively (undertake activities on which others may depend)

Figure 3(b)

take opportunity to enter area of high uncertainty

cope with uncertainty

coping activities become highly immediate

become powerful

Coping decreases substitutability (e.g. it develops special skills)

Simultaneously extend work links pervasively

Figure 3 (a)

Figure 3 (b)

Tentative outlines of two models of power attainment
Footnotes

1. This research was carried out at the Faculty of Business Administration, University of Alberta, with the support of Canada Council Grants No.67-0253 and No.69-0714; and concluded at the Organizational Analysis Research Unit, University of Bradford, England, and the Industrial Administration Research Unit, The University of Aston in Birmingham, England.
REFERENCES


March, James G. and Herbert A. Simon  

McQuitty, L. L.  
1957 'Elementary Linkage Analysis for Isolating both Orthogonal Types and Typal Relevancies', Educational Psychological Measurement, 20: 293-304.  
1964 'Capabilities and Improvements in Linkage Analysis as a clustering method'. Educational Psychological Measurement, 24: 441-456.

Perrow, Charles  

Tannenbaum, Arnold S.  

Thompson, James D.  