

Using Employee Opinion Surveys to Identify Control Mechanisms in Organizations¹

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INTRODUCTION

Although control is a central concept in the study of human factors, and an important variable in the investigation of individual differences, it has been largely ignored in the field of organisational behavior. One reason for this apparent disregard may be that few usable models are readily available that indicate how control structures may be measured and implemented. The goal of this chapter is to show (a) how data from employee opinion surveys (EOSs) can be used to develop a model of the operation of an organisation that (b) indicates which control procedures or managerial interventions are likely to be effective in changing the level and/or quality of the output of that organization. Accordingly, we work through three concrete examples that illustrate the 'nuts and bolts' issues involved in constructing specific models of organisations that indicate what interventions are likely to be effective in managing their 'bottom line' variables.

Control: An Invisible Presence

Control is woven into every moment that we live, and is part of each action that we take. We are cybernetic beings, and so control is a fundamental and continuing component of our lives, both as managers of organisations and as individuals. Despite its pervasiveness, however, textbooks of organisational behaviour usually include only scattered references to control.

Although the word itself may make only cameo appearances, related notions play a significant role in the study of organisations. Terms like *development*, *change*, and *transformation* are central in texts of organisational behaviour. Each depends upon the ability to exert control. Why might it be that the presence of control is invisible? One reason may be that our 'working model' of the world is

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an equilibrium one; things should stay as they are unless an external disturbance upsets them.

Consider the task facing the manager of an organisation. A significant part of it is either to deal with events and interventions that threaten the performance and stability of the organisation, or to create interventions that will lift performance to a higher level while maintaining its stability. The term *control*, on the other hand, connotes continuous change and thus continuous regulation.

Continuous regulation creates a problem for a manager in that the application of control implies both precise measurement and quantitative relationships between the variables in the system. In the study of organisations, one often finds careful measurement of the attributes of an organisation, but the descriptions of relationships between concepts and variables are usually only qualitative.

The Managers' Models: From The Intuitive To The Explicit

Given that managers need to control their organisational environment, every manager needs a model of the causal relationships that link the variables in the system for which he or she is responsible. Without this model, it is difficult to understand and deal effectively with change. Currently, the causal models that are commonly used derive from the 'mental models' of consultants and managers. These are usually based upon some combination of organisational and human resource management theory, knowledge of the company and its particular situation, their own experience, and their preferred methods of operating. Whatever the virtues of these mental models of how an organisation works (and for the perceptive and experienced these models may be largely accurate), they are still intuitive, not quantitatively precise, and probably difficult to communicate to others except in a very general sense. Moreover, intuitive models can rarely account for the full complexity of organisational systems, particularly when looking at the causes and consequences of change in a single variable that is embedded within a large system of other variables. Models abound, see for example Howard & Associates (1994), that attempt to represent dynamic relationships, but in general they do so in an abstract, non-quantitative way so that the reader is left with a schematic representation that provides only limited policy guidance. In sum, more precise quantitative models (a) provide a means for explicitly testing competing causal hypotheses, (b) control for the effects of extraneous variables, (c) facilitate the forecasting and cost benefits analyses that should guide organisational change, and (d) provide a means for understanding the complexity of change and its consequences. We present such quantitative procedures below.

Organizations Need both State and Change Information

Organizational effectiveness is determined in large part by the quality of managerial decision making, and this in turn depends upon the information provided to

the decision makers. We may distinguish two kinds of information. The first kind is about the *state* of an organisation, sometimes called structural, or static information. Organization charts, balance sheets, perceived quality of management, information about stocks, or levels of stress and morale are examples of static information. While useful in providing information about a single variable in isolation from all other variables, this type of information tells us nothing about the relationships between the variables and, more importantly, whether or not these relationships can be considered as causal. To formulate policy, or exercise effective control, it is important to understand the causal relationships between the variables. For example, although it is useful to know how satisfied employees are with different aspects of management, it is much more useful to know how changes in various aspects of management are related to change in different aspects of employee or company performance.

Thus the second kind of information is about processes of *change*, or dynamic information. Examples are graphs of weekly sales as a function of advertising expenditure plotted over a quarter. Because managers need to understand change, dynamic information is fundamentally important to them. They need to know how change in one variable results in changes in other variables, indeed, how change in one part of the system causes changes in the rest of the system.

DETERMINING CAUSAL STRUCTURE: SOME WORKED EXAMPLES

To illustrate the importance for policy and strategic decision-making of knowing how different variables are related to one another, we shall present three worked examples. The purpose of this nuts and bolts approach is to make the practical utility of so-called *causal modeling* clear to those readers who are involved in issues of organisational control, but are not familiar with structural equation modeling. From the outset, we should clarify our use of the term *causal*. In most situations, employee opinion surveys provide only a snapshot of the organisation. This is because they provide information that has been collected at a single point in time. Accordingly, it is only possible to use this information to develop and test theoretical causal models; models that are consistent with a causal theory about how the organisation functions. To examine actual causation, it is necessary to analyse information that has been collected on two or more different occasions (e.g., Kessler & Greenberg, 1981; Magnusson, Bergman, Rudinger, & Torestad, 1991; Menard, 1991).

EXAMPLE 1: DETERMINING THE JOB SATISFACTION OF POLICE OFFICERS

We begin with a simple example taken from a project designed to investigate the determinants of the job satisfaction among police officers. This project was concerned with understanding how police officers' personality characteristics (neuro-

ticism and extraversion) and coping styles (problem and emotion focused coping), as well as their positive and negative work experiences (police hassles and uplifts), contribute to job satisfaction. Data were obtained from 330 police officers, and the sampling procedure has been described elsewhere (Hart, Wearing & Headey, 1993; 1995).

Correlational Analysis

The simplest way in which to look at the relationships between these seven variables is with a correlation matrix (see table 31.1). Although these correlation coefficients provide us with information about the *direction* (positive or negative) and *strength* of the relationship between any two variables, they do not tell us how the system of variables operates as a whole. The correlation between any two variables may be due to their 'natural' or 'true' relationship, but may also be due to their joint dependence on other variables. For example, the correlation of -.25 between Emotion-Focused Coping and Job Satisfaction is statistically significant, and suggests that these two variables are inversely related; the more police officers use emotion-focused coping, the less their job satisfaction (or vice versa). As shown below, however, this relationship is spurious because it is due to the effects of other variables. There is no direct relationship between Emotion-Focused Coping and Job Satisfaction; the correlation merely reflects their joint dependence on other variables such as Neuroticism.

TABLE 31.1

Pearson product-moment correlation matrix showing the relationships between personality, coping, work experiences, and job satisfaction among police officers.

Variable	1	2	3	4	5	6	7
1. Job satisfaction	1.00						
2. Police hassles	-.47	1.00					
3. Police uplifts	.38	.03	1.00				
4. Emotion focused coping	-.25	.37	.11	1.00			
5. Problem focused coping	.02	.22	.33	.46	1.00		
6. Neuroticism	-.37	.36	-.07	.37	.05	1.00	
7. Extraversion	.22	-.03	.23	.07	.25	-.24	1.00

Note. $N = 261$. Correlations are significantly different from zero at the .05 level if the absolute value of the correlation is greater than .12.

Multiple Regression Analysis

Multiple regression analysis (given certain assumptions) informs us about the unique relationship between each predictor variable (e.g., police hassles) and the

dependent variable, in this case job satisfaction. The standardized beta coefficients derived from this analysis also enable us to determine the relative importance of the different predictors. For example, police hassles with a beta of $-.39$ is a stronger predictor of job satisfaction than is neuroticism with a beta of $-.15$. The analysis reported in table 31.2 suggests that police hassles is the strongest determinant of job satisfaction, followed by police uplifts and neuroticism. The non-significant beta coefficients for emotion-focused coping, extraversion and problem-focused coping suggest that these variables contribute neither positively nor negatively to job satisfaction, once the other predictors have been taken into account.

Table 31.2
Multiple regression analysis showing the unique contribution
made to job satisfaction.

Variable		Beta	<i>p</i>
1.	Police hassles	$-.39$	$< .001$
2.	Police uplifts	$.36$	$< .001$
3.	Neuroticism	$-.15$	$< .01$
4.	Emotion-focused coping	$-.11$	$> .05$
5.	Extraversion	$.10$	$> .05$
6.	Problem-focused coping	$.02$	$> .05$

Note. $N = 261$. The beta coefficients indicate the relative strength of the relationships between each predictor and job satisfaction (the larger the absolute value, the stronger the relationship). The *p* value indicates whether the relationship is significantly different from zero (values $> .05$ are not statistically significant from zero).

Policy Implications of the Regression Analysis. From a policy or control point of view, it could be concluded from these findings that police administrators need to reduce the negative aspects (police hassles) and increase the positive aspects (police uplifts) of police work in order to improve job satisfaction. When considering the relationship between neuroticism and job satisfaction, one might conclude that those high in neuroticism, which is a tendency to focus on the negative aspects of oneself and the environment, should be screened out during recruitment.

There are three further policy implications that flow from these findings. First, the influence of neuroticism is weak when compared to the influence of police work experiences. This may lead to the conclusion that it is more important to try to change the police work environment than the personal attributes of police officers. Second, extraversion, which is marked by the tendency to be sociable and display interpersonal warmth, was not related to job satisfaction. Consequently, it seems that for job satisfaction it does not matter whether or not police are high or low in extraversion. Third, neither of the two coping styles

was significantly related to job satisfaction. This suggests, from a normative perspective, that teaching coping skills to police officers will not increase job satisfaction.

Limitations of Multiple Regression Analysis. Multiple regression, however, may be too simple a model. It assumes that there are only two stages in the causal process; a set of input or predictor variables (in this case six) and a single outcome or dependent variable. It is possible, however, that there may be *multiple* stages in the causal process.

Structural Equation Modeling

Structural equation modeling enables us to examine the entire pattern of *direct* and *indirect* relationships between variables which reflect the causal operations within the system (e.g., Cuttance & Ecob, 1987; Hayduk, 1987; Loehlin, 1992; Marcoulides & Schumacker, 1996a; 1996b). As noted earlier, it is not possible to infer causality unequivocally from one wave of data. It is possible, however, to use a single wave of data to develop and test usable models that represent a causal theory. The structural equation model shown in figure 31.1 is based on the same data that gave rise to tables 31.1 and 31.2.

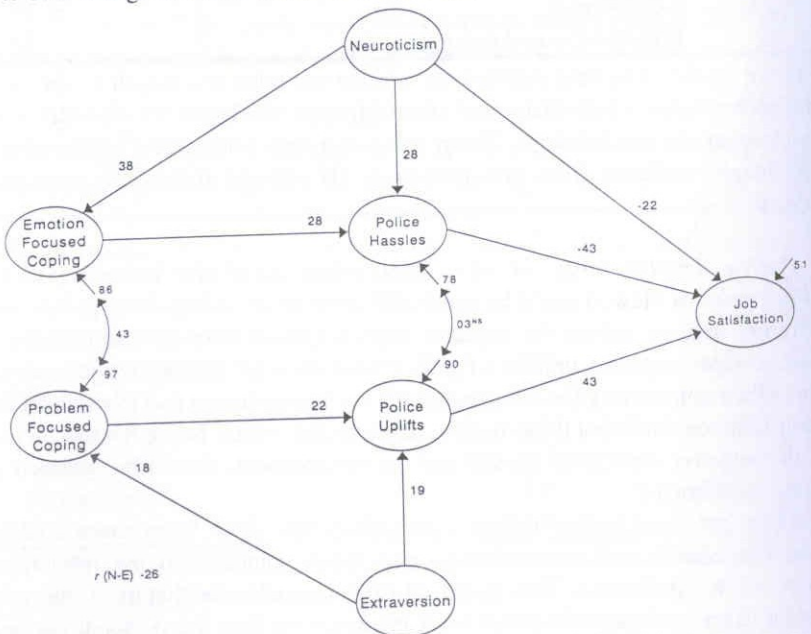


FIG. 31.1. Theoretical causal model showing the relationship between seven variables assessed in an employee opinion survey completed by 330 police officers (goodness-of-fit statistics: root-mean-square residual = .05; relative noncentrality index = .96).

Structural Models. The structural equation modelling procedure relates the latent variables or constructs (see the discussion of measurement models below) to one another, as shown in figure 31.1. The relations shown in a structural equation model are not empirically derived, but must be specified according to some underlying theory. It is not possible, as in a multiple regression analysis, to merely include a set of predictor variables and allow the statistical procedure to determine what is important. A theoretical model must be specified first, and this model is then tested to see whether it is consistent with the data. In some circumstances, several theoretical models may be consistent with the data (see below for discussion on how to choose between competing models). The theoretical basis for the model shown in figure 31.1 is reported in Hart, Wearing and Headey (1995).

The relationships between the latent constructs in a structural equation model can either be *correlational* or *causal*. A correlation is depicted by a double headed arrow. For example, figure 31.1 shows that there is a .43 correlation between emotion-focused coping and problem-focused coping, once the effects of personality (neuroticism and extroversion) have been taken into account. Likewise, the model shows that there is a nonsignificant correlation of .03 between police hassles and police uplifts, once personality and coping have been taken into account. These correlations are interpreted in a similar way to the correlations shown in table 31.1.

Causal Relationships. A causal relationship is depicted by a single headed arrow which joins two latent constructs. The arrow also indicates the direction of causation. The numbers associated with these arrows are standardised beta coefficients and, therefore show the strength of the relationship between the two variables, and the strength of this relationship can be compared directly with the strength of other relationships. For example, the -.22 coefficient between neuroticism and job satisfaction suggests that a unit (100%) increase in neuroticism will lead to a .22 (or 22%) decrease in job satisfaction.

Likewise, a unit (100%) increase in police hassles will lead to a .43 (43%) decrease in job satisfaction, and a unit increase in police uplifts will lead to a .43 (43%) increase in job satisfaction. As suggested by the multiple regression analysis, this model shows that police hassles and police uplifts have much stronger direct effects on job satisfaction than does neuroticism.

Direct and Indirect Causal Effects. From the causal relationships specified in a model it is possible to establish direct and indirect effects. Direct effects are simply shown by the individual arrows in the diagram. For example, the direct effect of neuroticism on emotion-focused coping is .38. It can also be seen that there are three direct effects on job satisfaction; from neuroticism (-.22), police hassles (-.43) and police uplifts (.43). These three direct effects are the same as those suggested by the multiple regression analyses (see table 31.2). However, two points are worthy of note. First, the effects are larger in figure

31.1. This is because the modelling procedure takes the measurement error into account. Second, the model shows that there is a complex pattern of relationships between the six predictors of job satisfaction that was not revealed by the multiple regression analysis.

Residual Variance. One purpose of structural equation modeling is to determine how much of the variation in a dependent variable is explained by a set of predictor variables. Although this is similar to one of the purposes of multiple regression analysis, structural equation modeling allows for the possibility that *all variables* can have causal antecedents and so be treated as separate dependent variables. In other words, a policy maker can determine, for example, how much variation is explained in emotion-focused coping (14%), police hassles (22%) and job satisfaction (49%) by the system of variables depicted in figure 31.2. The amount of unexplained variance is shown in the diagram by a single headed arrow that is connected to only one variable. For example, the unexplained variance in job satisfaction is .51 and, therefore, the explained variance is .49 or 49%. Consequently, it may be concluded that there are other causes of job satisfaction which have not been measured. Moreover, it may be that these unknown causes, once identified, are more policy amenable.

Policy and Control Implications: A Comparison of Structural Equation Modeling and Multiple Regression Analysis. Examination of the direct and indirect effects depicted in figure 31.1 shows that all the variables are important, and that some of the conclusions we drew from the multiple regression analysis (see table 31.2) were incorrect. For example, from this analysis it can be seen that coping styles are important in determining police hassles and uplifts. It would therefore be appropriate to focus on improving police officers' coping styles in order to improve their work experiences and, ultimately, their job satisfaction; a conclusion that was contra-indicated by the multiple regression analysis.

Furthermore, it was concluded from the multiple regression analysis that neuroticism played a minor role in determining job satisfaction when compared to the influence of police hassles and police uplifts. It can be seen from figure 31.1, however, that neuroticism is causally related to emotion-focused coping and police hassles, as well as to job satisfaction. This means that neuroticism has both direct and indirect effects on job satisfaction; a finding that was obscured in the multiple regression analysis. The strength of these indirect effects can be calculated by multiplying the relevant direct effects. For example, the indirect effect of neuroticism on job satisfaction through police hassles is $.28 \times -.43 = -.12$. Likewise the indirect effect of neuroticism on job satisfaction through emotion-focused coping and police hassles is $.38 \times .28 \times -.43 = -.05$. Adding the direct and indirect effects shows that the total effect of neuroticism on job satisfaction is $-.39$; providing a quite different picture from that suggested by the multiple regression analysis or examination of the direct effects alone.

In the following examples we will illustrate the use of structural equation modelling by demonstrating its application to employee opinion surveys (EOSs) that were conducted in two multinational organisations. Many organisations now conduct EOSs as a matter of routine, so it may be possible for readers to apply these examples to their own situations.

EXAMPLE 2: DETERMINING CAUSAL STRUCTURE IN EMPLOYEE'S OPINIONS ABOUT A TELECOMMUNICATIONS COMPANY

Employee opinion surveys (EOSs) are widely used to 'take the temperature' of organizations (Kraut, 1996). They not only provide an assessment of how positively or negatively employees feel about their organization, but they also indicate the extent to which employees believe that their supervisors and management are performing satisfactorily. In addition they provide information about the level of commitment, the perceived adequacy of physical conditions and the effectiveness of the organization, and so on. This information may be of diagnostic significance in that it identifies 'hot spots' or areas that are in need of managerial attention. It also provides an indication of how well employees understand and are committed to the aims, priorities, and performance of the organization.

To exercise control, however, requires that we not only know the state of the organisation, but we also know what factors are causing these states to change. The data for this example are drawn from a survey of 3,822 staff of a telecommunications company. The major goal of these analyses was to identify one or more causal models that fitted (i.e., were consistent with) the data.

Measurement Models

Most EOS variables, such as Job Satisfaction, are measured with a set of survey items. Although items may differ from one another in terms of their particular semantic content, it is assumed that they measure the same underlying or latent construct. The measurement model in structural equation analysis relates survey items or scales to the latent constructs (variables in the model) which the items or scales are thought to approximate, much as in factor analysis where several items may load on a single underlying construct. Survey items and scales contain, to varying degrees, measurement error and unique variance. One of the benefits of structural equation modeling is its ability to account for this measurement error and unique variance; something that is not possible with traditional procedures such as multiple regression analysis. This does not solve the problems associated with poor measurement or purely defined concepts, but it does enable us to estimate more accurately the true effects of one variable on another. This is important when selecting variables as foci for intervention and for accurately forecasting the effects of change in these variables. Simple bivariate correlations and beta coefficients derived from multiple regression analyses are generally biased

downwards because of measurement error. It is important for the successful application of structural equation modeling, however, that the concepts are clearly defined, measured well, and differentiated both theoretically and statistically from other concepts.

Table 31.3
Description and reliability of the 14 variables used in the
structural equation analyses report for example 2.

Variable	Description	α
<i>Multiple Item Scales</i>		
Appraisal	Knowing how one's job is evaluated, and a belief that it is evaluated fairly.	.71
Company reputation	A belief that the company is highly regarded by competitors, customers, employees, and the general public.	.76
Customer orientation	Being responsive to customer requirements and expectations.	.69
Efficiency	Working in a department which is well managed, organized, and efficient.	.81
Job satisfaction	The extent to which employees are satisfied with their work relationships, opportunities for growth, and benefits.	.89
Loyalty	Feeling that one is part of the organization, as well as believing that the company operates with integrity and values its employees.	.77
Management	Management which is seen to be caring, competent, fair, and open, as well as being respected and trusted by employees.	.86
Pay	A sense of being paid fairly, when compared to colleagues and other companies.	.82
Self worth	A belief that one's job is important and worthwhile, as well as achieving a sense of accomplishment and positive attitude toward work.	.85
Supervision	A belief that supervisors are fair, and actively	.77

Table 31.3 (continued)

Variable	Description	a
	facilitate the involvement of staff.	
<i>Single Item Scales</i>		
Company Satisfaction	The extent to which the company is either the best or worst to work for, when compared to other companies.	
Intention to leave	The extent to which employees are seriously considering leaving the company.	
People	The extent to which employees get along well with their colleagues.	
Work pressure	The extent to which employees feel bothered by excessive pressure in their work.	

Note. For the purpose of the structural equation analyses, it was assumed that the reliability of the single item scales was .85

As the focus of this chapter is on using causal models to control or steer organizations, we will not discuss this issue further except to say that exploratory and confirmatory factor analyses of the EOS yielded 10 reliable scales which were then used for modelling (i.e., structural equation analysis). Additionally, 4 single item scales were included in the structural equation analysis, because these items measured important constructs that were of relevance to the organisation. The variables assessed by the 14 scales are briefly described in table 31.3. The coefficients alpha for the multiple item scales are also shown.

Structural Models

As in figure 31.1, these models are presented as path diagrams which show the theoretical causal relationships between the variables. The coefficients have been standardised so that they indicate how much change could be expected. A positive integer suggests that an increase in the predictor variable will cause an increase in the outcome variable, whereas a negative integer suggests that an increase in the predictor variable will cause a decrease in the outcome variable.

As noted in example 1, the indirect effects of one variable on another can also be determined. The direct and indirect effects are additive, so it is possible to ascertain the total effect of one variable on another. In this manner, it is possible to identify key causal variables, as well as their antecedents and consequences. The structural equation model shown in figure 31.2 is based on the data obtained from employees in the telecommunications company. This model was developed

Using These Results, or What Does This Model Tell Us that Could Not Otherwise Have Been Known. These results provide information about how to control the system of variables. Management is the cornerstone of the system, and is related, either directly or indirectly, to all other variables. Consequently, by following the various paths it is possible to estimate the likely changes throughout the system if there was a 10% improvement in management. For example, a 10% improvement in management would lead to a 6% improvement in loyalty, a 4.9% improvement in customer orientation, but only a 1.4% improvement in work pressure. Likewise, a 10% improvement in appraisal will lead to a 4.1% improvement in job satisfaction, whereas a 10% improvement in work pressure will lead to a mere 0.5% increase in job satisfaction.

Even More Information: A Second Model. The model shown in figure 31.2 assumes that there are five stages in the causal process. It is possible, however, to take the analyses a step further and investigate the causal relationships between all 14 variables. For example, the third stage in figure 31.5 includes the variables self-worth, efficiency, customer orientation, and loyalty. It was assumed, for the purpose of exposition, that no causal relationships exist between these variables. Since this assumption was unlikely to be correct, we developed a model which took into account the possible causal relationships between all variables. This model is quite complex, and cannot easily be represented diagrammatically. Figure 31.3 shows the causal relationships between the four variables at stage 3 of the model shown in figure 31.2:

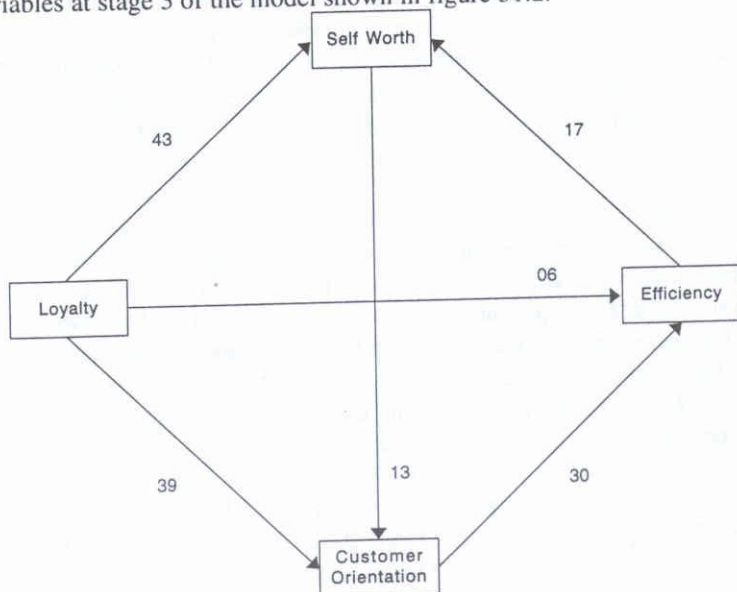


FIG. 31.3. Theoretical causal model showing the relationship between four of the variables in figure 31.2.

It can be seen from figure 31.3 that important relationships exist between these four variables. In order of importance, loyalty is causally antecedent to self-worth ($\beta = .43$), customer orientation ($\beta = .39$), and efficiency ($\beta = .06$). Self-worth is causally antecedent to customer orientation which, in turn, is causally related to efficiency. Efficiency is also related to self-worth, suggesting that these three variables form a cyclic feedback system.

More importantly, having an understanding of these relationships adds to the interpretation of figure 31.2 and, therefore, increases the policy options that are available. For example, figure 31.2 suggests that self-worth is not related to company reputation; so changing employees' sense of self-worth will not lead to an improvement in the level of perceived company reputation. While it is true that there is no direct relationship between self-worth and company reputation, the more complex analysis shown in figure 31.3 shows that self-worth is *indirectly* related to company reputation through customer orientation. In a similar vein, this analysis shows that customer orientation is indirectly related to job satisfaction through efficiency and self-worth, even though there is no direct relationship between them.

Two benefits flow from this more complex analysis. First, it provides more options for controlling the system. For example, customer orientation can be enhanced by improving employees' sense of self-worth and loyalty; options that were not apparent from figure 31.2. Secondly, the flow-on effects of change in one part of the system can be more accurately estimated. This information is useful when assessing the cost/benefits of different policy options. For example, a 10% improvement in loyalty will have a much greater effect on company satisfaction in light of figure 31.3. According to figure 31.3, a 10% change in loyalty would result in a 1% improvement in company satisfaction. When the causal relationships shown in figure 31.3 are also taken into account, a 10% improvement in loyalty would result in a 3% improvement in company satisfaction.

What Model is Correct and How Can One Know? It is not straightforward, particularly when using cross-sectional data, to determine which model is the correct one. With cross-sectional data it is not possible to separate with certainty causal from spurious effects; this would require at least two waves of data in the case of uni-directional causal relationships, and at least three waves of data in the case of reciprocal (two-way) causal relationships (e.g., Headey, Veenhoven & Wearing, 1991). In these ambiguous cases, theoretical and practical criteria have to be used to choose the *best* or most appropriate model. This can be done by asking the following questions: (a) Does the model accord with theoretical knowledge? (b) Is it consistent with previous research findings? (c) Can the model be replicated with different data sets? (d) Does the model make sense to those who know the organisation? (e) Do predictions made on the basis of the model hold true? The more of these questions which can be answered affirmatively, the more confidence one can have in the model.

EXAMPLE 3: DETERMINING CAUSAL STRUCTURE IN EMPLOYEE'S OPINIONS ABOUT AN INTERNATIONAL AIRLINE

In this example we consider the following question: What are the causes and consequences of quality management? This question was examined with data obtained through an employee opinion survey that was completed by 14,028 employees of an international airline. To maintain confidentiality, we will refer to the airline as International Airlines.

Answering Dynamic Questions: Psychometric Prerequisites

As noted above, it is important that the variables are well measured. When using EOS's to develop and test causal models, a high degree of precision is needed in the measurement of theoretical constructs so that fine grain distinctions between the variables can be made with confidence. For example, we might be interested in two separate questions about goals: (a) what determines employees' beliefs that they can set their own goals (goal setting); and, (b) what contributes to an employees' understanding of how their jobs contribute to departmental or corporate goals (goal contribution). In order to answer these two questions, we must be confident that appropriate items in the EOS measure as separable constructs the two variables of goal Setting and goal contribution. We must be confident that the items measuring these two variables are not assessing the same thing.

Identifying the Best Measures. The first stage of any analysis must be concerned with identifying the best measures. In our experience, the theoretical structure of an employee opinion survey is not always supported by the data. Although a survey might be designed to measure certain constructs that are of interest to an organisation, in reality, the data may show that the items cohere in a way that is quite different. For example, items that were designed to measure a single construct reflecting management processes may in fact assess a number of distinct, but related constructs (e.g., communication, participative decision-making, role clarification, and supportive leadership). Accordingly, it is important to determine the structure and quality of the survey instrument.

In this example, 8 psychometrically adequate scales were constructed from 21 items. Sixteen further items were retained as single item scales because of their conceptual importance. Although 14 of the single item scales could be combined to form two higher-order constructs reflecting management performance (9 items) and corporate performance (5 items), for the purpose of these analyses, we were more concerned about understanding the individual contribution made by each of the items. Of course, if we were interested in a more global question about the relation between these two different aspects of performance, it may have been appropriate to use the aggregated scales. Table 31.4 provides a brief description of

the 24 multiple and single item scales that were used in the structural equation analysis. The coefficients alpha for the multiple item scales are also shown.

TABLE 31.4
*Description and reliability of the 24 variables used
in the structural equation analyses reported for example 3.*

Variable	Description	α
<i>Multiple Item Scales</i>		
Customer orientation	The extent to which staff believe that their department actively seeks to understand and be responsive to customer needs.	.86
External reputation	The extent to which staff believe that International Airlines is highly regarded by its customers and the general public.	.78
Goal contribution	The extent to which staff feel they understand how their jobs contribute to departmental and corporate goals.	.79
Goal setting	The extent to which staff believe that there is an effective process for setting their own and their work group's goals.	.91
Goal understanding	The extent to which staff feel that they understand their department's goals, and how they will be achieved.	.87
Quality improvement	The extent to which staff believe that International Airlines is doing a good job in implementing quality improvement initiatives, and providing the necessary resources, tools, and training to achieve quality improvement.	.84
Staff commitment	The extent to which staff are proud to work for International Airlines, feel that they would like to stay with International Airlines for the foreseeable future, and believe that International Airlines has a brighter future than most other airlines.	.69
Staff feel valued	The extent to which staff feel that they are treated as individuals, as well as with respect and fairness.	.84

TABLE 31.4 (continued)

Variable	Description	a
<i>Single Item Scales (management performance)</i>		
Allowing initiative	The extent to which staff believe that management allow staff to use their own initiative.	
Communicating business	The extent to which staff believe management regularly communicate business.	
Consistency	The extent to which staff believe management show consistency in dealing with employees.	
Continuous Improvement	The extent to which staff believe management encourage continuous improvement.	
Giving honest feedback	The extent to which staff believe management provide honest feedback.	
Listening	The extent to which staff believe management listen to staff.	
Management performance	The extent to which staff believe they are managed well.	
Managing change	The extent to which staff believe management manage change well.	
Trusting staff	The extent to which staff believe management trust staff.	
<i>Single Item Scales (corporate performance)</i>		
Customer responsiveness	The extent to which staff believe that International Airlines is meeting its goal of being responsive to customers.	
Financial performance	The extent to which staff believe that International Airlines is meeting its goal of delivering a strong and consistent financial performance.	
Industry best	The extent to which staff believe that International Airlines is the best and most successful company in the industry.	

TABLE 31.4 (continued)

Variable	Description	a
Superior service and value	The extent to which staff believe that International Airlines is meeting its goal of providing superior service and value for money.	
Work environment	The extent to which staff believe that International Airlines is meeting its goal of sustaining a work environment that attracts, retains, and develops committed employees.	
<i>Single Item Scales (other)</i>		
Company satisfaction	The extent to which staff are satisfied with International Airlines as a company to work for.	
Global job satisfaction	The extent to which staff are satisfied with their jobs overall.	

Note. For the purpose of the structural equation analyses, it was assumed that the reliability of the single item scales was .85.

Estimating the Structural Equation Models

To reiterate, when causal models are based on cross-sectional data, the models provide only one of several plausible explanations of the data. Although it is difficult, when a large system of variables is under investigation, to develop multiple causal models that are both theoretically and empirically sound, it is still possible that more than one model of equal merit exists. In some cases, for example, the model will fit the data equally as well when nothing more than the direction of the relationship (arrow) linking two variables is reversed (e.g., MacCallum, Wegener, Uchino, & Fabrigar, 1993). Nevertheless, in practice it is difficult to get a model that fits the data well when there are many variables in the system. Figure 31.4 shows a model that takes into account the possible causal relationships between the 24 variables that were examined in this analysis.

Figure 31.4 shows that there are essentially two causal paths that run through the 24 variables; one leading to external reputation, and the other leading to staff commitment. We will look first at the path leading to external reputation. It can be seen from this model that management's emphasis on continuous improvement leads to goal understanding and quality improvement. In turn, quality improvement contributes to the four corporate goals included in this model. These four corporate goals contribute to staff perceptions about International Airlines being the industry's best airline. Finally, staff perception about the extent to which International Airlines is the industry's best airline, and the extent to which they believe that International Airlines is meeting its goal of providing superior service and value, both contribute directly to staff's perception

about how International Airlines is viewed by its customers and the general public. Consequently, this part of the model suggests that *management emphasis should be placed on continuous improvement in order for staff to feel positive about International Airlines performance and reputation outside of the company.*

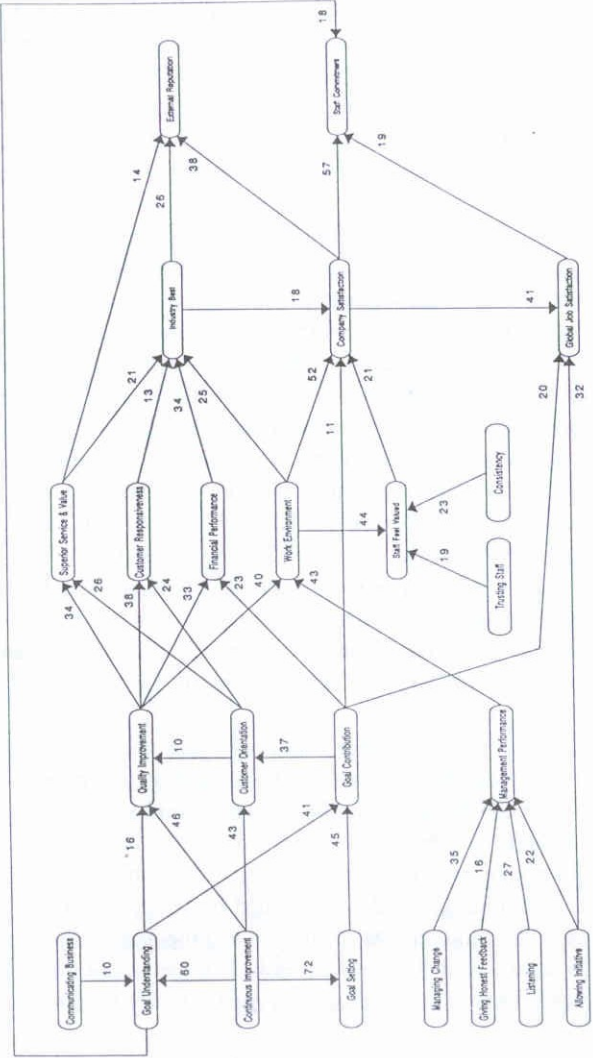


FIG. 31.4. Theoretical causal model showing the relationship between 24 variables assessed in an employee opinion survey completed by 14,028 airline workers (goodness-of-fit statistics: root-mean-square residual = .02; relative noncentrality index = 1.00).

Figure 31.4 also shows the main components that contribute to staff commitment. It can be seen that the four dimensions of management contribute to staff perceptions about management performance. In turn this contributes to the extent to which staff believe International Airlines is meeting the goal of providing a positive work environment. Meeting the goal of providing a positive work environment contributes to staff feeling that they are valued and determines the extent to which they are satisfied with International Airlines as a company to work for. Moreover, company satisfaction contributes to global job satisfaction, and both company satisfaction and global job satisfaction determine the levels of staff commitment. In essence, this part of the model suggests that *management performance, and meeting the goal of establishing a positive work environment are important in determining staff commitment.*

It can be seen from the full model that there is some overlap between the two main causal paths. For example, goal contribution and company satisfaction contribute to both paths. Consequently, although the two main causal paths can be considered as separate, there are some connections which bring them together as an integrated system. It should also be noted that these models are based on the perceptions of staff, and may or may not reflect the objective reality about the link between job satisfaction and company performance.

Figure 31.4 shows that the interrelationships are complex, requiring many causal links to be taken into account as policy measures are developed. A careful study will show that many causal variables are important, depending upon the outcome desired. Nevertheless, the 42 paths shown in this model represent only 15.2% of the total possible paths (based on 24 variables), which demonstrates the capability of such modeling to reduce the complexity of EOS data to a manageable level. Moreover, this reduction has been achieved and we are still able to explain 98% of all covariation in this system of 24 variables (the root-mean-square residual was .02).

Again, it is possible that other models fit the data equally well. It is important to test all plausible alternatives before using the results of a particular model. Many alternatives are usually examined during the model development phase. Since managers, who are the users of the information derived from the analyses, are likely to have strong views about how their organizations work, it is important to examine the models generated by these views. In this manner, it is possible to use the modeling procedure to test the competing views of different managers. We have found this to be a powerful technique that can assist managers to understand how their organisations may actually function.

CONCLUSION

The three examples show different models. We have not discussed the many technical issues involved in developing such models, nor have we drawn out all the policy and control implications of these analyses. Our intention was to provide enough detail to show how this modelling technology can assist the deve-

lopment of multifactorial control strategies. Moreover, it indicates those control activities that are likely to be effective as well as those which are not, and suggests the priority that should be assigned to each of the effective control strategies. Although this type of analysis should not be seen as the *holy grail* of employee opinion surveys, it does provide a rich source of information about how an organisation functions. When used to supplement the static information that is typically derived from an employee opinion survey, the results of these analyses can provide a powerful decision aide that enables managers to gain a clearer understanding of the control mechanisms operating within their organizations.

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