The Job Characteristics Model in Hong Kong

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The core job dimensions from 57 jobs in Hong Kong measured by job incumbents' self-reports on the Job Diagnostic Survey (JDS) and supervisory ratings on the Job Rating Form (JRF) together with job incumbent work satisfaction measured on the Job Descriptive Index (JDI) provided the data base for this research. The convergent and discriminant validities of the JDS and the JRF were examined by using confirmatory factor analysis. The results indicate that although the five-trait model as suggested by the job characteristics model did not fit the data, a modified four-trait model did. The results also indicate that the supervisory ratings of job characteristics had greater trait variance and less method variance than the ratings provided by the job incumbents. Subsequent correlational analysis further revealed that the within-person correlations between incumbents' task descriptions and work satisfaction as measured by the JDS and JDI work scales might be inflated by the common source variance and the confounding of items in the two scales. The results are discussed in terms of their relevance and implications for future job design research.

The use of Hackman and Oldham's (1975) job characteristics model has become the dominant approach for job design research (Evans, Kiggundu, & House, 1979; Roberts & Glick, 1981). It attempts to identify characteristics of individual and group jobs associated with important work outcomes such as employee satisfaction, performance, and absenteeism. Once identified, the job characteristics are redesigned in directions that are expected to lead to improvements in workers' motivation, which in turn lead to more positive work outcomes.

However, the job characteristics model has been criticized because it fails to distinguish the objective characteristics of jobs and the job incumbent's cognitions about these characteristics (Roberts & Glick, 1981). Another limitation is that most of the job characteristic research has been conducted in the United States and other Western societies; the relations between situational attributes and incumbent cognitions of attributes may differ in non-Western societies and cultures.

In this study, we focus on the relation between job incumbent perceptions and supervisory perceptions of job characteristics together with the job incumbent's work satisfaction through confirmatory factor analysis in order to explicate more clearly the relations involved. In addition, the present analysis was performed on data from 57 different jobs in Hong Kong and was conducted at the job level of analysis in order to test previous studies at that level.

The criticism that the job characteristics model fails to distinguish between the objective characteristics of jobs and the job incumbent's cognitions about these characteristics has three parts:

1. The job characteristics model focuses on task perceptions by the job incumbent without clearly articulating the relations between these perceptions and the numerous other factors besides the objective job attributes that may affect job perceptions. Several studies have demonstrated that task perceptions are strongly influenced by social cues (Weiss & Shaw, 1979; White & Mitchell, 1979), informational influence (O'Reilly & Caldwell, 1979), changing needs (Salancik & Pfeffer, 1977, 1978; Stone, Mowday, & Porter, 1977), and the job incumbent's frame of reference (O'Reilly, Parlette, & Bloom, 1980). The use of questionnaire measures filled out by the job incumbents may result in different descriptions of the same tasks because of influences such as these.

2. The usual dependent variable has been employees' work satisfaction, typically measured in the same questionnaire used to collect task perceptions. These perception-to-perception correlations are subject to unknown levels of common method variance (Farh & Scott, 1983).

3. The frequent claim that incumbents' perceptions of task attributes converge with outside raters' perceptions of the same attributes (cf. Oldham & Hackman, 1981) has been based on small samples of jobs and inadequate data analysis. The samples of jobs ranged from 9 jobs in the case of Oldham, Hackman, and Pearce (1976) to 21 jobs for studies by Hackman and Oldham (1975). Although multitrait–multimethod matrices could have been provided, only correlations between employ-

ees' and other raters' ratings for specific job characteristics have been reported (Hackman & Lawler, 1971; Hackman & Oldham, 1975; Oldham, Hackman, & Pearce, 1976). Failure to report intercorrelations among different job characteristics measured by the same method or by different methods prevents inferences about convergent or discriminant validities.

Core Job Dimensions

The core job dimensions include variety, identity, significance, autonomy, and job feedback (Hackman & Oldham, 1980). However, there are two alternative specifications of the model, depending on whether or not significance is included. Significance was not initially present in Turner and Lawrence's (1965) seminal work on the model or in Hackman and Lawler's (1971) early formulation. More recently, however, significance has been included in Hackman and Oldham's work (1976, 1980). However, significance continues to be excluded by Stone and Porter (1975, 1979), Stone (1976, 1979), and Stone, Mowday, and Porter, (1977).

Hypotheses

We hypothesized that the relations between the job incumbents' job descriptions and supervisors' job ratings can be represented by the model of five traits (i.e., Hackman & Oldham's, 1975, 1976, 1980, core job dimensions) and two methods (rating methods), as specified in Figure 1.

In this model, each measure is hypothesized to be caused by a method factor, a trait factor, and an error factor. A trait factor represents the common variance of a set of indicators whose attributes are that they all measure the same trait (job characteristic), whereas the method factor represents the common variance of a set of indicators whose attributes are that they share the same method of measurement. The error factor is a residual term composed of a unique factor and a random factor. In this model, the traits (i.e., the job characteristics) are hypothesized to be correlated with each other because the job characteristics were characterized by Hackman and Oldham (1975) as moderately correlated. However, no correlation is specified between methods because the two ratings were collected through independent methods and because there is a lack of theoretical justification for any such relation. This model specification is consistent with other studies in which multitrait-multimethod data have been examined (e.g., Bagozzi, 1980; Farh, Hoffman, & Hegarty, 1984; Jöreskog, 1974; Phillips, 1981).

Method

Sample

The sample consisted of 57 jobs from 37 organizations, including 20 multinational commercial banks, 13 schools, the telephone company, and 3 divisions in the Royal Crown Colony of Hong Kong Labour Department. These organizations are an appropriate sample for testing the job characteristics model because all use rigorous job classification systems (Roberts & Glick, 1981).

As of January 1, 1982, there were 123 licensed commercial banks operating in Hong Kong, representing 20 countries plus Hong Kong. The 20 commercial banks that provided complete sets of data were at least 51% owned by interests from the United States, France, Hong Kong, Switzerland, Great Britain, or Japan. Bank jobs were managerial positions or equivalent staff jobs and included branch managers, assistant branch managers, foreign exchange dealers, electronic data processing heads, marketing managers, accountants, and operations managers.

The 13 schools were associated with the Hong Kong Association for the Mentally Handicapped and reported both to the Hong Kong Education Department and Social Welfare Department. These 13 schools included mild, moderate, and severely mentally handicapped students from kindergarten through secondary and technical training schools. School jobs included teachers, social workers, speech therapists, occupational therapists, nurses, house parents, wardens, nursery workers, trade instructors, principals, headquarter administrators, and clerical workers.

Data were also collected from managerial and clerical employees in the personnel department of the Hong Kong telephone company and from the Hong Kong government Labour Department's professional employees within divisions such as labor relations and employment.

Data

Data from mailed questionnaires were collected from January to November 1982. Job incumbents completed the Job Description Survey (JDS; Hackman & Oldham, 1980) and the Job Descriptive Index (JDI; Smith, Kendall, & Hulin, 1969). In addition, their supervisors completed the Job Rating Form (JRF; Hackman & Oldham, 1980) on the job incumbents' job attributes. Questionnaires were randomly distributed to organizational employees by their supervisors and were returned by mail directly to the investigators. Of the 660 questionnaires distributed to employees through their supervisors 461 were returned in usable form, a 70% response rate. The JRF was completed by 79 out of the 90 (88%) supervisors who received it.

The back translation method was used to translate the original English language version of the JDS, JRF, and JDI into Chinese. This procedure was slightly different from that described by Brislin (1980, p. 431), in that the English language versions of the JDS, JRF, and JDI were initially translated into Chinese by a paid professional rather than by a bilingual volunteer. The professionally translated version was then back translated into English by the investigators and then was translated into Chinese and back into English once again. This back translation procedure helped insure an accurate prose translation that was decentered from a literal English language translation (Werner & Campbell, 1970). It did not, however, involve a psychometric analysis (Hulin, Drasgow, & Komocar, 1982). The decentered Chinese version was used to collect data from the 13 schools, whereas the original English language version was used to collect data from the banks, telephone company, and Labour Department.

Analysis

Confirmatory factor analysis (Jöreskog, 1969, 1971, 1974) was used to examine the convergent and discriminant validity of the multitrait-multimethod data. Convergent validity refers to the degree to which multiple attempts to measure the same construct by different methods are in agreement. Discriminant validity consists of demonstrating that the true correlations of two different constructs are meaningfully less than unity. Confirmatory factor analysis allows the researcher to determine convergent and discriminant validity of multitrait-multimethod data through an analysis of the pattern of correlations between two or more traits using two or more methods.

Results

Because we sought to identify relations between the JDS, JRF, and JDI, we analyzed the data at the job level. This is con-
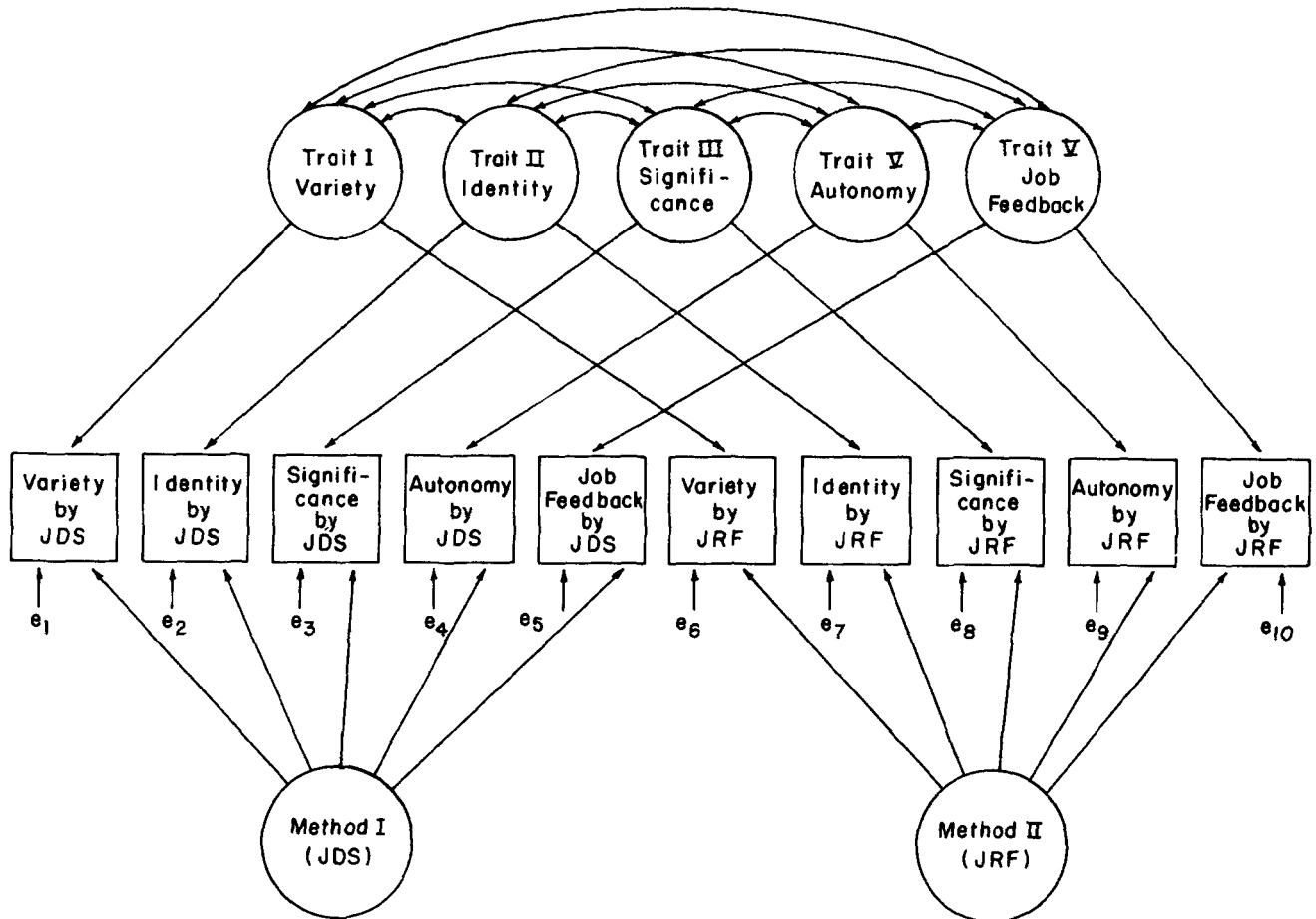
Figure 1. The five-trait two-method model of core job dimensions. (JDS = Job Diagnostic Survey; JRF = Job Rating Form; e indicates error variance; circle indicates unmeasured latent factors; square indicates observed measures.)

sistent with Stone and Porter (1979), who analyzed all three variables at the job level, and with Hackman and Lawler (1971) and Hackman and Oldham (1975), who analyzed the JDS and JRF, but not the JDI. Another major reason for analyzing these data at the job level rather than at the individual level is that the JRF (collected from one supervisor on several jobs under his or her supervision) and the JDI (collected from individual subordinates) are assessed from different sources. Consequently, the JRF-JDI relation should have less common method variance than the JDS-JDI relation.

A job level analysis necessitates the use of the averaged scores of job incumbents' self-reports of task attributes and work satisfaction within each job. As Roberts, Hulin, and Rousseau (1978) have pointed out, when a construct whose unit of theory is the individual, is aggregated to represent a macrounit of analysis, homogeneity of within-groups variance (in our case within-jobs variance) must first be demonstrated. Therefore, an analysis of variance (ANOVA) of the job incumbents' self-reports of task attributes and work satisfaction by job was performed, with the job as the independent variable in the ANOVA. The results showed highly significant differences across jobs ($p < .001$) for variety, identity, significance, autonomy, and

work satisfaction. However, the result for job feedback was not significant.

Furthermore, the intraclass correlation (Bartko, 1966), which represents the ratio of between-job variance to total variance, was computed for each of the above dimensions. These correlations were variety, .41; identity, .24; significance, .26; autonomy, .36; job feedback, .04; and work satisfaction, .38. The relatively low values suggest that the differences in job incumbents' self-reports of task attributes and job satisfaction were greatly affected by other factors independent of their jobs. This is especially true for job feedback, identity, and significance.

These results, taken together, suggest that the job incumbents performing the same job do share *some* common perceptions about the attributes of their jobs and their affective responses to them. The insignificant finding for job feedback suggests that the results of the job level analysis with regard to job feedback should be viewed with great caution.

Table 1 presents the intercorrelations and the reliability estimates for the five job dimensions, as measured by the incumbents' job descriptions and supervisory ratings of the jobs. An examination of the Cronbach alphas reveals that the reliability estimates are generally in a range comparable to those found in

Table 1
Matrix of Observed Correlations with Reliability Coefficients (Cronbach Alpha) in Diagonal

Method and trait	1	2	3	4	5	6	7	8	9	10
Job Diagnostic Survey										
1. Variety	(.785)									
2. Identity	.574**	(.724)								
3. Significance	.457**	.364**	(.814)							
4. Autonomy	.738**	.663**	.375**	(.838)						
5. Job feedback	.444**	.525**	.566**	.421**	(.712)					
Job Rating Form										
6. Variety	.618**	.354**	.143	.449**	.094	(.678)				
7. Identity	.305*	.359**	−.106	.246	.123	.482**	(.750)			
8. Significance	.094	−.183	.211	.001	.031	.281*	.132	(.626)		
9. Autonomy	.634**	.417**	.325*	.581**	.226	.756**	.502**	.223	(.774)	
10. Job feedback	.219	.083	.236	.171	.204	.121	.094	.201	.301*	(.526)

Note. $N = 57$.
* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

studies conducted at the individual level (Hackman & Oldham, 1975). There is also considerable agreement between job incumbents' self-reports and supervisory ratings on task variety and task autonomy. Less agreement, however, was found on task identity, task significance, and job feedback. It is interesting to note that despite the fact that this finding was revealed by a job level analysis, it is consistent with Hackman and Oldham's (1975) study, which was conducted at the individual level.

A confirmatory factor analysis of the five-trait two-method model (e.g., Figure 1) resulted in an improper solution (van Driel, 1978), indicated by negative error variance estimates for 2 of the 10 measures. The negative error variances gave a strong indication that the model, as specified in Figure 1, may not fit the data. Because the model tested here is already very general (cf. Farh, Hoffman, & Hegarty, 1984) and because there is no theoretical reason for adding new paths or new constructs to the model, we decided to stop fitting this model to the data.

Further data analysis focused on a four-trait two-method model, which included only four job characteristics (i.e., variety, autonomy, identity, and job feedback). The exclusion of the significance dimension from the model was based on two considerations. First, significance measures seemed to be the major cause of the misfit between the five-trait two-method model and the data. This was revealed by the large residual correlations associated with significance measures (Jöreskog, 1969) and the lack of correlation between the significance measures and also between significance measures and other measures such as identity. This lack of correlation may have resulted in empirical underidentification in our model (Kenny, 1979). Second, the exclusion of the significance dimension from the model is in accord with the original formulation of the job characteristics model by Hackman and Lawler (1971) and the current formulations of Stone and Porter (1975, 1979), Stone (1976, 1979), and Stone, Mowday, and Porter (1977). In addition, the work by Hackman and Oldham (1975, 1980) has consistently shown the significance dimension to have low agreement among raters. Theoretically, the inclusion of significance has never been particularly well articulated. A job's significance depends largely on the context within which it occurs, and describes its relation with other jobs rather than being an intrinsic characteristic of

the job itself. Therefore, it is not surprising that the significance dimension is difficult for different raters to agree upon.

A confirmatory factor analysis of the four-trait two-method model resulted in a chi-square value of 7.49 with 6 degrees of freedom ($p < .28$). The estimated path coefficients are shown in Figure 2. An examination of the parameter estimates and standard errors in Figure 2 indicates that none of the estimates is unreasonable. This finding coupled with the insignificant chi-square test of the overall goodness of fit suggests that the model represents a reasonable fit for the data.

Further examination of Figure 2 indicates that the path coefficients between each trait and its corresponding measures are all significant. This suggests that convergent validity has been achieved. Figure 2 also shows the path coefficients between each method and its corresponding measures. Although the JDS had significant method coefficients for each of the measures, the method coefficients for each of the JRF measures were not significant. In addition, the trait coefficients were consistently higher for each of the JRF measures than for their corresponding JDS measures. Clearly, the insignificant method coefficients and greater trait coefficients for the JRF suggest that, at least for this sample, the JRF fits the model better and, consequently, may be a better method for measuring job characteristics than the JDS (cf. Kalleberg & Kluegel, 1975).

The preceding analysis also led to the partitioning of total variance of each measure due to traits, methods, and errors shown in Table 2. For the JRF method, on the average, traits accounted for 58% of variance, common method accounted for 8%, and error explained the remaining 34% of the variance. For the JDS method, on the average, traits accounted for 35% of the variance, common method accounted for 34%, and error explained the remaining 31% of the variance.

Figure 2 also gives the intercorrelations among the four traits (job dimensions), with the method and error variances held constant. The four job dimensions are all significantly correlated with each other, but none of the correlations, except between variety and autonomy, approaches unity. This suggests that discriminant validity has been achieved.

The second part of the analysis was concerned with the relation between the JDS and the JDI and between the JRF and the
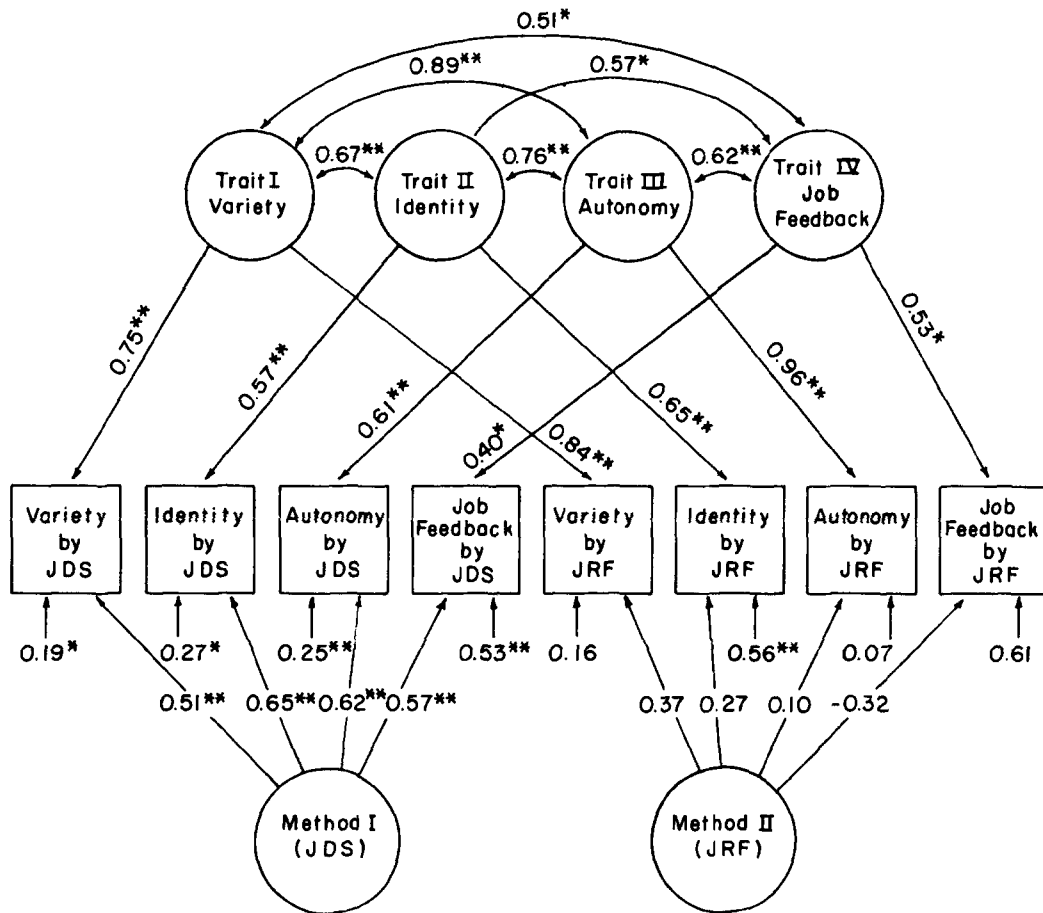
Figure 2. The four-trait two-method model with estimated path coefficients and error variances. (JDS = Job Diagnostic Survey; JRF = Job Rating Form. $*p < .05.$ $**p < .01.$

JDI. Ferratt, Dunham, and Pierce (1981) noted that the JDI work satisfaction scale has descriptive and evaluative components. A close examination of the JDI work satisfaction scale revealed that although two of the items may be judged *descriptive* (i.e., routine and simple), items could not be unequivocally

classified as either descriptive or evaluative (i.e., hot, creative, frustrating, healthful, tiresome, and endless). Nevertheless, we have decided to include five items that are primarily evaluative—based on Ferrat et al. (1981)—to form an evaluative component to be used in subsequent data analysis. These items are satisfying, good, pleasant, useful, and sense of accomplishment. The evaluative component, thus formulated, is regarded as having less contamination in measurement similarity than the complete work satisfaction measure. The intercorrelation matrix between the JDS, JRF, and the evaluative and complete JDI measures is presented in Table 3. As the intercorrelations indicate, the JDS correlations with the JDI were always higher than the corresponding JRF correlations with the JDI. In addition, in 9 out of 10 cases, the JDS or JRF were correlated higher with the complete JDI measure than with the JDI evaluative component. This finding is consistent with Ferrat et al.'s (1981) contention that the confounding of items between the JDI descriptive items (e.g., simple and routine) and the JDS may have led to inflated correlations between JDI work satisfaction scale and JDS dimensions.

Table 2

Partitioning of Variance According to Trait, Method, and Error for Measures of Four-Core Job Dimension Model

Model	Variance components		
	Trait	Method	Error
Job Diagnostic Survey			
Variety	.56	.26	.19
Identity	.32	.42	.27
Autonomy	.38	.38	.24
Job feedback	.16	.32	.53
Job Rating Form			
Variety	.71	.14	.16
Identity	.42	.07	.50
Autonomy	.92	.01	.07
Job feedback	.28	.10	.61

Discussion and Conclusions

Except for the significance dimension, the multitrait–multimethod model based on the job characteristics model fits the

Table 3
Intercorrelations Between Work Satisfaction and Job Dimensional Scores As Rated By Job Incumbents and Supervisors

	Job Diagnostic Survey					Job Rating Form				
Work satisfaction	Variety	Identity	Significance	Autonomy	Job feedback	Variety	Identity	Significance	Autonomy	Job feedback
Evaluative component[a]	.43**	.40**	.57**	.46**	.36**	.37**	.18	.44**	.40**	.16
Complete scale	.49**	.49**	.60**	.51**	.43**	.46**	.31**	.35**	.46**	.25*

Note. The sample size here was 56 instead of 57 because one case was dropped due to missing data in the work satisfaction measure.
[a] Evaluative component consisted of five items from Job Descriptive Index work satisfaction scale—satisfying, good, pleasant, useful, and sense of accomplishment. The reliability coefficients (Cronbach alphas) for the evaluative component and the complete scale were .88 and .89, respectively.
* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

data in Hong Kong well. Our results indicate that, when the method and error variances were held constant, convergent validity was demonstrated for variety, autonomy, identity, and job feedback dimensions. This suggests that both JDS and JRF are measuring a common set of job characteristics. This, however, does not imply that these two methods are psychometrically equivalent. In fact, our findings indicate that the JRF measures contain much less method variance and greater trait variance than do the JDS measures.

Note that the JRF and JDS are essentially the same instrument completed by two groups of respondents, those who supervise others to perform and those who actually perform the focal jobs. Our results seem to suggest that when asked to rate jobs on a set of characteristics, the supervisors are able to distinguish these dimensions better than do the job incumbents. Without additional data, one can only speculate that this result might be obtained because the supervisors were more emotionally removed from the jobs in question and had greater opportunity to observe different jobs in action.

This finding has important implications for future job design efforts. The past research on job design has almost exclusively relied on the job incumbents to provide information about job characteristics (e.g., Roberts & Glick, 1981). Information provided by supervisors was rarely used in describing jobs in job design research. If the results from the present study prevail in future research, supervisors and perhaps other independent observers such as job analysts should play a more prominent role in providing information about job characteristics.

The results concerning the independence of core job dimensions are consistent with the literature. We found that with the measurement errors controlled, the core job dimensions were moderately to highly correlated with each other at the job level (particularly between autonomy and variety). This finding resembles the research findings conducted at the individual level (Dunham, 1976; Dunham, Aldag, & Brief, 1977; Hackman & Lawler, 1971).

The high correlation between variety and autonomy is not surprising in view of the observation that in the objective design of jobs, jobs of low variety are often jobs of low autonomy (e.g., many unskilled jobs); jobs of high autonomy are often jobs with high variety such as in many management jobs (Mintzberg, 1975, p. 79). This has led some researchers to go so far as to assert that the only way one can have a variety of things to do is

when one is given some freedom or vice versa (Aldag, Barr, & Brief, 1981).

In a recent study, Stone and Gueutal (1985) asked subjects to judge the similarity of 20 stimulus jobs on the basis of the work activities performed, and then rated these jobs on a large set of job characteristics. They then used a multidimensional scaling algorithm to uncover the dimensions along which individuals perceived characteristics of jobs. Three dimensions emerged from their analysis: job complexity, serves the public, and physical demand. It is interesting to note that in their study, variety and autonomy, along with some other characteristics, collapsed into the job complexity dimension.

These results, taken together, suggest that the positive intercorrelations among the job characteristics do not seem to be merely an instrument problem; it may well be an ecological phenomenon; that is, when a job is designed to be high on one characteristic, it also tends to be high on one or more others. Although at the conceptual level it may be justifiable to differentiate autonomy from variety and others, the usefulness of this classification for job redesign is highly suspect. If our reasoning is correct, a pressing agenda for future job design research is to develop an alternative framework for describing jobs. The dimensions identified by such a framework should be consistent with the existing literature and with those dimensions along which individuals perceive job characteristics.

As expected, the correlations between the JDS dimensions and the JDI work satisfaction scale are higher than those between the JRF dimensions and the JDI work satisfaction. Given the large amount of method variance that existed in the job incumbents' job descriptions, one may suspect that this was due to the common source problem, because the job incumbents were asked to provide both job descriptions and work satisfaction measures. However, it is also conceivable that the higher correlation between the JDS and the JDI work satisfaction is simply due to the direct causal linkage between a person's perception and affect. Whatever perspective one may take, the most obvious fact is that all of the job characteristics as reported by the supervisors are significantly correlated with the JDI work satisfaction scale as reported by the job incumbents. Although the magnitude of these correlations diminished somewhat when the evaluative component of the work satisfaction scale was used, respectable results were still obtained for three of the five dimensions (see Table 3). This result is particularly striking

considering the fact that the study was conducted in a different culture, analyzed at the job level, with the item-confounding and the common-source problems under control. This pattern of relation clearly supports one of the major contentions of the job characteristics model; that is, job enrichment enhances work satisfaction.

Despite this finding, the readers should be warned that the direct causal linkage between job enrichment and work satisfaction went untested in this study. The observation that middle managers are more satisfied with their jobs than are the janitors does not preclude the possibility that this relation is caused by factors other than job characteristics such as job prestige, salary, and working conditions. Future research should measure these variables explicitly and control them in their hypothesis testing process so that a clearer relation between job characteristics and work satisfaction can be revealed. Similar suggestions can be made to studies in which job incumbents are asked to provide both job characteristics and work satisfaction measures. In those studies, additional efforts should be made to include measures that may tap common method variance such as social desirability.

Further, the intraclass correlation was low in this study. Future studies that compare the different job characteristic scales (e.g., JDS, JRF, and JDI) should examine this issue. Previous studies have only sought to clarify the dimensionality of the scales; the interrater reliability issue has never been examined (Aldag et al., 1981).

Finally, the present study was conducted on a sample of 57 jobs in the Royal Crown Colony of Hong Kong. This is the only study of its type conducted so far; therefore, replication of this study both in Hong Kong and in other societies is called for, particularly in those societies that might include a large, more representative set of jobs. This type of research is needed to determine whether the findings reported here can be generalized to a variety of cultural settings.

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