Quality Management, Job-related Contentment and Performance: an empirical analysis of British workplaces

Lilian M. de Menezes

Cass Business School, City University London, UK.

Stephen J. Wood

Leicester University, UK

Contact details

Lilian M. de Menezes, Faculty of Management, Cass Business School, 106 Bunhill Row, London EC1Y 8TZ, UK.

Phone: +44 (0)20 7040 8359; Fax: +44 (0)20 7040 8328; Email: l.demenezes@city.ac.uk

Stephen Wood, School of Management, University of Leicester, Ken Edwards Building, Leicester LE1 7RH, UK.
Phone: +44 (0)116 223 1869; Email: s.j.wood@leicester.ac.uk

Acknowledgements

We thank Melina Dritsaki and Ellen Farleigh for their help with the data preparation for this study. The UK's Economic and Social Research Council funded this research. The empirical research is based on data from the 2004 Workplace Employment Relations Survey (WERS2004), a survey that is jointly sponsored by the UK's Department of Trade and Industry, the Advisory, Conciliation and Arbitration Service, the Economic and Social Research Council, and the Policy Studies Institute. The National Centre for Social Research was commissioned to conduct the survey fieldwork on behalf of the sponsors. WERS2004 is deposited at the Data Archive at the University of Essex, UK. Neither the sponsors nor the Data Archive bear any responsibility for the analysis or interpretation of the material contained in this paper.

Lilian M. de Menezes is Professor of Decision Sciences at Cass Business School, City University London, which she joined in 2002. Her research contributions range from studies of the changing world of work to the development of forecasting and statistical methodology, and publications include articles in *European Journal of Operational Research, Human Relations, International Journal of Forecasting, International Journal of Human Resource Management, International Journal of Production and Operations Management, Journal of Operations Management, Journal of the Royal Statistical Society and Neural Networks.*

Stephen Wood is Professor of Management and Director of Research Income and Enterprise in the School of Management, University of Leicester. He joined the School in April 2010 from the University of Sheffield, where he was Deputy Director and Research Chair at the Institute of Work Psychology and was a Co-Director of the Economic and Social Research Council Centre for Organisation and Innovation. Recent publications include articles in *Journal of Occupational Health Psychology, Journal of Management, Journal of Business Ethics, Journal of Operations Management* and *Human Relations.*

Quality Management, Job-related Contentment and Performance: an empirical analysis of British workplaces

Abstract

Purpose - This article investigates whether a quality management philosophy underlies the joint use of operations and human resource management practices, and the relationships with job-related contentment and performance.

Design/ methodology/approach - Data from an economy-wide survey is used to test hypotheses via latent variable analyses (latent trait and latent class models) and structural equation models. The sensitivity of each path is then assessed using regression models.

Findings – Different elements rather than a unified philosophy are identified. A managerial approach that integrates total quality management and just-in-time procedures is rare, but is associated with the quality of the product or service delivered. Labor productivity and quality are independent of the level of job-related contentment in the workplace. Although the average workforce is content, high involvement management and motivational support practices are associated with job anxiety. On the positive side, job enrichment is linked to labor productivity, thus suggesting potential gains through job design.

Originality/value - The study adds evidence from a national sample about a comprehensive range of management practices, and suggests distinct outcomes from different elements of quality management. Additionally, it shows that performance expectations based on previous studies may not hold in large nationwide heterogeneous samples.

Keywords - quality management; performance; anxiety-contentment; latent variable, path and regression models.

Classification - research paper

Introduction

Quality management focuses on continuous improvement of all functions within an organization and aims to meet or even exceed customer requirements (Deming, 2000; Juran 1993; Martinez-Lorente *et al*., 1998; Molina-Azorin, Tari *et al.*, 2009). Its principles, which can be traced back to 1949 (Powell, 1995), have since spread beyond manufacturing to services (Abernathy *et al*, 2000) and healthcare (Kollberg *et al.*, 2007). Quality management principles have also been translated into criteria for business excellence models. An example is the Baldrige Award, whose focus changed from product quality to overall organization competitiveness and sustainability, as highlighted in its criteria: leadership, strategic planning, customer focus, measurement, analysis and knowledge management, workforce management, and process management.

Quality management (QM) is not only cross-functional but, most importantly, is an integrated approach for firm-wide management (Sadikoglu and Zehir, 2010) that encompasses human resource management (Flynn *et al.*, 1995). As Schroeder *et al.* (2005) argued, the human issues in QM are of increasing interest, as highlighted in studies that show employee performance to mediate the link between QM practices and firm performance (Sadikoglu and Zehir, 2010), or empowerment and teamwork to be associated with productivity (Birdi *et al.*, 2008). Nonetheless, such findings may not be universal, and negative or insignificant correlations between QM and performance have also been reported (e.g. Kannan and Tan, 2005; Prajogo and Sohal, 2004; Rahman and Bullock, 2005; Yang *et al.*, 2009). Furthermore, the success of QM can be at the expense of employees (Green, 2006), though empirical evidence on the effects of QM on employees remains scarce (Sadikoglu and Zehir, 2010). All in all, there is need for assessing the relationships between QM, performance and employee outcomes within the wider economy.

This study investigates the associations between human resource and operation management (HRM & OM) practices that have been linked to QM and the relationship with

job-related contentment, labor productivity and product/service quality. The Workplace Employment Relations Survey of 2004 (WERS2004), an economy-wide sample of 2295 British workplaces that relies on responses from managers and employees, is used. A comprehensive set of HRM practices are included, which are known to support process management (Appelbaum *et al.,* 2000; Wickens, 1987). These are aimed at: job enrichment by providing employees discretion over how they perform their jobs (task variety, method control, timing control); fostering direct participation by involving workers (teamwork, functional flexibility, quality circles, suggestion schemes, teambriefing, induction, training in human relations skills, information disclosure, appraisal), and motivating workers (survey feedback, priority given to internal recruitment, motivation as a selection criterion, job security guarantees, single status, variable pay). The OM practices in the dataset are: training in quality, training in problem solving, self-inspection of quality, keeping records of faults or complaints, keeping records on quality customer surveying, quality targets, customer service targets, team briefings that involve quality, and just-in-time procedures (JIT). Employee and workplace data are matched so that the level of job-related contentment in each workplace is measured through a well-tested psychological scale, "anxiety-contentment", which was developed by Warr (1990).

Background and Hypotheses

An Integrated Quality Management

QM is a managerial philosophy that should be reflected in an organization's adoption of integrated managerial systems that are aimed at higher quality, customer satisfaction and performance (Bou and Beltran, 2005; Kaynak, 2003). Consequently, there ought to be some positive association in the use of QM-related OM and HRM practices: all or least a core set should be used in association with each other (Shah and Ward, 2007), and this association would reflect the underlying quality management philosophy in the organization. In

statistical terms, this means that the correlation in practice use is explained by a common factor (latent variable). Therefore,

Hypothesis 1: There is correlation in the use of HRM and OM practices, and this correlation stems from a common factor that underlies a QM philosophy.

Few authors have modeled the correlation in the adoption of different types of management practices. Callen *et al.* (2003), in their study of the risk–profitability trade-off of JIT manufacturing, used principal component analysis to develop their measure. Fullerton *et al.*, (2003) used factor analysis and found three QM factors underlying ten practices. Similarly, de Menezes and Wood (2006) found that six TQM and nine HRM practices loaded on a single factor, but found JIT to be a separate element. Shah and Ward (2007) factor analyzed 48 management practices, of which 41 loaded on 10 factors that were distinct but also highly interrelated; practices were subsequently grouped into three areas: supplier-related, customer-related and internally-related. According to the authors, each area would be positively associated with organizational performance, and their joint implementation would result in sustainable competitive advantage.

To date, most empirical studies suggest multiple QM factors, but there are at least two exceptions. De Menezes *et al.* (2010) identified a discrete factor (ordered latent classes), using data from a sample of UK manufacturing firms that covered a period of 23 years, and Sadikoglu and Zehir (2010) found a continuous factor in a multi-industry cross-sectional sample. Both samples comprised less than 400 firms and up to 8 management practices and it may be that focus on small sets of management practices might have facilitated the identification of a single QM factor. Investigations of wider representative samples are then important, especially as “quality management is often linked to higher performance” (Levine and Toffel, 2010: 978).

QM and Organizational Performance

Although there have been many claims of a positive link between individual QM related management practices and different measures of organizational performance (e.g. Challis *et al*., 2002; Cua *et al.*, 2001; Kaynak, 2003; Kaynak and Hartley, 2005; Douglas and Judge, 2001; Escrig *et al.*, 2001; Narasimhan *et al.*, 2004; Samson and Terziovski, 1999; Shah and Ward, 2003), reviews of the QM - organizational performance nexus tend to be mixed (e.g. Powell, 1995; Reed *et al.*, 1996). Not surprisingly, some authors have concluded that any link between QM and performance remains to be established (e.g. Callen *et al.*, 2000; Eriksson and Hansson, 2003; Fullerton *et al*., 2003; Hendriks and Singhal, 2001; Nahm *et al.*, 2003). As a whole, the empirical evidence on the association with performance tends to be based on a small number of management practices, though recently their measurements have broadened (Levine and Toffel, 2010), few studies have actually addressed QM as an integrated approach, i.e.:

Hypothesis 2: Quality management is positively associated with workplace performance.

In the analysis that follows, if Hypothesis 1 is rejected and distinct elements of QM are found, we will then consider the association between each element and performance. The association with financial performance has been subject of a debate (Fullerton and Wempe, 2008; Sadikoglu and Zehir, 2010), since it may not be captured in the short term and is likely to depend on previous financial performance and be mediated by non-financial performance (e.g. product or service quality, customer satisfaction). An investigation of the relationship with financial performance would therefore require longitudinal data. Hence, this study focuses on direct and indirect associations with labor productivity and product/service quality, which are more likely to reflect the QM practices that are in use.

The importance of HRM in QM has been justified on grounds that motivation needs to be high so that workers will apply their knowledge and skills through discretionary effort. There is strong empirical support for the positive role of HRM (e.g. Akdere, 2009; Flynn *et*

al. 1995; MacDuffie, 1995; Nair, 2006; Sila and Ebrahimpour, 2005). In fact, when measuring QM as multiple elements, some authors concluded that HRM was the key element for firm performance (e.g. Bou and Beltran, 2005; Merino-Diaz De Cerio, 2003; Rahman and Bullock, 2005).

HRM in Quality Management

Direct employee participation has been advocated as a means of influencing performance and worker well-being (Humphrey *et al.*, 2007; Parker and Wall, 1998; Perdomo-Ortiz *et al.*, 2009). QM can be a source of more challenging work or an opportunity for greater job control. Klein (1991:36) argued that, although process controls might limit discretion over pace and work methods, they can generate different routes for employee involvement. In other words, OM practices that reduce waste and increase efficiency may imply that work processes are better organized and therefore less stressful; for example, Rungtusanatham (2001) showed that effective statistical process control created more enriched jobs for operators and resulted in higher levels of motivation and job satisfaction. Having opportunities for problem solving has also been linked to well-being (e.g. Adler and Cole, 1993; Mullarkey *et al.*, 1995; Peterson, 1997 and better mental health (Makie *et al.*, 2001). There is further evidence of positive association with: employee morale (Vandenberg *et al.*, 1999), general health and safety (Lawler *et al.*, 1992; Levine and Toffel, 2010), employment growth and wage increases (Levine and Toffel, 2010). Moreover, the potential effects on workers may largely account for improvements in quality (Kathuria and Davis, 2001; Sadikoglu and Zehir, 2010), and descriptions of the value chain of HRM show management practices having direct impact on employee outcomes that are then linked to performance (e.g. Purcell and Kinnie 2007: 541). Consequently,

Hypothesis 3: The association between QM and workplace performance is mediated by job-related workforce contentment.

Hypotheses 2 and 3 can be summarized in a single model:

Figure 1

Some scholars, however, associate TQM, JIT and some HRM practices (e.g. functional flexibility, quality circles) with work intensification (Conti *et al.,* 2006; Green, 2006). High levels of self-monitoring have been associated with increasing role conflict and stress (e.g. Parker, 2003; Mehra and Schenkel, 2008; Victor *et al.,* 2000). In short, the potential effects of QM on workers' well-being are uncertain.If there are different elements, rather than a unified QM, each may have distinct associations with job-related contentment or performance (de Treville and Antonakis 2006; Jackson and Martin 1996). In which case, distinct patterns of association should be investigated.

The Empirical Study

The Data

This study uses WERS2004, whose data were collected during a period of economic stability in the UK, and as such the workplace and employee data should not be affected by the financial crisis of 2008 and the recession that followed. Two instruments were used in WERS2004. Firstly, an interview with a senior manager at the workplace with day-to-day responsibility for employee relations or personnel matters, from which the data on management practices and performance are extracted. Interviews were conducted in 2,295 workplaces from an in-scope sample of 3,587 addresses, representing a response rate of 64%. The sample covers the private and public sector and all industries, except for farms and private households with domestic staff (7% of all workplaces). Establishments with fewer than five employees (60% of all workplaces) are excluded. The sample was taken from the Inter Departmental Business Register, maintained by the Office of National Statistics. Secondly, an eight-page questionnaire was distributed to employees in 86% of the workplaces where the WERS2004 surveyors had conducted the management interview. From this survey of 22,451 employees (response rate of 61%), the information on job contentment is used.

The sample is not random, so one must apply the probability weights that are provided in the dataset, if wishing to obtain unbiased population estimates. Employee weights are to be used when making inferences about the population of employees in a workplace, and establishment weights when inferring about workplaces in Britain.

Measures

Table 1 describes the management practices and gives examples (second column) of studies where similar measures were defined. The practice data are binary variables, which indicate the availability of a management practice in each workplace. Of the OM practices, nine are related to TQM and one is a measure of JIT. The HRM practices can be classified into three types, as highlighted in Table 1. The first two are concerned with promoting direct employee participation. Job enrichment practices allow for jobs that give their holders discretion, job variety and high levels of responsibility. Whereas, high involvement management (Lawler, 1986) practices encourage employee participation through methods that extend beyond the narrow confines of the job profile, and as such have also been associated with the high commitment management (Walton, 1985). Motivational support practices, though perceived as important for QM (de Treville and Antonakis, 2006), have also been found to be distinct from high involvement management (de Menezes and Wood, 2006). On one hand, they may be the little extra that, as described in Akerlof's (1982) gift exchange model, will motivate employees to perform above normal standards. On the other hand, HRM and industrial relations specialists (e.g. Beer *et al.,* 1984) argue that motivational support practices can discriminate or isolate individuals rather than foster teamwork. Together these three types of practices are expected to give employees the latitude, information, skills and motivation so that an organization's workforce becomes a source of its competitive advantage (Guthrie, 2001).

- Table 1-

The measures of labor productivity and quality in the workplace are assessments made by the managerial respondent on five-point scales that compare their workplace with others in the same industry. The scales range from 1 (“a lot below average”) (to 5 (“a lot better than average”), with average performance being equal to 3. These are subjective performance measures, which have been matched to audited company-level performance data, and were found to be consistent in case of companies that are single sites (Forth and McNabb, 2006). This finding gives us some confidence in using these subjective assessments.

From the employee survey, we obtain the measure of job-related contentment based on a question that asked how often the job made the respondent feel: tense, worried, uneasy, content, calm, and relaxed (Warr, 1990). Responses were on a five- point scale ranging from “all of the time” to “never” and, when needed, were coded in reverse order so that a measure of contentment was constructed. The reliability of this measure, as assessed by Cronbach’s alpha, is 0.85, which is consistent with the range reported across studies (0.71 to 0.88) that used this measure in predominantly manufacturing companies (Mullarkey *et al.*, 1999: 63). At the workplace-level, we computed the weighted mean per workplace of each item, and estimated a factor that measures the extent to which the establishment has a contented workforce. Following James *et al.* (1984), an index of agreement that indicates whether aggregate employee-level variables are representative of a workplace was computed, per workplace, and its mean is equal to 0.8, which is greater than the standard threshold of 0.7.

Control variables are used when the sensitivity of each direct association is investigated, these are: industry sectors (11 dummy variables with manufacturing being used as the baseline), and whether the workplace is part of a large organization (a binary indicator that is equal to one if organizations have more than 50,000 employees).

Analysis Procedure

First, the measurement construct(s) are developed, while testing Hypothesis 1. Secondly, structural equation models are estimated to test for direct and indirect effects (Hypotheses 2 and 3) on labor productivity or quality. These models follow from Figure 1, and are estimated using the subsample of workplaces that have employee contentment data (n = 1732).). The whole sample is subsequently used to assess the sensitivity of direct associations with either labor productivity or quality. The procedures undertaken in each stage are as follows.

Testing Hypotheses 1 and Developing the Quality Management Construct(s)

The association in practice use is examined via Chi-square tests. If the correlation structure is highly significant, we test whether a one-factor model fits this structure. If it does, the factor scores will then measure the underlying QM philosophy. However, if a single factor does not fit the data, we investigate whether QM is multidimensional.

Given that we have binary indicators of practice use, a factor model for binary data is needed. We apply the logit-normit latent trait model (Bartholomew *et al.*, 2008: 213–216; de Menezes and Wood, 2006) which estimates continuous factors that are distributed as a standard normal. Yet, it may be that an underlying common factor is categorical, for we have no theoretical ground to assume a continuous scale. In this case, we estimate latent class models (McCutcheon, 1987; Kreuter *et al.*, 2008).

A standard assumption of latent variable models (e.g. factor and latent class analyses) is “local independence”, i.e. all the correlation between the input variables, in our case the practice use indicator, is explained by the latent variable (thus leading to the label “common factor”). The quality of fit is judged by standard goodness-of-fit statistics (e.g. log-likelihood ratio test statistic), as well as the fit to two- and three-way cross-tabulations known as “goodness of fit for margins” (Bartholomew *et al*., 2008: 219–220). As a rule, when assessing the fit to cross-tabulations, a residual value (goodness of fit for margins statistic) greater than

4 indicates a poor fit to that cell in the cross-tabulation at a 5% significance level. The presence of several large residuals indicates that local independence does not hold. In this case, if a variable is identified as the source of residual correlation, e.g. because it is included in all pairs with large residuals, it does not reflect a common factor; it should then be excluded from the model. When large residuals are a consequence of correlated subsets of variables, these may form a secondary factor, which should be estimated.

While estimating latent class models, one needs to decide how many classes best represent the data, by fitting up to K latent classes (where K is less than the number of practices considered). The quality of fit is assessed by standard goodness-of-fit (Chi-square) statistics, and model selection criteria (e.g. Akaike Information Criterion – AIC – or Bayesian Information Criterion – BIC) are used to choose the "best" model.

Faced with large residual correlations, rather than eliminating variables from the analysis, one may relax the assumption of local independence by adding linear restrictions to the model (Vermunt and Magidson, 2005: 24). In which case, clusters (classes) of workplaces that have the same likelihood of using practices and therefore a similar approach to management will be identified. However, such an approach will not reflect a common (latent) factor underlying practice use. Such a restricted latent class model is simply a clustering method that, in contrast to standard cluster analysis which relies on arbitrary distance metrics and subjective assessments of fit, is a statistical model that is estimated by a maximum likelihood procedure. Consequently, its goodness of fit can still be statistically tested.

We use the latent trait program of Bartholomew *et al.* (2008) when estimating binary factor models, and LatentGold4.0 (Vermunt and Magidson, 2005) for latent class analysis.

Assessing the relationship with a contented workforce and performance

After developing the QM construct(s), the models that follow from hypotheses 2 and 3 are estimated for each performance outcome (quality and labor productivity). A robust maximum likelihood procedure (MLR) in Mplus (Muthen and Muthen, 2008), which

allows for weights to be specified, is used to estimate the correlations and coefficients of all paths. Goodness-of-fit criteria, fit indices and P-values are computed, and we rely on these to evaluate the quality of fit and the significance of each association. The sensitivity of each model and the robustness of our findings are further investigated via weighted regression analyses (ordered–logit or least squares, depending on whether the dependent variable is ordinal or continuous), which are controlled for the size of organization and industry that the workplace is part.

Empirical Results

Hypothesis 1 and the Quality Management Construct(s)

Most associations between practices are significant at the 1% significance level, but between practices of different types are weak (correlation coefficients< 0.2). Chi-Square tests (5% significance level) indicate that the three job enrichment practices, job security and motivation as a selection criterion were used independently of the OM practices. We are unable to fit a one factor model to the entire set of data on practice use and therefore reject Hypothesis 1. A two-factor model explained less than 20% of the log-likelihood ratio statistic and most residuals to the two-way contingency table were greater than 4. So, we also have no evidence in support of HRM and OM as two pure factors (Bou and Beltran, 2005), and therefore focus on unveiling the distinct factors within OM and HRM practices.

Operations Management

OM practice-use indicators are positively and significantly associated at a 1% level, with the exception of training in problem solving and team briefings that involve discussions on quality or product services. Factor models of all OM practices did not fit the data (at most 47.92 % of the log-likelihood ratio was explained by a two-factor model). Latent class analysis suggests four distinct groups of workplaces, since model selection criteria improve until four classes, but become worse for larger numbers. An unrestricted four-class model has

a log-likelihood ratio statistic (L^2) that is high, when compared to its degrees of freedom (df), its P-value is equal to 0.004, and some residual correlations are very high. Four pairs of practices appear to be associated independently of the latent variable measured in this model: customer surveys and just-in-time procedures, customer surveys and client satisfaction targets, training in quality and training in problem solving, team briefing involving discussions on quality and just-in-time procedures. Hence, we let these pairs of indicators (of practice use) be linearly associated by constraining the model.

Table 2 shows the estimated parameters in this model. The fit is good: log-likelihood ratio statistic, L^2 equals 1032 (df=976; P-value= 0.1), the Cressie-Read statistic, which is a more robust measure of fit when data are relatively sparse, is equal to 1006.71 (976 df) with a P-value of 0.24. All associations are significant (Wald statistics' P-values=0). Of the four estimated correlations in OM practice-use, most are positive; the exception is the pair customer surveys and JIT.

-Table 2-

According to this model, there is no common factor responsible for the association in practice use, but simply four clusters (classes) of workplaces, within which the probability of using an OM practice is the same. Only those workplaces in the fourth class have probabilities of practice use that are greater than 50% (range: 53% to 62%) and thus are more likely to integrate JIT and TQM. As shown in the second and third rows of Table 2 (size), these workplaces correspond to 39% of the sample, but only 24% of the population of workplaces in Britain (of 2004). These estimates are consistent with the observed frequencies of practice use that are shown in Appendix 1.

It is noteworthy that a question in the management survey asked: "To what extent would you say that the demand for your (main) product or service depends upon you offering better quality than your competitors?" and responses were given in 5-point scale (does not depend at all – depends heavily). A cross-tabulation and Chi-square test (P-value=0.00)

showed that belonging to Class 4 is associated with a perceived demand for better quality. From now on, we will interpret membership of Class 4 as being indicative that a workplace is more likely to integrate TQM and JIT. That is, we measure the OM element in QM by a binary variable (TQM-JIT) that is equal to one if the workplace belongs to Class 4, and zero otherwise.

Human Resource Management

Chi-square tests showed the association between most of HRM practices to be significant at 1% level. However, some correlations are weak and the use of job enrichment practices appears to be distinct from using other HRM practices (Appendix 2). Two factors are identified, by fitting one-factor models to separate sets: (1) job enrichment, (2) high involvement management (flexible work organization and skill acquisition). The uses of motivational support practices are discrete from these factors and do not reflect another factor. Hence, they are treated separately.

The models of high involvement management and job enrichment are summarized in Table 3. The fit to cross-tabulations is satisfactory: number of pairs and triplets for which the residual statistic, $(O-E)^2/E$, was greater than the threshold are respectively 0 and 1, showing that there is very little divergence between observed frequencies (O) and expected (E) frequencies in two- and three-way cross-tabulations. In spite of its relatively high Alpha, method control, which is only available in 20% of workplaces, is unlikely to be adopted by the average workplace in the data – the estimated probability of use at the workplace that is in the middle (mean) of the scale is equal to 0.001. By contrast, high involvement management practices are highly likely to be adopted in the average workplace (e.g. the probabilities of the average workplace in the sample to disclose information or brief teams are about 90%). These likelihoods of adoption are consistent with the observed practice use (Appendix 1).

In WERS2004, managers were also asked to what extent individuals in the workplace were involved in decisions over how their work is organized and responses were on a 4-point

scale (a little – a lot). It is noteworthy that both job enrichment (rho=0.45) and high involvement management (rho=0.16) are positively correlated with responses to this question, thus confirming that they measure different types of employee involvement, role and organizational (Wood et al., 2012).

-Insert Table 3-

To sum up, there is no evidence of an integrated approach underlying a QM philosophy. The measures of each identified QM element are treated as if they were observed variables in structural equation models, where labor productivity and quality are the separate dependent variables. For reasons of parsimony, in the structural equation models that follow from figure 1, the use of motivational support practices is measured as the number of such practices that are used in the workplace, rather than six separate independent variables. Nonetheless, when assessing the sensitivity of direct links, the use of each motivational support practice is considered by including six binary indicator variables in the regression models.

The association between QM, a contented workforce, and performance

Figures 2 and 3 summarize the direct and indirect links with labor productivity and quality, respectively. The models fit the data well: standardized root mean squared residuals are respectively 0.019 and 0.014; 90% confidence intervals for the root mean square error of approximation are [0.008, 0.03] and [0.000, 0.024] thus significantly below 0.5. As shown in Figure 2, job enrichment is positively associated with productivity (P-value=0.00). None of the identified elements are linked with quality, as indicated in Figure 2, where only one link is close to marginally significant, i.e. that with TQM-JIT (Class 4 in Table 2). Consequently, there is very little support for Hypothesis 2, which is further investigated in the next subsection.

Hypothesis 3 is rejected; the associations between a contented workforce and both performance measures are insignificant (P-values= 0.53 and 0.48). High involvement management and motivational supports are negatively associated with a contented workforce, thus suggesting that they may be a source of job anxiety. A moderate positive correlation between TQM-JIT and both high involvement management and motivational supports can also be inferred. These results were confirmed when we estimated the models using a sub-sample of workplaces in the manufacturing sector.

- Figures 2 and 3-

Sensitivity of direct links

We assess the robustness of the above findings by focusing on each direct path in the above figures and controlling for sector and size of the organization of which the workplace is part. Overall, the results described above are confirmed. First, productivity and quality are independent of the level of workforce contentment: P-values for workforce contentment were equal to 0.38 (productivity) and 0.23 (quality).

Secondly, a model of the association between the different QM elements and labor productivity indicates that motivational support practices, except variable pay, are not significant. After sequentially deleting non-significant variables, the associations are summarized in the second column of Table 4. Positive associations are observed with: job enrichment (P-value=0.02), high involvement management (P-value=0.03) and variable pay (P-value=0.02). The OM element remains unrelated to productivity (P-value=0.5 for TQM-JIT).

Concerning the association with quality, since TQM-JIT is correlated with both high involvement management and motivational supports, and in Figure 3 the P-value for its link with quality is 0.09, we assess the direct path to quality via regressing quality on TQM-JIT and controls. A positive association is found (P-value=0.008 for TQM-JIT). By adding the other elements to this model, we confirm that neither motivational support practices nor high

involvement management are related to quality, but job enrichment (P-value=0.00) and TQM-JIT (P-value=0.035) are positively associated with quality. Following a stepwise deletion of non-significant practices or derived constructs, the final model for the direct association between management practices and quality is summarized in the third column of Table 4. It shows positive correlation of both job enrichment and TQM-JIT with quality.

Finally, the sensitivity of the association with a contented workforce is addressed via weighted least square regressions model on workplaces that have both practice and employee data. The use of motivational support practices, with the exception of the survey feedback method (P-value= 0.001) that is found to be negatively associated, are unrelated to a contented workforce. High involvement management remains negatively associated (P-value= 0.007) and there is a marginally positive association with job enrichment (P-value = 0.052). After excluding non-significant motivation support practices, the model is summarized in the fourth column of Table 4: the OM element, TQM-JIT, is not associated with the level of job-related contentment in the workplace.

Further investigation shows a negative association when TQM-JIT is considered on its own (P-value= 0.02), but this is mediated by the negative association with high involvement management. Given the claims of potential synergies between HRM and OM practices (e.g. Shah and Ward, 2003), all combinations of the significant HRM practice-use indicators with TQM-JIT were added in the final models, but none are significant. All models in Table 4 have been confirmed in a sub-sample that covered the manufacturing sector. In conclusion, Hypotheses 1 and 3 are rejected; there may be limited support for direct associations, most noticeably for a positive correlation between having enriched jobs and workplace performance.

- Table 4 -

Summary and Implications

Our analysis shows that an integrated QM approach was not established in Britain of 2004. Distinct QM elements reflect a weaker correlation in the use of HRM and OM practices than observed in previous studies (e.g. Akdere, 2009; Sadikoglu and Zehir, 2010). The uses of practices in our data vary significantly, from 15% to 90%, with a mean of 41% in the population. Hence, in this national sample, practices are less adopted than implied in much of the QM literature, where noticeably accredited organizations are often examined. In fact, Levine and Toffel (2010:978) argued that certifications and QM awards can have their benefits magnified because they are interpreted as a signal of high-quality. These samples are also more homogeneous than we would expect in reality, since each unit of analysis has fulfilled the conditions for certification and is likely to show more use of QM related practices. In this context, it may not be surprising that there is no support for an integrated QM philosophy in a national sample of British workplaces.

Given the lack of integration in practice-use, we focus on separate elements. Job enrichment is independent of the other elements and directly positively associated with labor productivity. Other potential direct links between elements of QM and performance, which may be contingent on workplace characteristics, are unveiled: (1) variable pay and labor productivity, (2) job enrichment and quality, (3) OM and quality.

Overall an emphasis on job design appears to pay off, but surprisingly there is no evidence of synergies between QM elements. Moreover, when we consider the actual use of job enrichment practices (Appendix 1), these practices are absent in most workplaces. Hence, most employees had little autonomy, thus suggesting that the job design literature had not made its way to practice in Britain of 2004. Nonetheless, we cannot call for an emphasis on job enrichment at the expense of other practices, because there are evidences that emphases on job autonomy without clear operational focus can be detrimental (e.g. Scherrer-Rathje *et al.*, 2009; Terziovski *et al.*, 1996).

Although employees were on average contented with their jobs, there is no association between the level of job-related contentment in the workplace and its performance. Still different elements of QM have potentially distinct impacts on job related contentment. Hence, employee outcomes may vary with the nature of the management system, thus supporting previous literature that stresses such differences (de Treville and Antonakis, 2006; Jackson and Martin, 1996).

That high involvement management, motivational supports, TQM and JIT may be directly linked to job anxiety causes concern. Such findings may echo Conti *et al.* (2006) who observed that stress responses to job demand and support practices are much stronger than those for job control. There is need for thorough investigations on the impacts of employee involvement practices, as we observed that the negative association between TQM-JIT and job-related contentment is mediated by high involvement management, but high involvement management is negatively associated with job-related contentment. Emphasis on monitoring and process management practices have indeed been linked to job anxiety or stress (e.g. Fucini and Fucini, 1990; Graham, 1995; Parker and Slaughter, 1988), but high involvement management being potentially a source of anxiety contradicts its aims. Longer term effects should therefore be examined.

Some of our findings may be subject to sampling variations, but there is significant consistency in the results, which were generally confirmed on the subset of manufacturing workplaces. Due to the cross-sectional nature of the data, we cannot infer causality or long term effects. For example, a positive association between variable pay and productivity could also mean that more productive workplaces may perform better financially and share their gains. Similarly, the negative associations with the level of job-related contentment could mean that managers who observe lack of contentment may then survey their employees for feedback or adopt high involvement management. The effect of practices may take longer to be observed and we lacked information concerning the length or the extent of practice use.

We note that a new wave of the WERS survey is now available, whose data were collected at a time of austerity, with significant cuts in the public sector and increasing unemployment. The economic climate is then likely to impact on employee contentment as well as on the associations that we addressed.

Conclusion

This study adds economy-wide evidence to an ongoing debate on the relationship between operations and human resource management practices that underlie quality management and performance. It investigated the human aspects of quality management through a wide range of HRM practices as well as employee-level data on job-related contentment. There was no evidence of an integrated quality management. The average workforce was contented with their jobs, but happy workplaces were not associated with performance and high involvement management was linked to job anxiety. Yet, job enrichment, which was rare in the average workplace, appeared to be crucial to labor productivity. Managers are therefore reminded that good job design remains a source of competitive advantage.

References

Abernathy, F., Dunlop, J., Hammond, J. and Weil, D. (2000), "Control your inventory in a world of lean retailing." *Harvard Business Review*, November/December, pp. 169–176.

Adler, P. (1993), "Time and motion study regained." *Harvard Business Review*, Vol.71 No. 1, pp. 97–198.

Adler, P.S. and Cole, R.E. (1993), "Designed for learning: a tale of two auto plants." *Sloan Management Review*, Vol.34 No. 3, pp.85–94.

Agus, A. & Sagir, R.M. (2001), "The structural relationships between total quality management, competitive advantage and bottom line financial performance: an empirical study of Malaysian manufacturing companies." *Total Quality Management*, Vol. 12 No. 7, pp. 1018–1024.

Akdere, M. (2009), "A multi-level examination of quality-focused human resource practices and firm performance: evidence from the US healthcare industry." *International Journal of Human Resource Management*, Vol. 20 No.9, pp. 1945-1964.

Akerlof, G.A. (1982), "Labor contracts as partial gift exchange." *Quarterly Journal of Economics*, Vol. 97 No. 4, pp. 543–569.

Anderson, J.C., Rungtusanatham, M., Schroeder, R. and Devaraj, S. (1995), "A path analytic model of a theory of quality management underlying the Deming management method: preliminary empirical findings." *Decision Sciences*, Vol. 26 No. 5, pp. 637–658.

Appelbaum, E., Bailey, T., Berg, P. and Kalleberg, A.L. (2000), *Manufacturing Advantage: Why High Performance Work Systems Pay Off.* Ithaca, NY: Cornell University Press.

Bartholomew, D.J., Steele, F., Moustaki, I. and Galbraith, J.I. (2008), *Analysis of Multivariate Social Science Data*, 2nd edn. Boca Raton, FL: Chapman & Hall/CRC.

Beer, M., Spector, B., Lawrence, R., Mills, D. and Walton, R. (1984), *Managing Human Assets*. New York: The Free Press.

Birdi, K., Clegg, C., Patterson, M., Robinson, A., Stride, C.B., Wall, T.D., and Wood, S.J. (2008), "The impact of human resource and operational management practices on company productivity: A longitudinal study." *Personnel Psychology*, Vol. 61, 467–501.

Bou, J.C. and Beltran, I. (2005), "Total quality management, high-commitment human resource strategy and firm performance: an empirical study." *Total Quality Management*, Vol. 16 No.1, pp. 71–86.

Bowen, D.E. and Lawler, E.E. (1992), "Total-quality oriented human resources management." *Organizational Dynamics*, Vol. 20 No. 4, pp. 29–41.

Callen, J.L., Fader, C. and Krinsky, I. (2000), "Just-in-time: a cross-sectional plant analysis." *International Journal of Production Economics*, Vol. 63 No. 3, pp. 277–301.

Callen, J.L., Morel, M. and Fader, C. (2003), "The profitability-risk tradeoff of just-in-time manufacturing technologies." *Managerial and Decision Economics*, Vol. 24 No.5, pp. 393–402.

Challis, D., Samson, D. and Lawson, B. (2002), "Integrated manufacturing, employee and business performance: Australian and New Zealand evidence." I*nternational Journal of Production Research*, Vol.40 No.8, pp. 1941–1964.

Conti, R., Angelis, J., Cooper, C., Faragher, B. and Gill, C. (2006), "The effects of lean production on worker job stress." *International Journal of Operations and Production Management*, Vol. 26 No.9, pp. 1013–1038.

Costigan, R.D. (1995), "Adaptation of traditional human resource processes for total quality environments." *Quality Management Journal*, Vol. 2 No.3, pp. 7–23.

Cua, K.O., McKone, K.E. and Schroeder, R.G. (2001), "Relationships between implementation of TQM, JIT, and TPM and manufacturing performance." *Journal of Operations Management*, Vol. 19 No.2, pp. 675–694.

Deming, W. (2000), *Out of the Crisis: Quality, Productivity and Competitive Position*. Cambridge, MA: The MIT Press.

Douglas, T.J. and Judge, W.Q. (2001), "Total quality management implementation and competitive advantage: the role of structural control and exploration." *Academy of Management Journal*, Vol. 44 No.1, pp. 158–169.

Douglas, T.J., and Fredenhall, L. (2004), "Evaluating the Deming management model of total quality services." *Decision Sciences*, Vol. 35 No.3, pp. 393–422.

Eriksson, H., and Hansson, J. (2003), "The impact of TQM on financial performance." *Measuring Business Excellence*, Vol.7 No. 1, pp. 36–50.

Escrig, A.B., Bou, J.C. and Roca, V. (2001), "Measuring the relationship between total quality management and sustainable competitive advantage: a resource based view." *Total Quality Management*, Vol. 12 No. 7, pp. 932–938.

Flynn, B., Sakakibara, S. and Schroeder, R. (1995), "Relationship between JIT and TQM: practices and performances." *Academy of Management Journal*, Vol. 38 No.5, pp. 1325–1360.

Forza, C. (1996), "Work organization in lean production and traditional plants: what are the differences?" *International Journal of Operations and Production Management*, Vol. 16 No. 2, pp. 42–62.Forth, J. and McNabb, R. (2006) *Financial Performance Data in WERS 2004*, Employment Research Unit 21st Annual Conference: Perspectives from WERS 2004, Cardiff University, Cardiff, UK.

Fucini, J. and Fucini, S. (1990) *Working for the Japanese.* New York: The Free Press

Fullerton, R.R., McWatters, C. S. and Fawson, C. (2003), “An examination of the relationship between JIT and financial performance.” *Journal of Operations Management*, Vol. 21 No. 4, pp. 383–404.

Fullerton, R.R. and Wempe, W.F. (2008), “Lean manufacturing, non-financial performance measures, and financial performance.” *International Journal of Operations and Production Management*, Vol. 29 No.3, pp. 214–240.

Graham, L. (1995), *On the Line at Suburu-Isuzu: The Japanese Model*. New York: ILR, Ithaca.

Green, F. (2006), *Demanding Work: The paradox of Job Quality in the Affluent Economy*, Princeton, NJ: Oxford: Princeton University Press.

Guthrie, J.P. (2001), “High involvement work practices, turnover and productivity: evidence from New Zealand.” *Academy of Management Journal*, Vol. 44 No. 1, pp. 180–190.

Hendriks, K.B and Singhal, V.R. (2001), “Firm characteristics, total quality management and financial performance.” *Journal of Operations Management*, Vol, 19 No. 3, pp. 269–285.

Humphrey, S.E., Nahrgang, J.D. and Morgeson, F.P. (2007), “Integrating Motivational, Social, and Contextual Work Design Features: A Meta-Analytic Summary and Theoretical Extension of the Work Design Literature.” *Journal of Applied Psychology*, Vol. 92 No. 5, pp. 1332–56.

Jackson, P. R. and Martin, R. (1996), “Impact of just-in-time on job content, employee attitudes and well-being: *A longitudinal study.” Ergonomics*, Vol. 39 No.1, pp. 1–16.

James, L.R., Demaree, R.G. and Wolf, G. (1984), “Estimating within-group interrater reliability with and without response bias.” *Journal of Applied Psychology*, Vol. 69, pp. 85-98.

Juran, J. (1993), “Made in USA: a renaissance in quality.” *Harvard Business Review*, July–August, pp. 42–50.

Kannan, V.R. and Tan, K.C. (2005), “Just in time, total quality management, supply chain management: understanding their linkages and impact on business performance.” *Omega*, Vol. 33 No.2, pp. 153–162.

Kathuria, R. and Davis, E.B. (2001), “Quality and work force management practices: The managerial performance implication.” *Production and Operations Management*, *Vol.* 10 No. 4, pp. 460–477.

Kaynak, H. (2003), “The relationship between total quality management practices and their effects on firm performance.” *Journal of Operations Management*, Vol. 21 No.4, pp. 405–435.

Kaynak, H. and Hartley, J.L. (2005), “Exploring quality management practices and high tech firm performance.” *Journal of High Technology Management Research*, Vol. 16 No. 2, pp. 255–272.

Klein, J. (1991), “A reexamination of autonomy in the light of new manufacturing practices.” *Human Relations*, Vol. 44 No. 1, pp. 21–38.

Kreuter, F., Yan, T. and Tourangeau, R. (2008), “Good Item or Bad - Can Latent Class Analysis Tell?: The Utility of Latent Class Analysis for the Evaluation of Survey Questions.” *Journal of the Royal Statistical Society*: Series A (Statistics in Society), Vol. 171 No.3, pp. 723-738.

Kollberg, B., Dahlgaard, J.J. and Brehmer, P. (2007), “Measuring lean initiatives in health care services: issues and findings.” *International Journal of Productivity & Performance Management*, Vol. 56 No. 1, pp. 7–24.

Landsbergis, P.A., Cahill, J. and Schnall, P. (1999), “The impact of lean production and related new systems of work organization on worker health.” *Journal of Occupational Health Psychology*, Vol. 4 No. 2, pp. 108–130.

Lawler, E.E. (1986), *High Involvement Management; Participative Strategies for Improving Organizational Performance*. San Francisco: Jossey-Bass.

Lawler, E.E., Mohrman, S.A. and Ledford, G. E. Jr. (1992-5), *Employee involvement and total quality management: practices and results in Fortune 1000 companies*. San Francisco, CA: Josey-Bass.

Levine D. I. and Toffel, M. W. (2010), "Quality Management and Job Quality: How the ISO9001 Standard for Quality Management Systems Affects Employees and Employers." *Management Science*, Vol. 56 No. 6, pp. 978–996.

Makie, K.S., Holahan C.K. and Gottlieb, N. H. (2001), "Employee involvement management practices, work stress, and depression in employees of a human services residential care facility." *Human Relations*, Vol. 54 No. 8, pp. 1065–1092.

McCutcheon, A.C. (1987), *Latent Class Analysis.* Beverly Hills, CA: Sage Publications

MacDuffie, J.P. (1995), "Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry." *Industrial and Labor Relations Review*, Vol. 48 No. 2, pp. 197–221.

Martinez-Lorente, A., Dewhurst, F. and Dale, B. (1998), "Total quality management: origins and evolution of the term." *The TQM Magazine*, Vol. 10 No. 6, pp. 378–386.

de Menezes, L.M., and Wood, S. (2006), "The reality of flexible work systems in Britain." *International Journal of Human Resource Management*, Vol. 17 No. 2, pp. 106–138.

de Menezes, L.M., Wood, S. and Gelade, G. (2010), "The integration of human resource and operation management practices and its link with performance: A longitudinal latent class study." *Journal of Operations Management*, Vol. 28 (in press, available online ScienceDirect).

Mehra, A., and Schenkel, M.T. (2008), "The Price Chamaleons Pay: Self-monitoring, boundary spanning and role conflict in the workplace." *British Journal of Management*, Vol. 19, pp. 138-144.

Merino-Diaz De Cerio, J. (2003), "Quality management practices and operational performance: empirical evidence for the Spanish industry." *International Journal of Production Research,* Vol. 41 No. 12, pp. 2763–2786.

Molina-Azorin, J.F., Tari, J.J., Claver-Cortes, E. and Lopez-Gamero, M.D. (2009), "Quality management, environmental management and form performance: a review of empirical studies and issues of integration." *International Journal of Management Reviews*, Vol. 11 No. 2, pp. 197–222.

Monden, Y. (1983), *Toyota Production System, Industrial Engineering and Management Press.* Norcross, GA: Institute of Industrial Engineers.

Mullarkey, S., Jackson, P.R. and Parker, S.K. (1995), "Employee reactions to JIT manufacturing practices: a two-phase investigation." *International Journal of Operations and Production Management*, Vol. 15 No. 11, pp. 62–79.

Mullarkey, S., Wall, T.D., Warr, P.B., Clegg, C.W. and Stride, C.B. (1999), *Measures of Job Satisfaction, Mental Health and Job-Related Well-being.* Sheffield, UK: Institute of Work Psychology.

Muthen, L. K., and Muthen, B.O. (1998–2007), *Mplus User's Guide* (5th Edition). Los Angeles: Muthen & Muthen.

Nahm, A., Vonderembse, M.A. and Koufteros, X. (2003), "The impact of organizational structure on time-based manufacturing and performance." *Journal of Operations Management*, Vol. 21 No. 3, pp. 281–306.

Nair, A. (2006), "Meta-analysis of the relationship between quality management practices and firm performance – implications for quality management theory development." *Journal of Operations Management*, Vol. 24 No.6, pp. 948–975.

Narasimhan, R., Swink, M. and Kim, S.W. (2004), "Disentangling leanness and agility: an empirical investigation." *Journal of Operations Management*, Vol. 24 No. 5, pp. 421–439.

Parker, M. and Slaughter, J. (1988), *Choosing Sides: Unions and the Team Concept.* Boston, MA: South End Press

Parker, S.K. (2003), "Longitudinal effects of lean production on employee outcomes and the mediating role of work characteristics." *Journal of Applied Psychology*, Vol. 88 No. 4, pp. 620–634.

Parker, S.K. and Wall, T.D. (1998), *Job and work design: Organizing work to promote well-being and effectiveness*. Thousand Oaks, CA: Sage.

Peterson, M. (1997), "Work, corporate culture, and stress: implications for worksite health promotion." *American Journal of Heath Behavior*, Vol. 21 No. 4, pp. 243–252.

Perdomo-Ortiz J, Gonzalez-Benito J and Galende J (2009), "An analysis of the relationship between total quality management-based human resource management practices and innovation." *International Journal of Human Resource Management*, Vol. 20 No. 5, pp. 1191–1218.

Powell, T.C. (1995), "Total quality management as competitive advantage: a review and empirical study." *Strategic Management Journal*, Vol. 16 No. 1, pp. 15–37.

Prajogo, D.J. and Sohal, A.S. (2004), "The multidimensionality of TQM practices in determining quality and innovation performance: an empirical examination." *Technovation* Vol. 24, pp. 443–453.

Purcell, J. and Kinnie, N. (2007), "HRM and business performance". In: Boxall, P., Purcell, J., and Wright, R. (Eds), *Oxford Handbook of Human Resource Management.* Oxford: Oxford University Press, pp. 533–552.

Rahman, S. and Bullock, P. (2005), "Soft TQM, hard TQM, and organizational performance relationships: an empirical investigation." *Omega*, Vol. 33 No. 1, pp. 73–83.

Redman, T. and Mathews, B.P. (1998), "Service quality and human resource management: a review and research agenda." *Personnel Review*, Vol. 27 No. 1, pp. 57–77.

Reed, R., Lemak, D.J. and Montgomery, J.C. (1996), “Beyond process: TQM content and firm performance.” *Academy of Management Review*, Vol. 21 No. 1, pp. 173–202.

Rungtusanatham, M. (2001), “Beyond improved quality: the motivational effects of statistical process control.” *Journal of Operations Management*, Vol. 19 No. 6, pp. 653–673.

Sadikoglu, E. and Zehir, C. (2010), “Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: An empirical study of Turkish firms.” *International Journal of Production Economics*, Vol. 127 No. 1, pp. 13–26.

Samson, D. and Terziovski, M. (1999), “The relationship between total quality management practices and operational performance.” *Journal of Operations Management*, Vol. 17 No. 5, pp. 393–409.

Schroeder, R. G., Linderman, K. and Zhang, D. (2005), “Evolution of Quality: First Fifty Issues of Production and Operations Management,” *Production and Operations Management*, Vol. 14 No. 4, pp. 468-481.

Shah, R. and Ward, P.T. (2003), “Lean manufacturing: context, practice bundles, and performance.” *Journal of Operations Management*, Vol. 21 No. 2, pp. 129–150.

Shah, R. and Ward, P.T. (2007), Defining and developing measures of lean production. *Journal of Operations Management*, Vol. 25 No. 4, pp. 785–805.

Scherrer-Rathje, M., Boyle, T.A. and Deflorin, P. (2009), “Lean, take two! Reflections from the second attempt at lean implementation.” *Business Horizons*, Vol. 52 No. 1, pp. 79–88.

Shingo, S. (1981), *Study of the Toyota Production System from an Industrial Engineering Viewpoint*, Tokyo: Japanese Management Association

Sila, I. and Ebrahimpour, M. (2005), “Critical linkages among TQM factors and business results.” *International Journal of Operations and Production Management*, Vol. 25 No. 11, pp. 1123–1155.

Simmons, D.E., Shadur, M.A. and Preston, A.P. (1995), "Integrating TQM and HRM." *Employee Relations*, Vol. 17 No. 3, pp. 75–86.

Terziovski, M., Sohal, A. and Samson, D. (1996), "Best practice implementation of total quality management: Multiple cross-case analysis of manufacturing and service organizations." *Total Quality Management*, Vol. 7 No. 5, pp. 459–482.

de Treville, S. and Antonakis, J. (2006), "Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues." *Journal of Operations Management*, Vol. 24 No. 2, pp. 99–123.

Vandenberg, R.J., Richardson, H.A. and Eastman, L.J. (1999), "The impact of high involvement work processes on organizational effectiveness: a second-order latent variable approach". *Group and Organizational Management*, Vol. 24 No. 3, pp. 300-339.

Vermunt, J.K. and Magidson, J. (2005), *Technical Guide for Latent Gold 4.0: Basic and Advanced.* Belmont MA: Statistical Innovations Inc.

Victor, B., Boynton, A. and Stephens-Jahng, T. (2000), "The effective design of work under total quality management." *Organization Science*, Vol. 11 No. 1, pp. 102–117.

Walton, R. (1985), "From 'control' to 'commitment' in the workplace." *Harvard Business Review*, Vol. 63 No. 2**,** pp. 77–84.

Warr, P. (1990), "The measurement of well-being and other aspects of mental health." *Journal of Occupational Psychology*, Vol. 63 No. 3, pp. 193–210.

White, R.E., Pearson, J.N. and Wilson, J.R. (1999), "JIT manufacturing: a survey of implementations in small and large US manufacturers." *Management Science*, Vol. 45 No. 1, pp. 1–15.

Wickens, P. (1987), *The Road to Nissan: Flexibility, Quality, Teamwork.* Houndmills: Macmillan.Wood, S., van Veldhoven, M., Croon, M., & de Menezes, L. M. 2012. Enriched job design, high involvement management and organizational performance:

The mediating roles of job satisfaction and well-being. *Human Relations*, Vol. 65 No. 4, pp. 419-446.

Yang, J., Wong, C.W.Y., Lai, K.H. and Ntoko, A.N. (2009), "The antecedents of dyadic quality performance and its effects on buyer–supplier relationship improvement." *International Journal of Production Economics*, Vol. 120, pp. 243–251.

Table 1: Description of Management Practices from WERS2004

Operational Management Practices		
Just-in-time procedures	Shingo (1981), Fullerton et al. (2003), White et al. (1999), Birdi et al. (2008)	The workplace operates a system designed to minimize inventories, supplies or work-in-progress.
Training in quality	Anderson et al. (1995), Douglas & Fredendall (2004), Kaynak (2003)	Employees in the largest occupational group have received off-the-job training on quality procedures in the past year.
Training in problem solving	Forza (1996), Douglas & Judge (2001), Kaynak (2003), Merino-Diaz De Cerio (2003)	Employees in the largest occupational group have received off-the-job training on problem solving in the past year.
Self-inspection	Merino-Diaz De Cerio (2003), Shingo (1981)	Individual employees monitor quality.
Records on faults and complaints	Douglas & Fredendall (2004)	Quality monitored by keeping records on levels of faults/complaints.
Quality records kept	Douglas & Fredendall (2004), Douglas & Judge (2001)	Quality records are kept in the establishment.
Customer surveys	Anderson et al. (1995), Douglas & Judge (2001)	Quality is monitored through customer surveys.
Quality targets	Douglas & Fredendall (2004), Douglas & Judge (2001), Kaynak (2003)	Targets set for quality of product or service.
Customer service targets	Douglas & Fredendall (2004), Kaynak (2003)	Targets set for customer service.
Team briefings involve discussion on quality of product or services	Anderson et al. (1995), Douglas & Judge (2001)	The workplace has a system of briefing for any section or sections of the workforce and discusses quality of products/services (production issues).
HRM - Job Enrichment Practices		
Task variety*	Parker & Wall (1998), de Menezes & Wood (2006)	Employees in the largest occupational group have a lot of variety in their work.
Method control*	Merino-Diaz De Cerio (2003), Parker & Wall (1998)	Employees in the largest occupational group have a lot of discretion over how they do their work.
Timing control*	Parker & Wall (1998), de Menezes & Wood (2006)	Employees in the largest occupational group have a lot of control over the pace at which they do their work.
HRM - High Involvement Management Practices		
Functional flexibility*	Costigan (1995), Bou & Beltran (2005), de Treville & Antonakis (2006), Redman and Mathews (1998)	10% or more of the core occupational group are formally trained to be able to do jobs other than their own.
Teamworking*	Birdi et al. (2008), Forza (1996), MacDuffie (1995)	80% or more of the core occupational group work in formally designated teams.
Teambriefing	Forza (1996)	The workplace has briefing groups or team briefing for all the workers in a section and discusses work organization.
Suggestion schemes	Appelbaum et al. (2000), Merino-Diaz De Cerio (2003)	Management uses suggestion schemes to consult with employees.
Quality circles	White et al. (1999), Kaynak (2003)	Answering positively to question: "Do you have groups at this workplace that solve specific problems or

		discuss aspects of performance or quality? They are sometimes known as quality circles or problem solving or continuous improvement groups".
Induction	Appelbaum et al. (2000)	A standard induction program designed to introduce new employees in the largest occupational group to the workplace.
Training for human relations skills	Appelbaum et al. (2000), Merino-Diaz De Cerio (2003)	Employees in the largest occupational group have received off-the-job training on improving communication and/or teamworking in the past year.
Information disclosure	Bou & Beltran (2005), Bowen & Lawler (1992), Monden (1983)	Management gives regular information on one or more of the following: the financial position of the establishment, internal investment or staffing plans.
Appraisal	Bou & Beltran (2005), Costigan (1995)	Non-managerial staff in the workplace have their performance formally appraised.
HRM - Motivational Support Practices		
Survey feedback method	Monden (1983), Merino-Diaz De Cerio (2003)	Management or a third party have conducted a formal survey of employees' views or opinions during the past two years, the results of which are made available in written form to all employees.
Internal recruitment	Bou & Beltran (2005), Bowen & Lawler (1992), de Menezes & Wood (2006)	Constructed from a question asking about the "approach to filling vacancies in the workplace". 1=where internal applicants are the only source of recruits or are given preference over external applicants, 0=where internal and external candidates are treated equally.
Motivation as a major selection criterion	Redman & Mathews (1998), Simmons et al. (1995)	Motivation is an important factor when recruiting new employees.
Variable pay*	Appelbaum et al. (2000), Bou & Beltran (2005), Bowen & Lawler (1992), Redman & Mathews (1998)	80% or more of non-managerial employees are eligible for share ownership, or have received profit-related or performance-related pay over the past 12 months.
Job security guarantees	de Menezes & Wood (2006)	A policy of guaranteed job security or no-compulsory redundancies for any occupational group other than management.
Single status	Adler (1993)	Managers and non-managerial staff have the same level of benefits in the following areas: pension scheme, private health insurance, four weeks or more paid annual leave, and sick pay in excess of the statutory requirements. It is thus coded 1 if both managers and non-managers either have or do not have any of these benefits.

* Measures were originally based on a five-point scale that indicated the amount of adoption in a workplace. Given the skewness of the distributions of responses, a corresponding binary measure was calculated by using the median amount of adoption as the cut-off point, so that values below the median category were coded as zero.

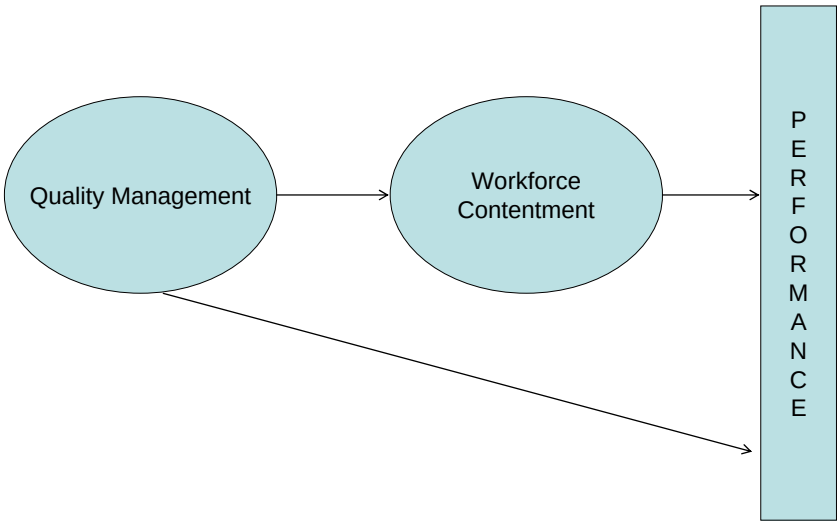

Figure 1: The Mediation Model

Table 2: The Latent Class Model of OM Practices – Estimated Parameters

Class	1	2	3	**4**
Size (Sample)	0.20	0.17	0.24	**0.39**
Size (Population)*	0.35	0.18	0.23	**0.24**
	Probability of using a practice in the class			
Just-in-time (JIT)	0.09	0.16	0.17	**0.59**
Training in quality	0.07	0.15	0.21	**0.57**
Training in problem solving	0.10	0.15	0.21	**0.53**
Self-inspection	0.08	0.07	0.27	**0.58**
Records on faults and complaints	0.04	0.07	0.30	**0.59**
Quality records	0.08	0.21	0.16	**0.55**
Customer surveys	0.04	0.08	0.28	**0.60**
Quality targets	0.01	0.28	0.07	**0.63**
Customer service targets	0.03	0.24	0.11	**0.62**
Teambriefing involves quality	0.10	0.15	0.21	**0.53**

Estimated Direct Effects and P-values in brackets: Customer surveys and JIT: -0.46 (0.003); Customer surveys and Quality targets: 1.07 (0.00); Training in problem solving and training in quality: 0.81 (0.00); Quality targets and JIT: 0.35 (0.00).
* Weighted frequencies based on the establishment weight provided in WERS2004.

Table 3: Latent Trait One-Factor Models
Estimated standardized discriminant coefficients (Alpha*) and probability of the average workplace adopting a practice (Pr)

	Job Enrichment***		High Involvement Management	
Practice	Alpha*	Pr	Alpha*	Pr
Task variety	0.617	0.429		
Method Control	0.995	0.001		
Timing Control	0.801	0.141		
Teamwork			0.758	0.641
Functional Flexibility			0.697	0.780
Quality Circles			0.787	0.295
Suggestion Schemes			0.654	0.333
Teambriefing			0.867	0.895
Induction			0.837	0.948
Training in HR skills			0.733	0.541
Information Disclosure			0.835	0.914
Appraisal			0.714	0.684
Quality of Fit				
No. of observed response patterns	13		353	
No. of $((O-E)^2/E))>4$	0		1	
Maximum $((O-E)^2/E))$	0.2		7.6	
% G^2 explained	71		63	
Chi-square (df)	18.5 (17)		206.8 (103)	
N	2295		2295	
*Reliability***	0.82		0.69	

*These values are equivalent to factor loadings in the traditional factor analysis.
** As defined in Bartholomew et al (2008: 175-206).
*** Since items were dichotomized due to the skewness of their distributions in order to obtain a better specified construct, we note that the correlation between this measure and the first principal component of the original items, which explains 59% of the variance in the data, is equal to 0.78.

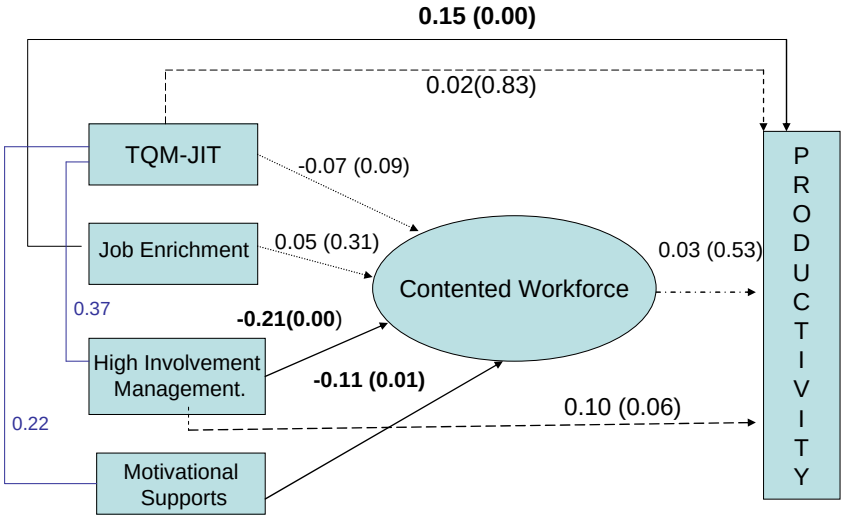

Figure2: The link with productivity: empirical results *

*All paths in the model were estimated. P-values are shown in brackets.

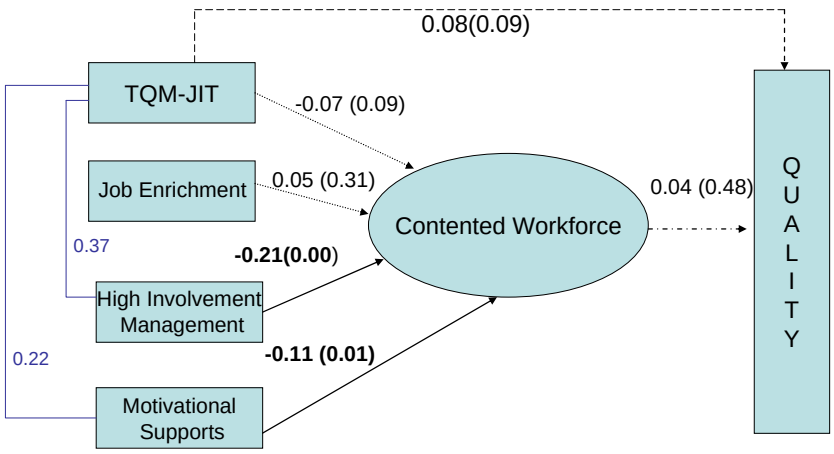

Figure 3:The link with quality - empirical results*

*All paths in the model were estimated. P-values are shown in brackets.

Table 4: Direct Links (Coefficients and P-values in brackets)

	Labor Productivity	**Quality**	**Contented Workforce**
Workplace Characteristics			
Part of a large organization	**-0.52 (0.01)**	**-0.59 (0.00)**	**-0.08 (0.05)**
Manufacturing (reference category)			
Electricity, gas and water	**-0.92 (0.03)**	0.07 (0.89)	0.08 (0.35)
Construction	-0.17 (0.69)	0.55 (0.90)	0.42 (0.60)
Wholesale and retail	-0.17 (0.57)	0.14 (0.61)	**0.21 (0.00)**
Hotels and restaurants	0.61 (0.07)	0.32 (0.33)	0.16 (0.14)
Transport and communication	0.08 (0.81)	-0.25 (0.53)	**-0.26 (0.03)**
Financial services	-0.36 (0.36)	0.43 (0.34)	**-0.29 (0.04)**
Other business services	0.33 (0.32)	0.51 (0.10)	-0.06 (0.40)
Public administration	0.16 (0.81)	-1.12 (0.04)	0.002 (0.99)
Education	-0.14 (0.68)	-0.19 (0.56)	0.06 (0.35)
Health	0.24 (0.44)	0.53 (0.08)	0.11 (0.09)
Other community services	0.60 (0.11)	-0.02 (0.95)	**0.24 (0.00)**
Measures of Practices			
TQM-JIT	0.11 (0.53)	**0.41 (0.01)**	-0.03 (0.45)
Job Enrichment	**0.25 (0.02)**	**0.34 (0.00)**	**0.05 (0.03)**
High Involvement Management	**0.23 (0.03)**		**-0.08 (0.00)**
Variable Pay	**0.42 (0.02)**		
Survey Feedback Method			**-0.14 (0.00)**
Model Statistics			
R-Sq			0.21
F	F(16, 1898)=2.62	F(14, 2061)=4.44	F(16, 1642)=8.35
Prob >F	0.00	0.00	0.00
N	1914	2075	1658

Appendix 1: Percentage Use of Quality Management Practices

	Sample	Population*
Just-in-time procedures	26.2	21.9
Training in quality	37.0	26.6
Training in problem solving	22.2	15.6
Self-inspection	47.6	38.7
Records on faults and complaints	61.1	46.6
Quality records kept	65.1	52.7
Customer surveys	56.1	41.5
Quality targets	55.5	41.8
Customer service targets	41.5	33.8
Team briefings involve discussion on quality of product or services	22.2	26.0
Task variety	43.5	48.4
Method control	22.4	28.0
Timing control	20.1	25.0
Functional flexibility	42.1	41.3
Teamworking	61.0	47.0
Teambriefing	62.0	60.4
Suggestion schemes	35.5	26.0
Quality circles	33.8	17.3
Induction	89.2	77.8
Training for human relations skills	52.8	40.9
Information disclosure	84.7	78.2
Appraisal	64.1	55.9
Survey feedback method	48.8	28.7
Internal recruitment	26.1	20.8
Motivation as a major selection criterion	81.8	81.4
Variable pay	37.1	33.7
Job security guarantees	16.5	14.5
Single status	62.7	63.6

* Weighted frequencies. N=2195

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	1																										
2	0.12	1																									
3	0.01	0.21	1																								
4	0.13	0.15	0.12	1																							
5	0.16	0.20	0.08	0.35	1																						
6	0.16	0.19	0.10	0.15	0.23	1																					
7	0.08	0.18	0.12	0.26	0.45	0.27	1																				
8	0.17	0.20	0.12	0.16	0.25	0.46	0.25	1																			
9	0.18	0.16	0.10	0.13	0.21	0.28	0.32	0.43	1																		
10	0.14	0.15	0.12	0.15	0.20	0.20	0.20	0.22	0.14	1																	
11	-0.11	0.03	0.11	-0.01	-0.07	-0.02	0.02	-0.02	-0.04	-0.04	1																
12	-0.08	-0.03	0.04	0.01	-0.12	-0.01	-0.05	-0.04	-0.06	-0.07	0.26	1															
13	-0.04	-0.01	0.02	0.01	-0.03	-0.02	0.00	-0.03	-0.01	-0.05	0.14	0.38	1														
14	0.09	0.18	0.12	0.07	0.16	0.13	0.10	0.14	0.14	0.19	-0.04	-0.05	-0.01	1													
15	0.04	0.10	0.09	0.11	0.11	0.11	0.15	0.16	0.08	0.26	0.08	0.00	-0.01	0.13	1												
16	0.10	0.12	0.14	0.11	0.19	0.16	0.21	0.20	0.15	0.71	-0.02	-0.06	-0.07	0.18	0.31	1											
17	0.12	0.13	0.13	0.09	0.17	0.18	0.19	0.17	0.15	0.18	-0.01	-0.07	-0.04	0.15	0.13	0.17	1										
18	0.15	0.20	0.17	0.18	0.17	0.18	0.18	0.21	0.13	0.21	0.03	0.00	-0.01	0.19	0.22	0.23	0.13	1									
19	0.06	0.14	0.09	0.07	0.22	0.16	0.20	0.19	0.16	0.19	0.01	-0.05	-0.03	0.22	0.15	0.22	0.15	0.15	1								
20	-0.03	0.23	0.36	0.09	0.13	0.11	0.17	0.14	0.12	0.17	0.12	0.00	-0.02	0.17	0.19	0.21	0.16	0.19	0.18	1							
21	0.04	0.12	0.15	0.11	0.14	0.13	0.18	0.17	0.14	0.20	0.10	0.04	0.00	0.19	0.20	0.23	0.15	0.20	0.20	0.21	1						
22	0.00	0.07	0.08	0.03	0.07	0.09	0.15	0.12	0.12	0.17	0.06	-0.02	-0.05	0.13	0.19	0.21	0.18	0.13	0.22	0.19	0.21	1					
23	0.04	0.11	0.12	0.12	0.19	0.15	0.27	0.21	0.21	0.22	0.02	-0.04	-0.03	0.19	0.21	0.26	0.25	0.24	0.23	0.22	0.27	0.25	1				
24	0.13	0.06	0.00	0.08	0.07	0.10	0.07	0.11	0.08	0.10	-0.08	-0.06	-0.04	0.11	0.08	0.06	0.06	0.11	0.07	0.02	0.06	0.09	0.08	1			
25	0.02	0.07	0.07	0.09	0.08	0.05	0.12	0.07	0.04	0.10	0.07	-0.01	0.00	0.04	0.03	0.07	0.07	0.04	0.09	0.08	0.10	0.05	0.10	0.03	1		
26	0.14	0.08	0.06	0.06	0.07	0.09	0.05	0.09	0.15	0.16	-0.09	-0.08	0.02	0.16	0.08	0.12	0.11	0.10	0.13	0.09	0.13	0.18	0.18	0.22	0.10	1	
27	-0.02	0.05	0.05	0.02	0.01	-0.01	0.04	0.05	0.04	-0.01	0.05	0.02	-0.01	0.01	0.05	0.03	0.10	0.02	0.02	0.08	0.09	0.08	0.13	-0.03	0.03	0.01	1
28	-0.13	-0.02	0.03	0.01	-0.03	-0.04	0.01	-0.06	-0.09	0.01	0.14	0.12	0.06	0.00	0.09	0.06	0.01	0.04	0.00	0.09	0.10	0.12	0.11	-0.11	0.02	-0.06	0.09

Appendix 2: Correlations (N=2195)

1. JIT; 2. Training in quality; 3. Training problem solving; 4. Self-inspection; 5. Records faults and complaints; 6. Quality records; 7. Customer surveys; 8. Quality targets; 9. Customer/ service targets; 10. Teambriefings on quality;11. Task variety; 12. Method control; 13. Timing Control; 14. Functional flexibility; 15. Teamworking; 16. Teambriefing; 17. Suggestion schemes; 18. Quality circles; 19. Induction; 20. Training for HR skills; 21. Information Disclosure; 22. Appraisal; 23. Survey feedback method; 24. Internal recruitment; 25. Motivation as selection criterion; 26. Variable pay; 27. Job security guarantees; 28. Single status.