Validating the organizational climate measure: links to managerial practices, productivity and innovation

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Summary   This paper describes the development and validation of a multidimensional measure of organizational climate, the Organizational Climate Measure (OCM), based upon Quinn and Rohrbaugh's Competing Values model. A sample of 6869 employees across 55 manufacturing organizations completed the questionnaire. The 17 scales contained within the measure had acceptable levels of reliability and were factorially distinct. Concurrent validity was measured by correlating employees' ratings with managers' and interviewers' descriptions of managerial practices and organizational characteristics. Predictive validity was established using measures of productivity and innovation. The OCM also discriminated effectively between organizations, demonstrating good discriminant validity. The measure offers researchers a relatively comprehensive and flexible approach to the assessment of organizational members' experience and promises applied and theoretical benefits. Copyright © 2005 John Wiley & Sons, Ltd.

Introduction

Central to most, if not all, models of organizational behavior are perceptions of the work environment, referred to generally as 'organizational climate' (Rousseau, 1988). Primarily understood as an intervening variable between the context of an organization and the behavior of its members, and attempting to understand how employees experience their organizations, the concept has inspired many descriptions and operationalizations. Despite the level of interest surrounding organizational climate, however, there are few well-validated measures of the construct. In this paper, we describe the development of a new measure of organizational climate which is both theoretically grounded and empirically validated.

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The climate concept

While climate has been consistently described as employees' perceptions of their organizations, the construct has suffered over the years from conflicting definitions and inconsistencies in operationalization. The dominant approach conceptualizes climate as employees' shared perceptions of organizational events, practices, and procedures. These perceptions are assumed to be primarily descriptive rather than affective or evaluative (Schneider & Reichers, 1983). More recent work contradicts this view, suggesting strong evaluative or affective components (Patterson, Warr, & West, 2004). At the individual level of analysis, referred to as 'psychological climate' (James & Jones, 1974), these perceptions represent how work environments are cognitively appraised and represented in terms of their meaning to and significance for individual employees in organizations (James & Jones, 1974; James & Sells, 1981).

Most empirical studies have used an aggregate unit of analysis, such as the work group, department, or organization (hence group, departmental, and organizational climate constructs). Such climates have been operationally constructed by aggregating individual scores to the appropriate level and using the mean to represent climate at that level. The rationale behind aggregating individual data to a unit level is the assumption that organizational collectives have their own climate and that these can be identified through the demonstration of significant differences in climate between units and significant agreement in perceptions within units (James, 1982). Perceptual agreement implies a shared assignment of psychological meaning allowing individual perceptions to be aggregated and treated as a higher-level construct. Most research is now focused on aggregate rather than on psychological climate (Schneider, Bowen, Ehrhart, & Holcombe, 2000). This paper therefore describes the development of a measure of organizational-level climate that is intended to support research focusing on organizational climate, given the current emphasis on organizational level climate in both theory and research (Schneider, Smith, & Goldstein, 2000).

Climate and culture

Consensus is not easily achieved in this area, however, since there are both theoretical differences and disciplinary differences in what climate represents. Many of these differences are revealed in the debate about the distinction between organizational climate and culture. Indeed, the two terms are sometimes used interchangeably. Goodman and Svyantek (1999), for example, used the Organizational Climate Questionnaire (OCQ) to operationally define dimensions of organizational culture. While this seems paradoxical, the OCQ's authors, Litwin and Stringer (1968), did describe the variables measured by the OCP as assessing the shared beliefs and values of organizational members that constitute the perceived work environment, and shared beliefs and values are often incorporated as central elements in definitions of organizational culture. Hence the problems of conceptual and definitional overlap.

There is no doubt that culture and climate are similar concepts since both describe employees' experiences of their organizations. Organizational climate, according to Schneider (2000), represents the descriptions of the things that happen to employees in an organization. Climate (he suggests) is behaviorally oriented. Climates for safety or service, for example, represent the patterns of behavior that support safety or service. Organizational culture, in contrast, comes to light when employees are asked why these patterns exist. The question is answered in relation to shared values, common assumptions, and patterns of beliefs held by organizational members, and it is these which define organizational culture.

Svyantek and Bott (2004) propose the definitions which help distinguish between climate and culture. Organizational culture is defined as a set of shared values and norms held by employees that guide

their interactions with peers, management, and clients. Organizational climate is more behaviorally oriented in that climates for creativity, innovation, safety, or service, for example, may be found in the workplace. These climates represent employees' perceptions of organizational policies, practices, and procedures, and subsequent patterns of interactions and behaviors that support creativity, innovation, safety, or service in the organization. Thus climate can be understood as a surface manifestation of culture (Schein, 1985; Schneider, 1990). Exploring organizational cultural values and assumptions in relation to, for example, individualism/collectivism can help explain employees' perceptions of the climate for teamwork in their organizations.

The quest to differentiate the concepts has influenced approaches to measurement, with most climate research utilizing quantitatively based questionnaire measures applied comparatively across several organizations, while most culture researchers have advocated the use of qualitative measures and a focus on single organizations. The approach taken in the research described here derives from climate research and involves the development of a quantitatively based questionnaire measure of organizational climate. What dimensions should such a measure seek to tap?

The dimensions of climate

An initial assumption of theory and research in the area of organizational climate was that social environments could be characterized by a limited number of dimensions. For example, Campbell, Dunnette, Lawler, and Weick (1970) identified four dimensions common to a number of climate studies (individual autonomy; degree of structure imposed on the situation; reward orientation; and consideration, warmth, and support). James and his colleagues (James & James, 1989; James & McIntyre, 1996; James & Sells, 1981) describe four dimensions they identified across a number of different work contexts: (1) role stress and lack of harmony; (2) job challenge and autonomy; (3) leadership facilitation and support; and (4) work group cooperation, friendliness, and warmth. James suggested that individuals developed a global or holistic perception of their work environment (e.g., James & Jones, 1974), which could be applied to any number of contexts and industries.

However, over the years the number of climate dimensions identified as targets of assessment has proliferated, leading to confusion and slow theoretical progress. For example, Glick's (1985) review of the field described an abbreviated list of climate dimensions including leader's psychological distance (Payne & Mansfield, 1978), managerial trust and consideration (Gavin & Howe, 1975), communication flow (Drexler, 1977), open-mindedness (Payne & Mansfield, 1978), risk orientation (Lawler, Hall, & Oldham, 1974), service quality (Schneider, Parkington, & Buxton, 1980); equity (James, 1982), and centrality (Joyce & Slocum, 1979). Since Glick's review, the development of new climate scales has continued. For example, the Business Organization Climate Index (Payne & Pheysey, 1971) was revised in 1992 with the addition of scales measuring concern for customer service, the impact of information quality, and ability to manage culture (Payne, Brown, & Gaston, 1992).

Schneider (1975, 1990, 2000) eschews the use of general multidimensional measures of climate and argues for a facet-specific climate approach where climate has a focus and is tied to something of interest. Schneider suggests that the dimensions of organizational climate will differ depending on the purpose of the investigation and the criterion of interest, and that general measures of organizational climate will contain dimensions that are not relevant for each specific study. This line of argument has encouraged the development of measures of several dimensions of climate such as service (Schneider, 1990) and innovation (Anderson & West, 1998; West, 1990).

Rather than considering the global and domain-specific approaches to organizational climate as opposite sides of one coin, it is worthwhile viewing both as a valid basis for the investigation of work

environment perceptions. Which approach is favored depends largely on the interests of the investigation. The global approach is advantageous in terms of its provision of an overall snapshot of organizational functioning, allowing a view of the ways whole organizations operate (Ashkanasy, Wilderom, & Peterson, 2000). A multidimensional global approach can also highlight subcultures and identify the effects of particular dimensions on specific outcome measures, such as organizational productivity or innovation (Ashkanasy et al., 2000). The domain-specific approach contributes more precise and targeted information for use in areas such as the improvement of customer satisfaction and the improvement of company safety. What has research revealed about the relationship between organizational climate and outcomes of theoretical interest?

Links between climate and outcomes

Research has suggested that climate perceptions are associated with a variety of important outcomes at the individual, group, and organizational levels. These include leader behavior (Rousseau, 1988; Rentsch, 1990), turnover intentions (Rousseau, 1988; Rentsch, 1990), job satisfaction (Mathieu, Hoffman, & Farr, 1993; James & Tetrick, 1986; James & Jones, 1980), individual job performance (Brown & Leigh, 1996; Pritchard & Karasick, 1973), and organizational performance (Lawler et al., 1974; Patterson et al., 2004).

As a global or summary construct, organizational climate has been related to several important work outcomes. Brown and Leigh (1996) demonstrated that perceptions of a motivating and involving organizational climate were positively related to supervisory ratings of performance. Organizational climate has been shown to relate to group process variables across organizational levels (Griffin & Mathieu, 1997). Day and Bedeian (1991) showed that employees performed better (as rated by their supervisors) in organizational climates they perceived as structured (unambiguous) and supportive of risk.

Domain-specific climate has also been linked with several important work outcomes. Using their model of service climate, Schneider and colleagues demonstrated that service climate is related to customer perceptions of service quality (Schneider, 1980; Schneider et al., 1980; Schneider, White, & Paul, 1998). Safety climate has been significantly linked with safety behaviors in accidents teams (Hofmann & Stetzer, 1996), and safety compliance in the health sector (Murphy, Gershon, & DeJoy, 1996). Research in the area of innovation suggests that group climate factors influence levels of innovative behavior in health care and top management teams (West & Wallace, 1991; West & Anderson, 1996).

While progress in understanding that dimensions of climate predict outcomes in a variety of studies, knowledge develops haphazardly in this field in a way that appears not to be synergistic or to lead to theory development. This is partly because virtually every study referred to above uses a different measure of climate, each assessing rather different dimensions. The accruing knowledge is not cumulative, hence the study we describe here which seeks to develop an inclusive, robust and theoretically based approach to the measurement of climate. Moreover, many instruments are not validated, are poorly designed, and fail to specify the level of analysis.

Existing measures of climate

The lack of a theoretical basis for many climate instruments has resulted in much of the variation in climate dimensions employed in different measures. For example, Wilderom, Glunk, and Maslowski

(2000) located and summarized 10 studies relating climate to organizational performance. They reported that different aspects of climate emerged as important in different studies. This diffuse pattern of results is likely to be due, in part, to the variety of methods of assessment of climate employed in these studies.

The inability to draw clear research conclusions through a lack of theory and subsequent inconsistent operationalization of climate is compounded by the fact that most climate instruments have not been validated. With the exception of some domain-specific climates such as Schneider's service climate (Schneider et al., 1998), there are few measures with demonstrated reliability and validity.

One of the best-known general measures of organizational climate is the Organizational Climate Questionnaire (OCQ) by Litwin and Stringer (1968). It comprises 50 items that assess nine dimensions of climate. A number of studies (e.g., Sims & LaFollette, 1975; Muchinsky, 1976) have suggested that a six-factor structure is more appropriate and pointed out that the existing nine scales showed poor split-half reliabilities. A review by Rogers, Miles, and Biggs (1980) showed that most studies had found six factors and that there was virtually no agreement among researchers regarding which items loaded best on the different factors. They concluded that the OCQ lacked validity and was not a consistent measurement device. Such measurement problems are not unusual in this area of research and prompted the development of the measure described here.

A number of culture questionnaires have been published over the last 25 years, but they can also be seen as measures of climate as they tap the surface manifestations of underlying cultural assumptions (Schein, 2000). Again, these instruments suffer from a number of problems including a lack of a theoretical basis, little validity information (Ashkanasy et al., 2000), little or no confirmatory studies and/or small sample sizes used for their development.

A further methodological weakness of climate research is the vague or poorly specified descriptive level of items in many climate measures. Each climate questionnaire item should clearly focus on the specific collective unit which corresponds to the climate being studied (team, department, or organization). Unfortunately, in many studies respondents have not been instructed to focus on a specific organizational unit, but rather to provide descriptions relating to their 'work environments' (Howe, 1977; Schneider & Reichers, 1983). This ambiguity in the frame of reference of climate items can lead to individuals describing perceptions of different parts of the organization, some assuming the questionnaire asks them to describe their department and others assuming the referent is the organization (Rousseau, 1988).

A related issue concerns the type of respondents included in studies of organizational climate. Organizational climate is a characteristic of an entire organization and, as Wilderom et al. (2000) argue, 'it seems crucial that researchers investigate all sorts of organizational members, representative of all the various hierarchical, departmental, divisional and/or professional entities' (p. 207). However, investigations often focus only on managerial employees (Gordon & DiTomaso, 1992; Kotter & Heskett, 1992; Sheridan, 1992; Denison, 2001; Denison & Mishra, 1995; Weber, 1996). Clearly, for inclusiveness, we need measures of organizational climate that assess the experiences of employees throughout the workforce. The content and wording of such measures should therefore be relevant and comprehensible to all organizational members.

This paper describes the development of a global multidimensional measure of organizational climate intended to address the conceptual and methodological issues outlined above. The measure is designed to be theoretically grounded, to explicitly and consistently specify the appropriate frame of reference, and to be applicable across a range of work settings and to target all employee levels (lower level as well as managerial employees). We report data, from a large sample of employees and organizations, describing its factor structure and internal reliability, and assessing the

measure's discriminant and consensual validity and (using separate source data) concurrent and predictive validity. First, we describe the Competing Values framework, which underpins our measure.

Competing Values model

We tackle the problem of what dimensions to include in a measure of organizational climate by adopting a clear theoretical framework to drive this choice. In choosing a framework we were mindful of the need to clearly anchor the measure at the organizational level. The measure had to assess a broad class of organizational, rather than psychological variables that constitute the organizational context for individual actions and that therefore enable comparative studies of organizational climate. We propose that one meta-theoretical model, the Competing Values model (Quinn & Rohrbaugh, 1983; Quinn & McGrath, 1985; Gifford, Zammuto, & Goodman, 2002), provides a framework of values that underlie organizational climates. The model represents broad managerial ideologies that have emerged over time (the content of these ideologies are discussed below). Building on Beyer's (1981) work on ideologies in organizations, Zammuto, Gifford, and Goodman (2000) argue that as managerial ideologies become institutionalized they form a common basis for the ideologies of individual organizations, imported via education, consultants, training, and management books. As a result, Western managers 'draw from a common, limited set of managerial ideologies that are the foundation for the assumptions, values, and beliefs on which individual organizations' cultures are based. Differences in which parts of these broad managerial ideologies are imported into organizations' ideologies lead to differences in organizational cultures' (Zammuto et al., 2000, p. 264). The essential point is that an organization's ideology and culture will shape decision-making and action in that organization (Beyer, 1981; Zammuto et al., 2000), and consequently will play an important role in the development of its climate.

The Competing Values model, developed in a series of articles and studies by Quinn and colleagues (e.g., Quinn & Rohrbaugh, 1981, 1983; Quinn & McGrath, 1985), proposes that organizational effectiveness criteria in the literature can best be understood when organized along fundamental dimensions—flexibility versus control and internal versus external orientation. The framework's four quadrants describe four broad domains of valued outcomes and associated managerial ideologies about the means through which these outcomes may be achieved. It calls attention to how opposing values exist in organizations and how 'individual organizations are likely to embrace different mixtures of values that are reflected in their desired ends and in the means to attain them, such as their structural designs and mechanisms of co-ordination and control' (Zammuto & O'Connor, 1992, p. 711). The intention of the model is to encapsulate into one framework the major approaches to organizational values and effectiveness over the last 100 years.

A major strength of this model is its derivation from four major schools of study of organizational effectiveness, reflecting long traditions in management and organizational psychology:

- The human relations approach (internal focus and flexibility in relation to the environment) reflects the tradition derived from the socio-technical (Emery & Trist, 1965) and human relations schools (e.g., McGregor, 1960). This approach emphasizes the well-being, growth and commitment of the community of workers within an organization.
- The internal process approach (internal focus and tight control within the organization) reflects a Tayloristic concern with formalization and internal control of the system in order that resources are efficiently used.
- The open systems approach (external focus and flexible relationships with the environment) emphasizes the interaction and adaptation of the organization in its environment, with managers

seeking resources and innovating in response to environmental (or market) demands (Shipper & White, 1983).

- The rational goal approach (external focus but with tight control within the organization) reflects a rational economic model of organizational functioning in which the emphasis is upon productivity and goal achievement (Hall, 1980; Clinebell, 1984).

By combining these orientations into one model, Quinn and colleagues aimed to provide a broad conceptual map of the domains of theory in the field over the last 60 years. Such a map is useful in identifying the required topography of a climate measure, applicable to a wide range of organizations. The model is also useful in reflecting the means for implementing those values in terms of managerial practices, and the ends or outcomes which are emphasized or which compete in each domain.

It is important, however, to recognize that the model does not propose that organizations can be located predominantly in one quadrant but, reflecting the rich mix of competing views and perspectives in organizations, proposes that organizations will be active in, and give emphasis to, each domain, but with differing strengths. Quinn (1988) argued that a balance of competing organizational values is required for organizational effectiveness. Similarly, we suggest that organizations will not have strong climates in relation to each of the dimensions we identify within any one quadrant but that the strength of emphasis will vary both across quadrants and across dimensions within quadrants. The value of the model for the development of a climate measure is that it aids inclusiveness and ensures that dimensions tap the core values of organizations.

Identifying climate dimensions

Dimensions were generated within domains to ensure that there was an adequate sample of dimensions identified within each of the four broadly conceptualized domains. In order to develop subscales that reflected each of these four domains, we searched the literatures referred to above to develop such an inclusive set of dimensions. We selected those dimensions that were most frequently utilized in research studies from 1960 to 2000 on climate and that fitted into the competing values model with a relatively unambiguous location in one of the four quadrants. This process was iterative, involving a large number of meetings to achieve consensus by members of the research team. In addition, where no suitable dimension could be found in the literature we identified an appropriate construct (e.g., the concept of reflexivity as a dimension within the open systems quadrant).

Debates and conceptual analyses among the authors and ultimately psychometric analyses served to sharpen our conceptualization of the nature and structure of organizational climate, located in the Competing Values model, as well as to identify deficiencies in the dimension pool. The key question addressed was 'Does the pool adequately reflect the four domains of the Competing Values model?'

Below we present the Competing Values model and the climate scales which we attributed to each of the quadrants represented in the model. We did not attempt to create an equal number of dimensions and scales in each quadrant since some dimensions are inherently more complex and multifaceted (e.g., human relations) than others (internal process).

The *Human Relations Model* (internal focus, flexible orientations) has norms and values associated with belonging, trust, and cohesion, achieved through means such as training and human resource development. Coordination and control are accomplished through empowerment and participation, and interpersonal relations are supportive, cooperative, and trusting in nature. Climate dimensions which we identified as representing this quadrant are:

- *employee welfare*—the extent to which the organization values and cares for employees (e.g., Robinson & Rousseau, 1994; Guest, 1998);

- *autonomy*—designing jobs in ways which give employees wide scope to enact work (e.g., Cherns, 1976; Klein, 1991);
- *participation*—employees have considerable influence over decision-making (e.g., Miller & Monge, 1986; Hollander & Offerman, 1990; Heller, Pusi, Strauss, & Wilpert, 1998);
- *communication*—the free sharing of information throughout the organization (e.g., Callan, 1993; Hargie & Tourish, 2000);
- *emphasis on training*—a concern with developing employee skills (e.g., Gattiker, 1995; Morrow, Jarrett, & Rupinski, 1997);
- *integration*—the extent of interdepartmental trust and cooperation (e.g., Lawrence & Lorsch, 1967; Nauta & Sanders, 2000);
- *supervisory support*—the extent to which employees experience support and understanding from their immediate supervisor (e.g., Cummins, 1990; Eisenberger et al., 2002).

In the *Internal Process Model* (internal focus, control orientation) the emphasis is on stability, where the effects of environmental uncertainty are ignored or minimized. Coordination and control are achieved by adherence to formal rules and procedures. The Internal Process Model represents the classic bureaucracy. Scales which reflect this model are:

- *formalization*—a concern with formal rules and procedures (e.g., Pugh, Hickson, Hinings, & Turner, 1968; Hall, 1991);
- *tradition*—the extent to which established ways of doing things are valued (e.g., Coch & French, 1948).

The emphasis of the *Open Systems Model* (external focus and flexible orientation) is on readiness, change and innovation, where norms and values are associated with growth, resource acquisition, creativity and adaptation. Climate dimensions which are likely to reflect this orientation are:

- *flexibility*—an orientation toward change (e.g., Garrahan & Stewart, 1992; King & Anderson, 1995);
- *innovation*—the extent of encouragement and support for new ideas and innovative approaches (e.g., West & Farr, 1990);
- *outward focus*—the extent to which the organization is responsive to the needs of the customer and the marketplace in general (Kiesler & Sproull, 1982; West & Farr, 1990);
- *reflexivity*—a concern with reviewing and reflecting upon objectives, strategies, and work processes, in order to adapt to the wider environment (West, 1996, 2000).

The primary emphasis in the *Rational Goal Model* (external focus and control orientation) is on the pursuit and attainment of well-defined objectives, where norms and values are associated with productivity, efficiency, goal fulfillment, and performance feedback. Climate dimensions which might reflect this model are:

- *clarity of organizational goals*—a concern with clearly defining the goals of the organization (e.g., Locke, 1991);
- *effort*—how hard people in organizations work towards achieving goals (e.g., McCaol, Hinsz, & McCaol, 1987);
- *efficiency*—the degree of importance placed on employee efficiency and productivity at work (e.g., Ostroff & Schmitt, 1993);
- *quality*—the emphasis given to quality procedures (e.g., Deming, 1986; Hackman & Wageman, 1995);
- *pressure to produce*—the extent of pressure for employees to meet targets (e.g., Taira, 1996);
- *performance feedback*—the measurement and feedback of job performance (e.g., Annett, 1969; Kopelmann, 1986).

Organizational Context

The Companies

The companies were spread throughout the United Kingdom, and were drawn from the manufacture of metal goods and mechanical engineering sector, plastics and rubber sector, and a third miscellaneous category. They were predominantly single site and averaged approximately 260 employees. The climate data were collected between 1994 and 1996. At this time the companies were facing testing trading conditions, with a greater than usual probability of bankruptcy and an increased threat to jobs. In response many firms set about trying to improve productivity through introducing new management practices, reorganizing production methods and so on. Almost all the firms in our sample reported undergoing significant change in structure, human resource management policies, and work design. In short, the study took place at a time of considerable uncertainty and change for manufacturing organizations.

Employees' Climate Perceptions

The organizational climate surveys across the companies reinforced the researchers' views that organizational changes were implemented with limited effectiveness. Employees reported low levels of participation, lack of open communication, and little decentralization. Pressure on employees to produce and formalization (the use of rules and formal procedures to control activities) dominated employees' climate perceptions of their organizations.

Method

Pilot study and development of the main item pool

Approximately 10 items per scale were generated to tap into each of 19 proposed dimensions of climate. We used broad and comprehensive sets of items to tap the organizational climate dimensions. Subsequently, each item set was reduced and items modified during the piloting. Weaker items (i.e., those that respondents found ambiguous or confusing), and the more important items (those which loaded highly on the constructs) were returned identified. Scale items were also selected on the basis of item differentiation and measurement width within scales by examining both inter-item correlations and semantic context. After all these processes, 95 items remained. Items from across all the scales were randomly arranged, in order that effects due to response set were minimized. The response format used was a 4-point Likert scale of *definitely false*, *mostly false*, *mostly true*, and *definitely true*.

Because the questionnaire was designed for use within all levels of the workforce, care was taken to use straightforward wording. The first page contained instructions explaining the purpose and format of the questionnaire, and informed respondents that it would take about 25 minutes to complete. They were asked to answer all questions, as far as possible.

Administering the questionnaire

The Organizational Climate Measure (OCM)© was administered to employees from 55 organizations within the U.K. manufacturing sector.[1] The size of the companies ranged from 60 to 1929 employees,

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[1]Researchers interested in using the OCM for research can do so without charge on application to the second author.

with an average of 256 employees. Some 12 051 questionnaires were distributed and in 49 organizations all employees were asked to complete the OCM. In the six organizations with more than 500 employees, a random sample of 60 per cent of the workforce was selected to complete the questionnaire.

Two methods were used to administer the questionnaire. In 37 companies a postal survey was carried out. Here, climate questionnaires were sent out to employees at their place of work in personally addressed envelopes which also contained a pre-paid return envelope. Seventeen companies chose to have the climate survey administered by researchers on site.

Results

Overall, completed questionnaires were received from 6869 employees, constituting a 57.0 per cent response rate across the sample. There was no evidence that response rates varied by organizational size or sector.

There were three stages in the analysis. First, using the data provided by 50 per cent of the respondents, we employed confirmatory factor analysis to examine how closely the data derived from employees' responses to the 95 items were consistent with a 19-latent factor model of organizational climate. Based on these findings, the model was refined to improve the fit between the model and the data in terms of internal consistency of scale items and discrimination between latent constructs. The adequacy of the refined model was then formally assessed (cross-validated) using the remaining 50 per cent of the sample, again employing confirmatory analysis.

The final part of the analysis centered on demonstrating the usefulness and adequacy of our climate measures, in terms of consensual, discriminant, and external (concurrent, predictive) validity and measurement invariance (i.e., does the instrument measure the same constructs across different samples?).

A common problem with data collected from lengthy questionnaires is missing data. Within our 6869 returned questionnaires we found that, on average, 8 per cent of questions were left unanswered by each respondent. A list-wise deletion of cases would result in the loss of around 80 per cent of the sample. Far more efficient methods are now available to researchers, including use of full information maximum likelihood estimation (FIML) (Arbuckle, 1996), which uses all available data to produce estimates, and the expectation–maximization (EM) algorithm, which uses the information contained in cases with and without missing data to compute a maximum likelihood covariance matrix and so makes more efficient use of the available data than standard missing data techniques. Graham, Hofer, and MacKinnon (1996) demonstrated that parameter estimates based on the analysis of the EM covariance matrix are excellent in that they are unbiased and efficient. We made use of both these procedures during the analysis.

Throughout the analysis we made the assumption that all missing data points may be regarded as missing at random, since the percentage missing for each question varied from only 1 per cent to 2.5 per cent (i.e., there appeared to be no 'favored' or 'unfavored' items). These figures suggested that piloting had been successful in eliminating 'unfriendly' or 'difficult' questions and that missing responses could be regarded as reasonably random in occurrence throughout the sample.

One further assumption was also made throughout the analysis. The covariances observed between item responses were assumed to be reasonably homogeneous across different categories of job type, age, sex, department, etc. In other words, the covariations (and therefore factor structure) among responses for persons who are (say) management staff and those who are non-management staff were considered to be reasonably similar. A more detailed discussion of this assumption is given in the Results section.

Model exploration and refinement

A common analytical technique used for scale development is to split the data at random into two subsamples, and then to use the first subsample for exploratory analysis of the factor structure and the second subsample to confirm this structure. We broadly followed this approach, although rather than using exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA), we used CFA on both parts of the data. This was due to the problems of missing data mentioned above: while full information maximum likelihood estimation (FIML) is an appropriate technique for dealing with missing data for CFA, no such equivalent technique is available for EFA.

Since we hypothesized the existence of the 19 different climate constructs a priori, and intentionally wrote items to tap into each of these domains, we started by assessing how well a 19-factor structural equation model described the covariation between items. For this, data provided by the first 50 per cent of the sample were used. Each of the sets of five items was specified to load onto a single factor only, representing the underlying construct in mind. Correlation among the latent factors was permitted, based on the assumption that the 19 constructs reflect both opposing/similar domains within the two-dimensional Competing Values framework (internal versus external focus, and control versus flexible orientation).

The covariance matrix was computed using EM (expectation maximization) by Schafer's (1997) NORM program. The EM covariance matrix was then entered into the AMOS structural equation modeling program (Arbuckle, 1996) for fitting of the 19-factor confirmatory factor analysis model. Detailed results of this analysis are not repeated here, but are available on request from the authors.

Refinement of factor structure

There were very strong correlations between the latent factors labeled Innovation and Flexibility (0.94) and between Participation and Communication (0.98). This indicated that the shared variance in items designed to measure Innovation corresponded almost precisely to the shared variation in items designed to reflect Flexibility. The same applied to items representing Participation and Communication. An examination of item correlations showed that Innovation items correlated just as highly with Flexibility items as they did with items within their own subscale (again this was also true for the items representing Participation and Communication).

In view of the fact that we wanted subscales to measure reasonably distinct dimensions of climate, the first modification to the model was therefore to allow the two subsets of Innovation and Flexibility items to load onto a new single factor which we called Innovation & Flexibility. Similarly, items originally designed to tap aspects of Participation and Communication were allowed to load onto a single construct, provisionally labeled Involvement. When the revised model was refitted to the first 50 per cent sample of data, there were no correlations over 0.80.

Scale refinement

The process of subscale refinement was based on several criteria. We examined regression weights for small loadings in order to identify items that had insufficient covariation with other items in a subscale. Unidimensionality and internal consistency were also assessed by calculation of reliability coefficients (Cronbach's alpha) and inter-item correlations. We also removed those items loading highly on other factors. This was assessed by examination of modification indices.

In the new 17-factor model, all but one of the regression weights of the latent variables on their respective items were highly significant. This one item was removed. Also, modification indices

suggested that two items loaded highly on several other factors. Reliability analysis showed that there would be no change in the value of Cronbach's alpha if the items were removed, and inspection of the remaining items in the scales showed that measurement width would be unaffected. Therefore these items were also removed. We also reduced the number of items in some scales on the basis of low reliability/regression weights and overlap into other domains of climate. Where two scales had been combined (Participation and Communication, Flexibility and Innovation), the new composite scales were reduced to six items, in order that the number of items for each should not be too over-representative, but allowing the scale to retain its breadth of content. In total, 13 of the 95 items were removed.

Assessment of proposed dimension structure and scale measures

To assess the adequacy of our refined subscales and factor structure, a confirmatory factor analysis of the proposed model was performed on the remaining 50 per cent of the data. To overcome the problem of not getting fit indices with FIML, a commonly used (but undocumented) approach to assessing goodness of fit in missing data situations was used (J. Graham, personal communication, 1998). The first step involves assessing the overall goodness of fit of the specified model and the second step requires estimating parameters and obtaining accurate standard errors for more exact critical ratio tests. We computed EM estimates of item covariances on the same remaining approximately 50 per cent of the dataset using the same technique described earlier and fitted the proposed model to the estimated covariance matrix. The fit indices produced are based on the assumption that there are no missing data in the $N = 3428$ cases and therefore are too conservative. The correct value of N to be used in the calculation of fit indices should be somewhat smaller than 3428 (nominal N) to reflect the fact that many of these cases did not contain answers to all items. A very crude approximation would be to use a value of $N' = 3428 \times$ proportion of the data points actually observed. This value of N' should then give fit indices that are much closer to the true values. In fact, since the proportion of missing data points in our sample was relatively small, the sample sizes N and N' were very similar and gave the same values (to within 0.003) for the fit indices of interest. In light of the above, we can reasonably claim the true values of the indices should be very similar to those obtained by using EM.

Internal homogeneity

Internal consistency estimates (using Cronbach's alpha) of the final 17 scales are presented in Table 1. With the exception of the Autonomy scale, all alpha values are at or above 0.73. Also shown are the means, standard deviations, and correlations for each scale. The items comprising each scale can be found in the Appendix, along with which scales map onto each of the four quadrants of the Competing Values model.

The standardized estimates of regression weights produced by FIML can also be found in the Appendix. All critical ratios were significant, indicating that the latent factors explained significant proportions of variance in the scale items.

Confirmatory factor analysis of dimensional structure

Four commonly used fit indices obtained by fitting the model to the EM covariance matrix are presented in Table 2. In view of the large sample size, the usual chi-square statistic was considered

Table 1. Cronbach's alpha, means, SDs, and correlations for the climate scales

Scales	Cronbach alpha	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Autonomy	0.67	2.28	0.52																
2. Integration	0.86	2.52	0.68	0.23															
3. Involvement	0.87	2.29	0.69	0.37	0.61														
4. Supervisory Support	0.88	2.64	0.67	0.22	0.49	0.52													
5. Training	0.83	2.53	0.76	0.21	0.52	0.64	0.51												
6. Welfare	0.91	2.63	0.79	0.33	0.55	0.70	0.60	0.64											
7. Formalization	0.77	2.81	0.60	−0.26	0.30	0.26	0.26	0.37	0.32										
8. Tradition	0.73	2.42	0.64	−0.26	−0.44	−0.53	−0.32	−0.48	−0.49	−0.28									
9. Innov. & Flexibility	0.86	2.49	0.64	0.21	0.53	0.61	0.54	0.58	0.63	0.31	−0.56								
10. Outward Focus	0.83	3.20	0.63	0.06	0.38	0.36	0.38	0.38	0.47	0.37	−0.43	0.48							
11. Reflexivity	0.76	2.64	0.54	0.16	0.54	0.56	0.45	0.52	0.55	0.33	−0.51	0.65	0.53						
12. Clarity of Org. Goals	0.87	2.53	0.73	0.14	0.48	0.58	0.43	0.53	0.54	0.32	−0.44	0.61	0.42	0.58					
13. Efficiency	0.80	2.03	0.70	0.18	0.42	0.53	0.27	0.46	0.41	0.27	−0.47	0.38	0.21	0.35	0.39				
14. Effort	0.79	2.76	0.58	0.12	0.44	0.45	0.45	0.45	0.47	0.35	−0.39	0.48	0.39	0.38	0.43	0.34			
15. Perform. Feedback	0.78	2.44	0.66	0.15	0.48	0.59	0.42	0.56	0.50	0.35	−0.49	0.52	0.35	0.54	0.56	0.48	0.44		
16. Pressure to Produce	0.79	2.90	0.63	−0.22	−0.12	−0.22	−0.12	−0.14	−0.24	0.11	0.04	−0.11	0.05	−0.04	−0.08	−0.18	0.14	−0.04	
17. Quality	0.80	3.28	0.62	0.02	0.36	0.33	0.40	0.42	0.46	0.43	−0.35	0.47	0.60	0.44	0.45	0.20	0.51	0.38	0.04

$N = 6869$.
All correlations are statistically significant with $p < 0.001$, except for those between Autonomy and Quality ($p = 0.032$), Reflexivity and Pressure to Produce ($p = 0.101$), and Outward Focus and Pressure to Produce ($p = 0.001$).

Table 2. Goodness of fit indices for the 17-factor CFA model

Index	Specified sample size		
	Nominal N		N'
NFI	0.83		0.83
NNFI	0.84		0.84
CFI	0.85		0.85
RMSR		0.042	
Chi-squared (d.f.)		25195.9 (3103)	

inappropriate for model assessment (although quoted here for completeness). Instead we used the Bentler–Bonnett normal fit index (NFI), the non-normal fit index (NNFI) and the comparative fit index (CFI), all of which are thought to reflect fit relatively well regardless of the sample size. In addition we also examined the RMSR (root mean square [standardized] residual), which represents the average absolute value by which the observed sample variances and covariances differ from those predicted by the model.

A value of RMSR below 0.05 is regarded as evidence that the model predicts the observed covariances among items very well. Our results therefore suggest that the proposed model provides an adequate explanation of the relationships in the data. Values of NFI, NNFI, and CFI above 0.9 are usually considered indicative of a good fit. Our statistics fall short of this recognized level. However, it is widely accepted that achieving high levels of fit with large numbers of items is difficult or even impossible (e.g., Floyd & Widaman, 1995). In our case, limitations on the overall level of fit are due not only to the large number of items but also to the specification of the factor model. Even though questions were worded and subsequently selected to be unidimensional, facets of climate are non-independent by nature, so success in confirming factor structure will always be limited by restricting items to load on just one factor (when there are 16 possible others). Moreover, the items were randomly arranged in the questionnaire, which may have contributed to more response overlap. One final, but important, point relates to this observation. Researchers are unlikely to wish to use the whole OCM in a single study, especially where their use of the measure is focused by the appropriate use of theory. They will be more likely to focus on the use of scales from one quadrant of the Competing Values model. For example, researchers examining innovation are more likely to focus on scales from the Open Systems quadrant, whereas those interested in people management issues may focus only on scales in the Human Relations quadrant. Where the focus is thus defined, the fit of items to subscales within quadrants is more convincing. Climate scales which are likely to map onto the Competing Values quadrants are:

- *Human Relations*—comprising, Involvement, Autonomy, Supervisory Support, Integration, Welfare, Training, and Effort;
- *Internal Process*—Formalization and Tradition;
- *Open Systems*—Reflexivity, Innovation & Flexibility, and Outward Focus;
- *Rational Goal*—Clarity of Organizational Goals, Pressure to Produce, Quality, Performance Feedback, and Efficiency.

Confirmatory factor analyses for each of these four proposed models on the second 50 per cent of cases yielded the sets of fit indices shown in Table 3.

We do not predict or expect there necessarily to be a high level of intercorrelation between scales within quadrants, thus producing a second-order factor structure mapped on to the four quadrants. When we incorporated all scales into one CFA and tested for four underlying constructs, there was

Table 3. Fit indices for the four competing values domains

Domains	Indices using nominal N or N'			
	NFI	NNFI	CFI	Chi-squared (d.f.)
Human relations	0.88	0.88	0.89	7372.4 (506)
Internal process	0.91	0.88	0.92	645.2 (26)
Open systems	0.93	0.92	0.93	1583.6 (101)
Rational goal	0.90	0.89	0.91	3053.8 (220)

no neat second-order factor structure mapping onto the four quadrants. The quadrants describe the organizational terrain; the model does not propose that organizations will have a set of practices that map on to all or most of these climate dimensions within one domain. In some organizations, a human relations orientation will be evidenced by supervisory support and an emphasis on employee welfare. In other organizations, a human relations orientation will be evidenced by an emphasis on employee involvement and autonomy. The one represents a 'patriarchal' approach to human relations; the other a more participative, democratic approach. There is no reason why we would necessarily expect them to be consistent. The same applies to the relationships between dimensions within the other three domains.

Generalizability

Throughout the analysis we have assumed that the same factor structure holds for each of several populations (e.g., management/non-management, shop floor/non-shop floor) and that all parameter values (i.e., correlations and regression weights) are roughly equal to those estimated across these subsamples. Since we intend the scales to be used at various levels within organizations, this assumption was tested for management/non-management and shop floor/non-shop floor. The results gave almost identical fit indices for the 17-factor model across all job types (these are shown in Table 4). There was no reason from these analyses to doubt that parameter estimates, or factor structures, would be any different between the two subsamples.

Consensual and discriminant validity

The scales have high face validity, because items were selected specifically to represent the constructs of interest, and because the analyses presented suggest factorially distinct scales relating to these

Table 4. Fit indices for the different subgroups

	Indices using nominal N or N'			
	NFI	NNFI	CFI	Chi-squared (d.f.)
Management	0.81	0.83	0.84	14885.7 (3103)
Non-management	0.85	0.85	0.86	32205.7 (3103)
Shopfloor	0.82	0.83	0.84	22525.7 (3103)
Non-shopfloor	0.81	0.84	0.84	20354.3 (3103)

Sample included 1656 managers and 5067 non-managers, and 3012 shopfloor workers and 2257 non-shopfloor workers.

constructs. The instrument should also demonstrate significant differences in employee perceptions across organizations if it is to be useful in discriminating between organizations. It should also produce data indicating reasonable consensus between employees within organizations. To determine the discriminant validity of the OCM, analyses of variance were performed using all the scales, with organizations as the independent variables. There were significant between-organization differences on all scales. F-values ranged from 5.21 (d.f. $= 53$) for Integration to 27.25 (d.f. $= 53$) for Pressure to Produce.

In order to assess the inter-rater reliability for each scale, the results of the one-way analysis of variance were converted to intra-class correlations (ICC) (Shrout & Fleiss, 1979) with the two versions commonly known as ICC(1) and ICC(2) (Bliese, 2000). These coefficients assess the ratio of variation within organizations to variation among organizations. Thus, high coefficients are related to small within-organization variance. Whereas ICC(1) assesses the reliability of a single rating (i.e., the reliability of one respondent's answers), ICC(2) assesses the reliability of a mean rating (or an aggregated score). The ICC(1) values for the dimensions in this study are between 0.04 and 0.22, with an average of 0.16, and are within the range reported by previous studies.

Within the literature there are few guidelines for appropriate values of ICC(1). However, a review by James (1982) found values ranging from 0 to 0.50, with 0.12 as the median, and Bliese (2000) wrote that, in his experience, values typically range between 0.05 and 0.20. Also he reported that he had never encountered values higher than 0.30 and would be surprised to find values greater than this in most applied field research. Compared with these, the values in this study appear reasonable. Bliese also suggests that values of ICC(2) above 0.70 should be considered acceptable—all the values here are above 0.75, with all but two at least 0.89, demonstrating excellent inter-rater reliability in these scales. The scales demonstrating highest coefficients are Pressure to Produce, Quality, and Efficiency, and those with lowest coefficients are Integration and Reflexivity, with $p < 0.001$ for all scales. These are shown in Table 5.

As critics have argued that the intra-class coefficient is a measure of consistency and not agreement (Shrout & Fleiss, 1979; James, 1982) a further agreement index was utilized. The within-group agreement index of multiple item scales developed by James, Demaree, and Wolf (1984, 1993) is a

Table 5. Reliability and agreement of scales

Scale	Internal consistency (Cronbach's alpha)	ICC(1)	ICC(2)	Average agreement ($r_{WG(j)}$)
Autonomy	0.67	0.08	0.89	0.84
Integration	0.86	0.08	0.79	0.82
Involvement	0.87	0.12	0.93	0.80
Supervisory Support	0.88	0.10	0.92	0.83
Training	0.83	0.10	0.91	0.69
Welfare	0.91	0.17	0.95	0.77
Formalization	0.77	0.12	0.93	0.81
Tradition	0.73	0.15	0.94	0.77
Innov. & Flexibility	0.86	0.12	0.93	0.83
Outward Focus	0.83	0.17	0.90	0.85
Reflexivity	0.76	0.06	0.75	0.85
Clarity of Org. goals	0.87	0.12	0.93	0.76
Efficiency	0.80	0.23	0.97	0.79
Effort	0.79	0.12	0.93	0.85
Perform. Feedback	0.78	0.10	0.91	0.75
Pressure to Produce	0.79	0.22	0.96	0.83
Quality	0.80	0.22	0.96	0.84

technique for assessing agreement among the judgments made on a single variable in regard to a single target. It is therefore an appropriate measure to use when testing climate perceptions within an organizational unit. Agreement ranged from 0.69 to 0.85. Scales which yielded high indices included Outward Focus, Reflexivity, Effort, Quality, and Autonomy, and the scale which produced the lowest index was Training (a mean index of 0.69). A value of 0.7 or above has been suggested as the cut-off point to indicate within-group inter-rater agreement (James, 1982). This is consistent with the values suggested by Nunnally (1978) for acceptable internal consistency reliability estimates in this type of research. Organizational climate agreement indices produced a median of 0.87 in a study by Ostroff (1993). All agreement indices suggested a sufficient level of agreement between raters within organizations, except for training, and this was very close to the recommended level. Full results can be seen in Table 5.

Concurrent validity

The development of the OCM was undertaken as part of a wider longitudinal study examining relationships between management practices, organizational climate, employee attitudes, and company economic performance (West, Patterson, Pillinger, & Nickell, 1998). As indicated above, in addition to conducting climate surveys, researchers spent a minimum of one day in each company conducting semi-structured interviews with senior management about a range of company practices such as competitive strategies, organizational structure, quality practices, and human resource management issues. The interviews were conducted with the person primarily responsible for the practice in question (e.g., the chief executive for competitive strategy, the HRM director for training). Evidence from each interviewee was cross-checked with additional information from company documents and a tour of the manufacturing facility.

The interviewers' ratings (which were made before the climate surveys were carried out) provided rich data for determining the concurrent validity of the climate dimensions. As the data were not collected from the respondents who completed the climate questionnaires, the correlations were not inflated by common method variance. The following section describes the correlations between the climate scales and aspects of the interview data relating to associated areas of organizational functioning. All correlations are shown in Table 6.

Human Relations quadrant

Strong support for the concurrent validity of the Training scale was provided by a significant association with interviewer ratings of the sophistication of company training practices ($r = 0.52$, $p < 0.01$). Also, the Autonomy dimension was significantly correlated with the level of responsibility inherent in people's jobs, as rated by interviewers ($r = 0.46$, $p < 0.01$). The Integration scale was positively correlated with the use of problem solving and cross-functional teams ($r = 0.54$, $p < 0.01$) and interviewers' ratings of the extent to which a total quality culture had been implemented ($r = 0.40$, $p < 0.01$). Both of these practices can help break down functional barriers.

Involvement was positively related to interviewers' ratings of the coherence and coverage of the appraisal system ($r = 0.34$, $p < 0.05$). Such a relationship would be expected, since appraisal offers a formal opportunity for discussion between management and staff of objectives, strategies, and processes in the individual's work. Similarly, company scores on the Welfare scale were related to interviewers' ratings of the extent of harmonized terms and conditions ($r = 0.34$, $p < 0.05$) and the level of benefits offered to employees ($r = 0.55$, $p < 0.01$).

Table 6. Correlations of climate scales with similar variables from management interviews

	Training	Operator responsibility	Use of cross-functional teams	Total quality culture	Appraisal	Harmonization	Level of benefits	Comm'n to workforce	Age of org.	Eff'ness of market research
Autonomy	0.28	0.46	0.16	0.12	0.16	0.19	−0.02	0.14	−0.01	−0.18
Integration	0.27	0.15	0.54	0.40	0.08	−0.04	0.55	0.51	−0.18	0.11
Involvement	0.42	0.24	0.11	0.11	0.34	0.24	0.16	−0.02	−0.06	0.06
Supervisory Support	0.06	−0.08	0.40	0.21	0.15	−0.01	0.26	0.26	−0.09	0.03
Training	0.52	0.20	0.48	0.44	0.19	0.29	0.47	0.58	−0.21	0.41
Welfare	0.45	0.07	0.38	0.22	0.28	0.34	0.55	0.38	−0.18	0.16
Formalization	0.23	−0.34	0.39	0.41	0.22	0.12	0.33	0.35	−0.07	0.31
Tradition	−0.42	−0.12	−0.45	−0.36	−0.30	−0.15	−0.64	−0.51	0.08	−0.21
Innov. & Flexibility	0.28	0.20	0.44	0.31	0.20	0.19	0.54	0.50	−0.34	0.05
Outward Focus	0.29	−0.25	0.40	0.37	0.13	0.03	0.62	0.45	0.03	0.46
Reflexivity	0.43	0.22	0.47	0.37	0.35	0.15	0.57	0.56	0.03	0.20
Clarity of Org. goals	0.49	0.10	0.41	0.41	0.43	0.20	0.55	0.61	0.13	0.21
Efficiency	0.16	0.06	0.54	0.28	0.18	0.22	0.44	0.44	−0.14	0.07
Effort	0.12	−0.23	0.46	0.25	0.06	−0.01	0.25	0.33	0.01	0.18
Perform. Feedback	0.43	0.00	0.56	0.42	0.48	0.19	0.49	0.58	0.20	0.18
Pressure to Produce	−0.12	−0.25	0.03	0.02	−0.07	−0.18	−0.22	−0.01	0.25	0.05
Quality	0.24	−0.35	0.27	0.17	0.11	−0.06	0.49	0.35	−0.04	0.33

$p < 0.05$ for correlations of 0.28 or more; $p < 0.01$ for correlations of 0.38 for more.

Internal Process quadrant

The Formalization scale, assessing the degree to which employees perceive the company as relying on formal rules and procedures, was negatively associated with interviewers' ratings of employee responsibility ($r = -0.34$, $p < 0.05$). The Tradition scale was negatively related to adoption of a number of management practices associated with the 'new manufacturing paradigm' (Dean & Snell, 1991); sophisticated training practices ($r = -0.42$, $p < 0.01$); use of appraisals ($r = -0.30$, $p < 0.05$); a total quality culture ($r = -0.36$, $p < 0.05$), use of cross-functional teams ($r = -0.45$, $p < 0.01$), and frequent and comprehensive communication to the workforce ($r = -0.51$, $p < 0.01$).

Open Systems quadrant

In older companies systems and patterns of behavior tend to become institutionalized, acting as a source of organizational inertia. This inertia sets limitations on the ability of organizations to adapt (Hannan & Freeman, 1977). Therefore the negative relationship between company age and the Innovation & Flexibility scale provided some validation for this scale ($r = -0.34$, $p < 0.05$). The Outward Focus dimension correlated positively with managers' rated effectiveness of their company's market research activities ($r = 0.46$, $p < 0.01$).

Rational Goal quadrant

The goal clarity and the feedback scales showed associations with closely related management practices. The Clarity of Organizational Goals scale was positively related to interviewers' ratings of the frequency and comprehensiveness of communication to the workforce ($r = 0.61$, $p < 0.01$), and Performance Feedback was associated with the coherence and coverage of the appraisal system ($r = 0.48$, $p < 0.01$), and effective communication ($r = -0.58$, $p < 0.01$).

The Quality dimension was not significantly associated with interviewers' ratings of the effectiveness of company quality procedures. With this notable exception, overall, the associations between the climate dimensions and closely related management practices assessed by interviews with senior management indicate good concurrent validity.

Predictive validity

Approximately one year after the collection of climate data, the managing director or head of production operations of each company completed a survey relating to organizational innovation in the areas of products, production technology, and work organization. Researchers rated responses on a 5-point scale, from 1 'not at all innovative' to 5 'very innovative.' These ratings were based on the extent of innovation in relation to new products, adaptations of existing products, effects on production processes, and numbers of staff affected by the innovations. Questionnaires were rated by three researchers to check the reliability of the ratings. We examined whether the Innovation & Flexibility and Reflexivity climate scores provided by employees were associated with researcher ratings of organizational innovation one year later. The Innovation & Flexibility and Reflexivity scales were significantly associated with researchers' ratings of innovativeness in products ($r = 0.53$, $p < 0.01$; $r = 0.41$, $p < 0.01$ respectively), technology ($r = 0.44$, $p < 0.01$; $r = 0.31$, $p < 0.01$), and work organization ($r = 0.36$, $p < 0.01$; $r = 0.39$, $p < 0.01$).

We were also able to investigate the predictive validity of the measure of organizational climate in relation to organizational productivity. Productivity data (logarithm of financial value of net sale per employee) for 42 companies from our sample were collected from company accounts lodged in Companies House (the central repository for the compulsory submission of annual accounts made by every limited company in the UK). Subsequent productivity (collected one year after the climate survey) was significantly correlated in controlled analyses with eight aspects of organizational climate (training, welfare, supervisory support, effort, innovation and flexibility, quality, performance feedback, and formalization). For a detailed report of these findings see Patterson et al. (2004).

Discussion

The OCM was developed and tested with a large sample of employees drawn from 55 manufacturing organizations. The results revealed that the instrument has sound psychometric properties and provides researchers with a robust means for assessing 17 dimensions of employee perceptions of their work environments. Moreover, the internal reliability of the scales was acceptable in almost all cases and good in many.

Uniquely, we were able to assess the concurrent and predictive validity of many of the scales drawing on intensive interviews conducted with managers in the 55 organizations; upon interviewer ratings of dimensions of company functioning such as innovative orientation, sophistication and extent of human resource management practices, richness and responsibility of front line jobs; and on productivity and innovation data.

The measure also discriminated effectively between organizations, demonstrating good discriminant validity. Agreement between raters (employees) within organizations was high, showing that the measure satisfied the conditions for aggregation of perceptions of employees. The fact that the measure does effectively discriminate between organizations is important, since it suggests that variations in climate can reliably be reflected in the data gathered using this instrument. Studies of organizational-level factors and relationships with climate can therefore be embarked upon with a high degree of confidence, especially where researchers have identified, a priori, organizations which are likely to differ in characteristics under study, and which can be related to climate (e.g., economic performance, innovation, employee commitment).

We did not predict nor find a second-order factor structure mapping on to the four quadrants of the Competing Values model. The Competing Values model proposes that organizations span all four quadrants, having a greater or lesser degree of emphasis across all four, rather than fitting into one or other. The model specifically rejects a typological approach, arguing that understanding of organizations should be based on the relative emphasis they give to each of the competing values. Forcing them into one or other quadrant would misrepresent their inherent span of activity and experience and of those who work within them. Employees experience control, flexibility, and internal and external focus in their organizations. It is the degree of emphasis and associated types of managerial practices (effectively the application of managerial ideologies) that is of interest to climate researchers.

Similarly, we would not expect that organizations would have a high degree of emphasis on every or even most dimensions of climate within a quadrant. For two organizations with strong human relations orientations we might find that one emphasizes supervisory support but not autonomy, while another might emphasize training but not involvement. The Competing Values model provides a topography of organizational climate—it does not propose that organizations characterized by a strong human relations orientation will have high scores on every or most dimensions within that quadrant.

The OCM was developed from a theoretical base, the Competing Values model, itself reflecting considerable prior theoretical development. By basing the measure on underlying conceptual bases in the organizational sciences, we aimed to provide a measure which would be useful for a broad range of research interests, enabling researchers to test central theoretical propositions about relationships, such as those between climate and organizational effectiveness. The measure consequently offers a number of unique advantages.

First it is relatively comprehensive, offering researchers the advantage of being able to assess employees' experience over many fundamental dimensions of climate. It is unlikely that most researchers will wish to apply all 17 scales of the OCM in their research since the logistics of administering the questionnaires, and analyzing the resultant data sets, are likely to prove too cumbersome. Moreover, it might suggest a lack of theoretical focus. Indeed, the instrument can be used in a more refined way by selecting scales most applicable to the research questions being posed. This might require the use of only one or two scales, such as those tapping innovation orientation or traditionalism. Alternatively, whole domains might be assessed by using all scales in one quadrant (e.g., all seven scales in the Human Relations domain). The wider applicability of the scales in this regard has been demonstrated by our application of them in a service setting, where we have demonstrated factorial invariance, reliability, and validity of 12 of the scales in their use amongst 5000 employees in 27 hospitals in the United Kingdom (Hill, West, Patterson, & Borrill, 1997).

The measure can be used to study mergers and acquisitions since it will provide an indication of the similarity or difference between organizational climates or value emphasis before and after merger (are they similar in terms of emphases and in which quadrants of the model?). Similarly, it can be applied to studies of organizational change and specifically culture change to determine the effects on employees' experience of change. It is possible, for example, to determine whether most change occurs in scales in the open systems or internal process quadrants. Are the intended consequences of the change (a more human relations-oriented organization for example) borne out by the results of the application of the measure? The measure can also be used to assess differences between subcultures in large organizations. Moreover, researchers can examine organizational change processes generally to determine trends over time—are most organizational changes focused on internal process, open systems, rational goal or human relations values?

The measure's development also opens up possibilities for testing theory. Quinn proposed that strong emphasis across all four domains (climate strength) would be associated with organizational effectiveness and the measure can be employed to test this prediction. Moreover, it enables testing of other ideas about climate strength (where all or most climate dimensions within a quadrant intercorrelate highly) as a predictor of organizational outcomes. The alternative conception of strong climates (where organizational members agree in their climate ratings) and how this relates to organizational outcomes can also be tested. Furthermore, because the measure is based on the four value domains, researchers can both develop and test theory about the relationship between specific climate dimensions in or across quadrants and a broad range of outcomes (e.g., turnover, productivity, accidents, citizenship, and innovation).

The research also suggested some gaps in both the model and the measure. The body of work on organizational ethics (e.g., Trevino & Weaver, 1994; Victor & Cullen, 1988) and governance (e.g.,Wood, 1994) is not reflected in the Competing Values model. Values that emphasize ethics apply to all four quadrants. Specifically, we believe that the Competing Values model neglects dimensions that are common to or span all four areas of values or emphases. Ethics is an issue in all areas. The model, we propose, should incorporate a central (Venn diagram-like) component that integrates common elements such as an emphasis on ethical practice and policy. We see this as an area for future theoretical and psychometric development. Finally, it is important that the measure is applied across a variety of organizational types and in a variety of national contexts.

In conclusion, we hope researchers find this measure useful in their research and that we are able to more easily accumulate understanding about the role of climate in organizational functioning.

Author biographies

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Appendix

Organizational Climate Measure©

The Organizational Climate Measure (OCM) consists of 17 scales, divided in to four quadrants: human relations, internal process, open systems, and rational goal. Items marked with an asterisk (*) are reversed before the scale is calculated. Regression weights quoted are from the confirmatory factor analysis on the second 50 per cent of the data; all are highly statistically significant.

The response scale is: 1 = 'Definitely false', 2 = 'Mostly false', 3 = 'Mostly true', 4 = 'Definitely true'.

Item	Regression weight
Autonomy	
Management let people make their own decisions much of the time	0.585
Management trust people to take work-related decisions without getting permission first	0.556
People at the top tightly control the work of those below them*	0.528
Management keep too tight a reign on the way things are done around here*	0.516
It's important to check things first with the boss before taking a decision*	0.513
Integration	
People are suspicious of other departments*	0.699
There is very little conflict between departments here	0.719
People in different departments are prepared to share information	0.719
Collaboration between departments is very effective	0.728
There is very little respect between some of the departments here*	0.766

Continues

Appendix. Continued

Item	Regression weight
Involvement	
Management involve people when decisions are made that affect them	0.633
Changes are made without talking to the people involved in them*	0.752
People don't have any say in decisions which affect their work*	0.739
People feel decisions are frequently made over their heads*	0.738
Information is widely shared	0.695
There are often breakdowns in communication here*	0.744
Supervisory Support	
Supervisors here are really good at understanding peoples' problems	0.749
Supervisors show that they have confidence in those they manage	0.712
Supervisors here are friendly and easy to approach	0.715
Supervisors can be relied upon to give good guidance to people	0.807
Supervisors show an understanding of the people who work for them	0.851
Training	
People are not properly trained when there is a new machine or bit of equipment*	0.765
People receive enough training when it comes to using new equipment	0.804
The company only gives people the minimum amount of training they need to do their job*	0.741
People are strongly encouraged to develop their skills	0.649
Welfare	
This company pays little attention to the interests of employees*	0.729
This company tries to look after its employees	0.907
This company cares about its employees	0.918
This company tries to be fair in its actions towards employees	0.823
Formalization	
It is considered extremely important here to follow the rules	0.676
People can ignore formal procedures and rules if it helps get the job done*	0.640
Everything has to be done by the book	0.591
Its not necessary to follow procedures to the letter around here*	0.650
Nobody gets too upset if people break the rules around here*	0.581
Tradition	
Senior management like to keep to established, traditional ways of doing things	0.688
The way this organization does things has never changed very much	0.469
Management are not interested in trying out new ideas	0.645
Changes in the way things are done here happen very slowly	0.714
Innovation & Flexibility	
New ideas are readily accepted here	0.715
This company is quick to respond when changes need to be made	0.702
Management here are quick to spot the need to do things differently	0.701
This organization is very flexible; it can quickly change procedures to meet new conditions and solve problems as they arise	0.702
Assistance in developing new ideas is readily available	0.682
People in this organization are always searching for new ways of looking at problems	0.716
Outward Focus	
This organization is quite inward looking; it does not concern itself with what is happening in the market place*	0.774
Ways of improving service to the customer are not given much thought*	0.677
Customer needs are not considered top priority here*	0.767
This company is slow to respond to the needs of the customer*	0.652
This organization is continually looking for new opportunities in the market place	0.588

Appendix. Continued

Item	Regression weight
Reflexivity	
In this organization, the way people work together is readily changed in order to improve performance	0.551
The methods used by this organization to get the job done are often discussed	0.747
There are regular discussions as to whether people in the organization are working effectively together	0.664
In this organization, objectives are modified in light of changing circumstances	0.482
In this organization, time is taken to review organizational objectives	0.707
Clarity of Organizational Goals	
People have a good understanding of what the organization is trying to do	0.664
The future direction of the company is clearly communicated to everyone	0.795
People aren't clear about the aims of the company*	0.659
Everyone who works here is well aware of the long-term plans and direction of this company	0.842
There is a strong sense of where the company is going	0.839
Efficiency	
Time and money could be saved if work were better organized*	0.768
Things could be done much more efficiently, if people stopped to think*	0.605
Poor scheduling and planning often result in targets not being met*	0.657
Productivity could be improved if jobs were organized and planned better*	0.829
Effort	
People here always want to perform to the best of their ability	0.660
People are enthusiastic about their work	0.692
People here get by with doing as little as possible*	0.604
People are prepared to make a special effort to do a good job	0.688
People here don't put more effort into their work than they have to*	0.637
Performance Feedback	
People usually receive feedback on the quality of work they have done	0.639
People don't have any idea how well they are doing their job*	0.629
In general, it is hard for someone to measure the quality of their performance*	0.635
People's performance is measured on a regular basis	0.629
The way people do their jobs is rarely assessed*	0.702
Pressure to Produce	
People are expected to do too much in a day	0.583
In general, peoples' workloads are not particularly demanding*	0.647
Management require people to work extremely hard	0.722
People here are under pressure to meet targets	0.585
The pace of work here is pretty relaxed*	0.672
Quality	
This company is always looking to achieve the highest standards of quality	0.791
Quality is taken very seriously here	0.811
People believe the company's success depends on high-quality work	0.649
This company does not have much of a reputation for top-quality products*	0.592

Quadrant	Scales
Human Relations	Autonomy
	Integration
	Involvement
	Supervisory Support
	Training

Appendix. Continued

Quadrant	Scales
	Welfare
Internal Process	Formalization
	Tradition
Open Systems	Innovation & Flexibility
	Outward Focus
	Reflexivity
Rational Goal	Clarity of Organizational Goals
	Efficiency
	Effort
	Performance Feedback
	Pressure to Produce
	Quality

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