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Supervision environments and performance of UK dairy warehouses: a path analysis

Abstract

Purpose – For team leaders or supervisors (functional coordinators, FCs) warehouses are one of the most difficult places to supervise and manage subordinate workers. FCs themselves can be supervised by their bosses in different ways, either semi-autonomously or in a traditional authoritarian manner. However, different supervision environments for FCs may affect the performance of the warehouses they work in. This paper investigates the linkages between different supervision environments; FCs' trust in and satisfaction with their bosses, warehouse service quality and company growth.

Design/methodology/approach – Structural equation modelling (path analysis) is applied to a randomly-drawn data sample ($n = 95$) of dairy warehouses from the UK.

Findings – The results show that semi-autonomous supervision has a strong positive impact on FCs' trust and satisfaction and on warehouse service quality which positively affects company growth. In addition, FCs' trust and satisfaction are found to be important antecedents of warehouse service quality and they also directly enhance company growth. In contrast, traditional supervision does not build trust nor creates satisfaction and has a negative direct impact on warehouse service quality.

Practical limitations/implications – While conducted based on a small sample, the study examines important performance determinants and thus enhances the understanding of how to better manage warehouses in particular in a logistically challenging industry.

Originality/value – This study empirically analyses the linkages between supervision environments, warehouse service quality and company growth and thus contributes to determine a best-practice approach for modern warehouse management.

Keywords Functional coordinators, supervision environments, warehouse performance, UK, dairy industry

Paper type Research paper

1. Introduction

Supervision is management by overseeing the performance or operations of a person or group of people. Supervisors can choose between two opposing supervision approaches or styles: semi-autonomous and traditional authoritarian. The former emphasises the empowering of work teams. This supervision practice appreciates participation from team members and demonstrates recognition, respect, flexibility and workplace autonomy. The latter adopts command-and-control practices that reflect directive supervision behaviour (authoritarian management style). A main difference between these two approaches is the level of autonomy given to subordinates or supervisees (Doughty, 2005).

Researchers have identified a significant connection between supervision style and performance. For instance, Ichniowski et al. (1996) estimated an increase of about 7% in production output when the production lines were run by autonomous supervision practices rather than in traditional practices and Pfeffer (1998) stated that a manufacturing firm reduced by 38% defect rates and increased its productivity by 20%. However, despite the strong evidence documented in the literature about the associated benefits of employee empowerment and a supportive culture within organizations, only a small percentage of businesses have adopted a full system of employee autonomy, particularly in warehouses (Ellinger et al., 2003; Leeuw and Berg, 2011).

Warehouses are dedicated spaces for storage and handling of materials. In supply-driven chains, warehouses hold stocks to feed internal departments such as manufacturing and production. In demand-driven chains, warehouses store goods to fulfil the needs of external customers (Emmett, 2005).

In warehouses, functional coordinators play a vital role. Functional coordinators (FCs) are team leaders or supervisors who are responsible for a number of activities such as training and developing team members, clarifying goals, solving day-to-day problems and managing stakeholder relationships. Moreover, with the responsibility of coordinating their supply chain activities, these coordinators regularly communicate with upper management and external customers (Lado et al., 2011).

Yet, while semi-autonomous practices in warehouses are increasingly adopted, little research attention has been given to empirically investigating their effectiveness, in particular in a logistically challenging industry such as perishable food distribution. In this industry, warehouse operations are characterised by high throughput rates (due to the limited shelf life of the handled products) and the controlled temperature environment adds additional operational constraints thus making it difficult to achieve good performance results.

This study therefore attempts to extend the existing literature and knowledge by collecting and analysing data from the UK food logistics industry. Based on a sample of dairy warehouses, which handle logistically demanding products such as fresh milk, yogurt, butter and cheese, the inter-relationships between different supervision environments, trust, satisfaction, warehouse service quality and company growth are analysed.

2. Previous work and hypotheses

A semi-autonomous supervision style emphasises the empowerment of employees. It has been an important part of the creative manager's tool-kit during the last two decades. On the other hand, in traditional authoritarian supervision environments, job

performance is closely associated with rates of pay and clearly separates the duties and rights of workers. In addition to this, in the traditional system, upper management retains the major decision-making power and conflicts are resolved through formal chains of command and grievance procedures. This system of supervision also ignores workforce empowerment (Doughty, 2005).

In general, the work effectiveness of employees depends on the nature of supervision that ties workers and managers into a unified whole. To support this view, a study conducted in fourteen US firms clearly revealed a positive relationship between workers' decision-making participation and job performance (Hammer et al., 1991). Stewart and Him (1991) further believed that the ability to create, develop and maintain good working relationships is the key ingredient used by Chinese supervisors. In such type of supervision, FCs focus on gathering and transformation of information, teamwork and relationships management. They consider employees as a major source of their success and productivity. Therefore, supervision styles that emphasize the participation of all team members and treating employees fairly allow maximizing the morale and productivity of a workforce (Bent et al., 1999). Other studies further support this finding by indicating (i) a significant positive relationship between the supervision style and effects on the shop floor behaviour in multiple Dutch industries (Leeuw and Berg, 2011); (ii) a highly significant correlation between supervision style and warehouse performance (Ellinger et al., 2003); and (iii) management's trust in employees improving service quality and sales performance in a longitudinal study of 88 retail stores (Salamon, 2008).

Hypothesis 1a. In UK dairy warehouses, as in other industries, employee work performance will be higher in semi-autonomous supervision environments than in traditional supervision ones

Other research indicates that higher levels of trust in management are associated with semi-autonomous teams rather than traditionally designed groups. Cordery et al. (1991) showed that the attitude of employees at work is more favourable which leads towards higher financial performance and better service quality. However, it was also found that absenteeism and employee turnover rates were higher in autonomous groups than traditional groups although one reason for this might be that workers in the autonomous groups had to travel longer distances and to work more overtime. Within a participative supervision environment, trust can increase work effectiveness. Bent et al. (1999) and DeConinck (2010) also argue that trust increases in a less regulated work environment.

Hypothesis 1b. In UK dairy warehouses, as in other industries, semi-autonomous supervision positively affects employees' trust in management while traditional supervision negatively affects it

Empirical studies by Wall et al. (1986) and Cordery et al. (1991) identified positive effects of semi-autonomous supervision environments on job satisfaction, which reflects the degree of employees' satisfaction with management behaviour. Cordery et al. (1991) claimed that higher levels of job satisfaction are correlated with the semi-autonomous management approach rather than the traditional authoritarian supervision style. An environment of praising employees for their good work, listening to their views,

encouraging their participation in decision-making and applying flexible control contribute to their satisfaction and help them to feel valued (Wall et al.,1986).

Hypothesis 1c. In UK dairy warehouses, as in other industries, semi-autonomous supervision positively affects employees' satisfaction with management while traditional supervision negatively affects it

A climate of trust can increase chances to acquire new skills and job enrichment (giving employees the opportunity to use a wide range of their abilities), and as a result, performance is improved. For example, the trust in participative management of General Motors has shown many positive effects such as good industrial relationships and low employee turnover. It is believed that General Motors has achieved relative success in Europe by implementing such practices (Ichniowski et al., 1996). Besides this, Salamon (2008) produced empirical evidence that management trust in employees improves service quality and increases sales performance.

Hypothesis 2. In UK dairy warehouses, as in other industries, higher levels of trust will result in higher work performance

The positive effects of semi-autonomous supervision on service quality were shown by Chaston (1998). His study suggested that management should not expect reducing employees' empowerment to have positive effects on overall service quality, sales and revenue. Ellinger et al. (2005) also believed that the semi-autonomous supervision approach is positively associated with staff job satisfaction and the productivity of a company. Moreover, satisfied employees stay longer and continually find ways to add

value. The outcome is a high-performing company in which people flourish and financial performance is sustained and increased (Chatteeuw et al., 2007).

Hypothesis 3. In UK dairy warehouses, as in other industries, higher levels of job satisfaction will result in higher work performance

Service quality is a key aspect of financial performance and company growth (Lado et al., 2011). Chen and Paulraj (2004) and Aramyan et al. (2007) suggested that delivery on time, order flexibility and a 100% fulfilling of orders are important ingredients for service quality and alternatively these factors contribute to financial results and growth. Theoretical dimensions of these factors have been discussed in previous studies (e.g., Chen and Paulraj, 2004; Aramyan et al., 2007). An empirical study of over 200 US manufacturing firms revealed a significant positive relationship between service quality and financial performance. Moreover, it has been suggested that service quality is an important factor to enhance competitiveness (Lado et al. 2011). Similarly, Sichtmann et al. (2011) found that service quality has positive and significant effects on company performance even though they were not particularly large in absolute terms.

Hypothesis 4. In UK dairy warehouses, as in other industries, service quality has a positive impact on company growth

In summary, the conceptual model shown in Figure 1 depicts the factors and their interrelationships which have been discussed above. Supervision type, FCs' trust and satisfaction are treated as exogenous (independent) yet interconnected variables.

Warehouse service quality and company growth are endogenous (dependent) variables.

In addition, warehouse service quality serves as a mediator variable, i.e., there are direct and indirect effects of the exogenous variables on company growth.

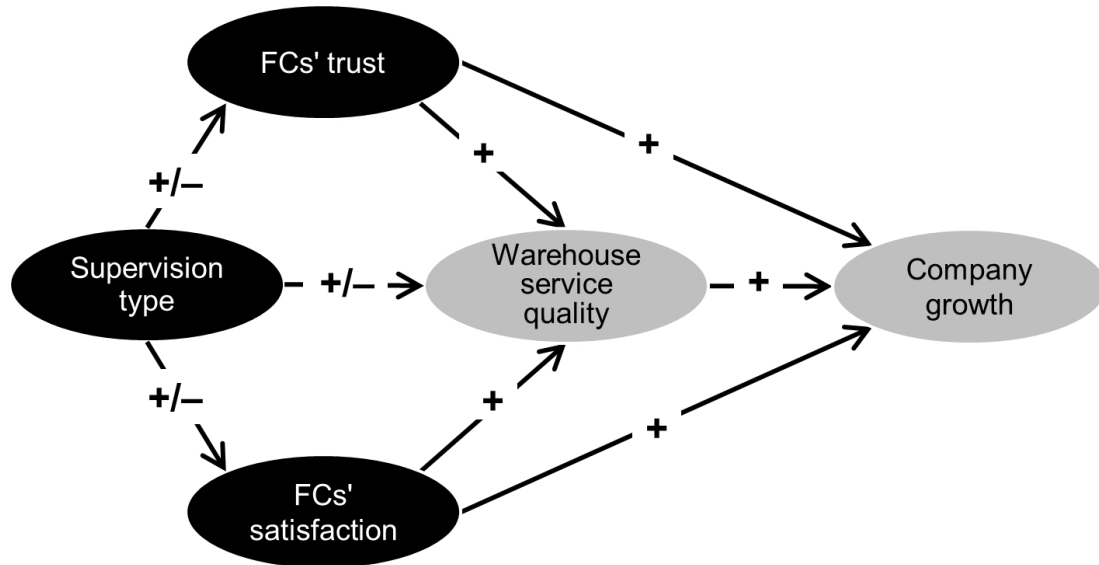


Figure 1. Conceptual model depicting the inter-relationships between the variables under investigation

3. Data collection and analysis method

3.1 Sample procedure

Dairy wholesalers listed in the business database system KOMPASS were randomly selected. The sample consists of wholesale companies which are part of UK dairy supply chains (milk, butter, cheese and yogurt). The selection was based on the UK industrial classification. Available funds limited the sample size to 400 companies. In the cover letter, it was explained that the questionnaire should be filled in by managers that can be considered as functional coordinator or come close to this work profile.

From the questionnaires sent by ordinary mail, 113 questionnaires were returned after a follow-up reminder letter. Eighteen of these questionnaires were unusable

because of incomplete responses or did not fulfil other quality criteria and were thus excluded from the study. This yielded a rate of usable responses of 24%.

3.2 Questionnaire and measures

The questionnaire was based on the literature discussed. Five-point Likert scales (strongly disagree: 1 and strongly agree: 5) were used to allow respondents to express their degree of agreement or disagreement. The developed questionnaire was tested on five FCs from four different warehouses. Remaining clarity issues and other problems were identified and resolved. The respondents also mentioned that a questionnaire-based survey was more convenient and time efficient than face-to-face interviews.

The constructs (variables) and measurement items used in this study are summarized in Appendix A. Each construct consists of three measures (statement items). The constructs of supervision environments, i.e., *semi-autonomous supervision* and *traditional authoritarian supervision*, were assessed employing scales originally developed by Warr et al. (1979) and Campion et al. (1993). The constructs measure who (immediate boss or FC) determine major work-related decisions and procedures. The construct *trust* measured the levels of trust which FCs have in their managers. The construct's individual items assessed the efficacy of management at work, the confidence of the FCs in being treated fairly and whether management fulfil their promises (Cook and Wall, 1980). Following Warr et al. (1979), FCs' *satisfaction* was measured based on how management deals with FCs, the quality of their working relationships with each other and an assessment of the quality of their immediate bosses.

By using measures (items) employed in previous studies (Chen and Paulraj, 2004; Aramyan et al., 2007), we measured performance using two constructs, *warehouse service quality* and *company growth*. *Service quality* was assessed using measures of delivery timing, order flexibility and rate of order fulfilment. The measures of *company growth* were indicators on profitability, sales and market share (Chen and Paulraj, 2004; Aramyan et al., 2007).

In order to identify two supervision environment sub-groups of companies, the constructs *semi-autonomous supervision* and *traditional supervision* were used. Using a cut-off value of 3 to define group membership resulted in statistically acceptable sub-sample sizes of 62 companies characterised by rather using semi-autonomous supervision and 33 rather using a traditional authoritarian one.

3.3 Data analysis

The statistical analysis conducted on the collected data includes the computation of descriptive statistics, reliability and validity tests and of structural equation models (SEMs). Before statistically testing the hypothesized relationships among the constructs, it was necessary to check whether the used data meet certain quality criteria such as means/medians comparisons and skewness and kurtosis being close to the recommended values (Barbara, 2010).

SEM is a tool to estimate simultaneously multiple relationships (controlled correlations) between the observed and hypothesised variables (Barbara, 2010). First, we calculated descriptive statistics and reliability tests using SPSS (version 18). Second, we performed validity tests and SEM (i.e., testing hypotheses and the fit of the data to the conceptual model) employing AMOS (version 18). AMOS utilizes the variance-

covariance matrix of the variables from the dataset for estimating path parameters. In general, maximum likelihood optimization and critical ratios are used to test the statistical significance of the estimated parameters. Values of the critical ratios greater than 1.96 indicate statistical significance ($p < 0.05$).

In order to assess the goodness of fit of the estimated SEM models, we used the standard measures discussed in the literature (e.g., Barbara, 2010). Table 1 summarizes the fit indices and lists their generally recommend cut-off values.

Table 1 Recommended values for SEM goodness-of-fit measures

Fit indices	Recommended values
χ^2/df	< 5
p value	> 0.05
Goodness of fit index (GFI)	> 0.90
Comparative fit index (CFI)	> 0.90
Normed fit index (NFI)	> 0.90
Root mean square error of approximation (RMSEA)	< 0.08

Source: Barbara, 2010

4. Results and discussion

4.1 Biases, descriptive statistics, data reliability and validity

To assess non-response bias, a total of 25 non-respondents were selected randomly. As suggested by Churchill (1991), data from this sample about general company characteristics (annual turnover and number of employees) was requested. The Mann-Whitney U-test showed that there was no statistically significant difference between the respondent and non-respondent samples ($p < 0.05$). The majority of respondents did not complete their questionnaires because of their busy schedule or company policies.¹ In

¹ The data collected from the non-respondents of the main survey was limited and the assessment of the non-response bias therefore confined to the mentioned general characteristics.

addition to this, no statistically significant difference was detected between early or late respondents.

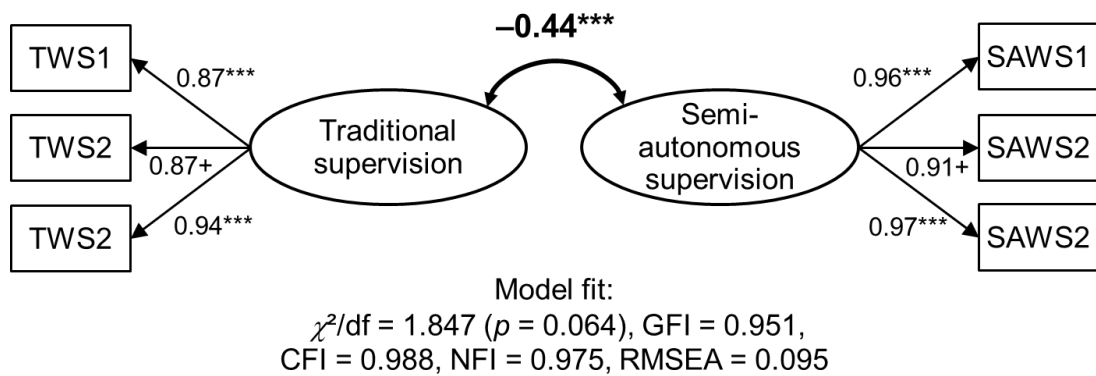
Statistical tests showed that the obtained data met the distributional assumptions and also supported the reliability and validity criteria (Barbara, 2010). Moreover, Cronbach α values are listed in Appendix B. All α values are larger than the recommended value of 0.7 (the values lie between 0.86 and 0.96) and thus confirm the reliability of the measurements (Kline, 2005).

The measurement models were also tested for validity. These models were estimated without putting additional constraints or modification indices. This process examined the relationships between the items and the underlying constructs. As shown in Appendix B, all factor loadings are higher than 0.50, ranging from 0.69 to 0.97. The loadings are statistically significant ($p < 0.01$). Furthermore, the values of construct reliability and average variance extracted are more than satisfactory (Kline, 2005). Finally, we assessed whether common method bias, i.e. significant measurement error due to multiple-item questions, limited the validity of our results. Following Podsakoff et al. (2003), the 'single-common-method-factor approach' was used to test whether the obtained SEM results would significantly change when adding an unmeasured latent methods factor to the estimated models. This was not the case. Moreover, Harman's single factor test was applied where a common method latent variable was constructed based on all directly measured items used in this study. The estimated factor model was not significant thus indicating that shared variance resulting from a common measurement approach is non-existent or small at worst.

However, there was a multicollinearity issue among the items used for *warehouse service quality* and *company growth*. In other words, inter-correlations among the items

of these constructs (i.e., Ser1, Ser2 and Ser3, and Gro1, Gro2 and Gro3, respectively, see Appendix B) were high. Therefore, we used ‘parcelling’ to overcome the multicollinearity problem and to reduce the number of indicators to achieve the main purpose of this study (i.e., investigating the structural relationships between the constructs under investigation rather than the relationships between the measurement items). Parcelling refers to the process of summing or averaging item scores of two or more items (Bandalos and Finney, 2001). Researchers (Marsh et al., 1998; Bandalos and Finney, 2001) showed that the results obtained from parcels rather than the original items are more likely to provide a proper solution. They suggested that parcelling is particularly suitable when the research focus is on the structural part of a model.

A final data issue was that while the constructs *traditional supervision* and *semi-autonomous supervision* were supposed to measure the same phenomenon but ‘the other way round’, we found that in fact both latent variables are only moderately related to each other. While the correlation coefficient is as expected negative and statistically highly significant its absolute size of -0.44 (see Figure 2) is not very large. This suggests that respondents did not give fully consistent answers with regard to the supervision environments in which they work. As the factor loadings in Figure 2 show, the *semi-autonomous supervision* constructs seem to be slightly more statistically reliable than the *traditional supervision* one and for this reason preference was given to it in the subsequent SEM analyses.



*** statistically significant at $p < 0.01$; + parameter fixed, i.e., no significant level available; $n = 95$

Figure 2. Correlation between the latent constructs *semi-autonomous supervision* and *traditional supervision*

4.2 Differences between the supervision environments

The results in Table 2 show that in semi-autonomous supervision environments, *warehouse service quality*, *company growth*, *FCs' satisfaction* and *trust* are all significantly higher rated than in traditional authoritarian supervision environments.

Table 2 Comparing supervision environments and mean difference test (*t* test)

Variable / construct	Mean rating		Standard deviation		Difference statistically significant? ($p < 0.05$)
	Semi-autonomous ($n = 62$)	Traditional ($n = 33$)	Semi-autonomous ($n = 62$)	Traditional ($n = 33$)	
<i>Warehouse service quality</i>	4.48	3.93	0.46	0.52	Yes
<i>Company growth</i>	4.43	3.79	0.53	0.56	Yes
<i>Satisfaction</i>	4.34	4.13	0.45	0.42	Yes
<i>Trust</i>	4.23	3.69	0.60	0.65	Yes

Source: authors' calculations from survey data

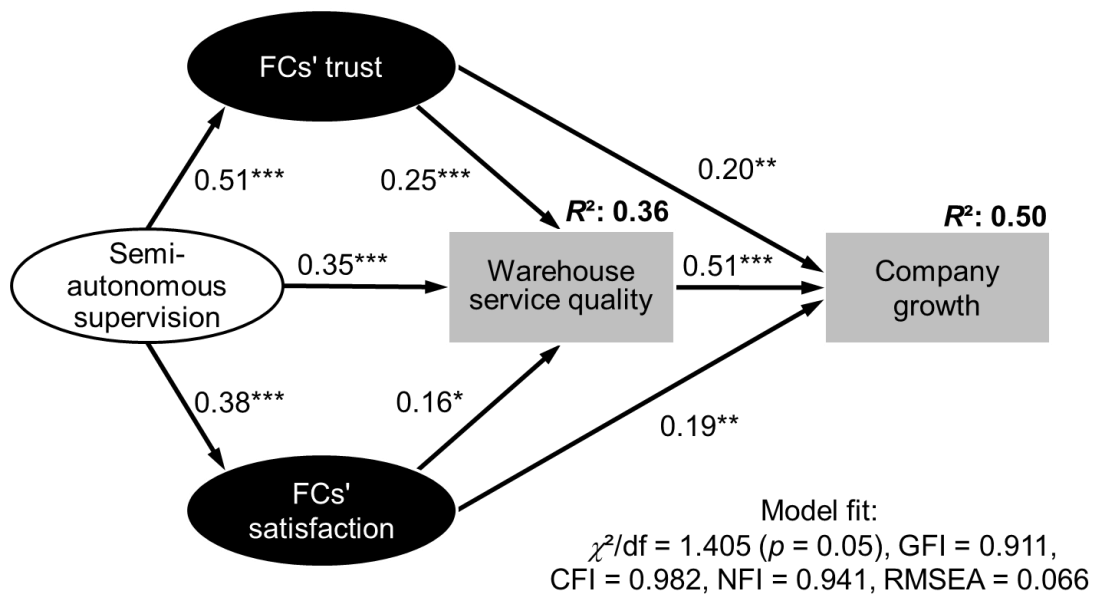
Hypothesis 1a states that in semi-autonomous supervision environments, employee *trust* in, and *satisfaction* with, management and employee work performance (here reflected in *warehouse service quality* and *company growth*) can be expected to be higher than in traditional supervision environments. Hence, this hypothesis is supported. The results confirm that what could have been assumed from the literature is also valid for the UK dairy logistics industry and thus show that, generally speaking, companies which leave more autonomy (i.e., decision power) to their staff perform better.

4.3 SEM estimates

The results from the SEM estimations are provided in Figures 3 and 4 which depict the standardized path estimates and R^2 values for the dependent variables.

Starting with *semi-autonomous supervision* as an antecedent, one can see that this variable positively, strongly and statistically highly significantly affects *FCs' trust* ($\beta = 0.51, p = 0.00$), *satisfaction* ($\beta = 0.38, p = 0.00$) and *warehouse service quality* ($\beta = 0.35, p = 0.00$). *Warehouse service quality* is a mediator which is the most important determinant for *company growth* ($\beta = 0.51, p = 0.00$), followed by *FCs' trust* ($\beta = 0.20$,

$p = 0.02$) and *FCs' satisfaction* ($\beta = 0.19, p = 0.02$). Moreover, *FCs' trust* ($\beta = 0.25, p = 0.00$) and *FCs' satisfaction* ($\beta = 0.16, p = 0.09$) are pivotal antecedents for *warehouse service quality*.



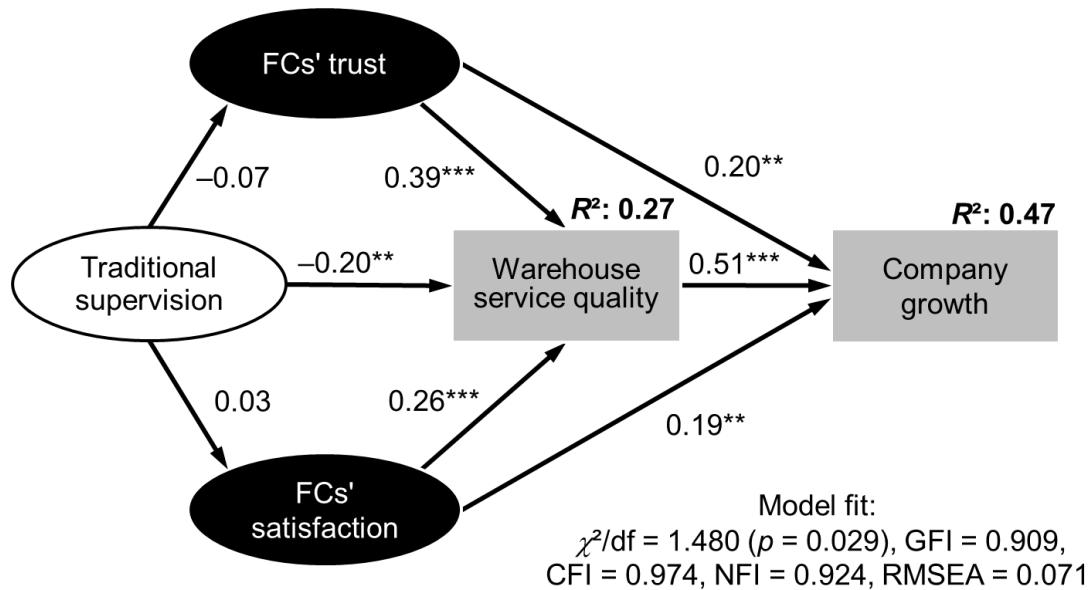
*** (**, *) statistically significant at $p < 0.01$ (0.05, 0.1); $n = 95$

Figure 3. SEM results using *semi-autonomous supervision* as an antecedent

While three variables, *FCs' trust*, *FCs' satisfaction* and *warehouse service quality*, may not be the only determinants for *company growth*, they explain (taken together) 50% of the variance of the *company growth* variable (which is a satisfactory result, considering the cross-sectional nature of the data). *Semi-autonomous supervision*, *FC's trust* and *FC's satisfaction* explain 36% of variance in *warehouse service quality*.

As to the model fit, all computed indices are better or equal the recommended values (Table 1) and thus indicate that the specified model represents in a more than satisfactory way the correlation structure contained in our sample data.

In the next step, the *semi-autonomous supervision* construct is swapped by the *traditional supervision* one (see Figure 4). Given that both constructs are supposed to measure the same phenomenon and are significantly negatively correlated with each other (see Figure 1) one would not expect major changes in the estimates for large parts of the model.



*** (**, *) statistically significant at $p < 0.01$ (0.05, 0.1); $n = 95$

Figure 4. SEM results using *traditional supervision* as an antecedent

The model estimates show that *traditional supervision* does not enhance neither *FCs' trust* nor *FCs' satisfaction* (both estimates are highly insignificant) but has a considerable negative impact on *warehouse service quality* ($\beta = -0.20$, $p = 0.03$). All the other estimates in this model are similar to the previous one, only the importance of *FCs' trust* ($\beta = 0.39$, $p = 0.00$) and *FCs' satisfaction* ($\beta = 0.26$, $p = 0.00$) as antecedents for warehouse has increased. Overall, the model explains somewhat less of the variance of the independent variables *company growth* (47%) and *warehouse service quality*

(27%) as compared to the previous model. Finally, the model fit measures are also all slightly less satisfactory but still very acceptable.

Turning to the remaining research questions, hypotheses 1b and 1c propose that, in UK dairy warehouses, semi-autonomous supervision positively affects employees' trust and satisfaction respectively in management while traditional supervision affect them negatively. Based on the SEM results, both hypotheses are strongly supported. Semi-autonomous supervision does strongly enhance *FCs' trust* and *FC's satisfaction* while traditional satisfaction does nothing of this sort as indicated by the insignificant path estimates. Moreover, semi-autonomous supervision has a strong positive direct impact on warehouse service quality while traditional supervision has a negative one.

Hypotheses 2 and 3 state that higher levels of trust and satisfaction respectively will result in higher work performance (i.e., service quality). The SEM estimates show that this is the case in both models and the effects are even stronger in the second model (Figure 4). Hence, both hypotheses are confirmed by the above results.

Finally, hypothesis 4 asserts that warehouse service quality has a positive impact on company growth. This hypothesis is also positively confirmed by the highly significant, positive and large path coefficients obtained in both SEMs.

5. Conclusions and managerial implications

This study investigated the impact of alternative supervision environments on FCs' trust and satisfaction, warehouse service quality and company growth.

The obtained results are vital in the context of the changing environment of workplaces. Companies often emphasize semi-autonomous and team-based approaches, and these practices require certain behavioural characteristics such as trust and

satisfaction of functional coordinators. Furthermore, such coordinators are often involved in inter- and extra-organizational (e.g., supply chain) coordination and therefore play a pivotal role within integrated and interdependent warehouses. The findings add to the existing body of literature by providing further empirical evidence for UK dairy warehouses thus confirming the results obtained in other studies which suggested that semi-autonomous supervision creates satisfaction, builds trust of functional coordinators and helps them feel valued (Wall et al., 1986; Cordery et al., 1991). In other words, companies which allow their staff to contribute to internal decision-making show better performance outcomes. Hence, it is shown that a “soft” (i.e., semi-autonomously) management approach also works in a “hard” (i.e., fast-moving and temperature-controlled) logistics environment such as UK dairy warehouses.

The practical management implications arising from this study are twofold. First, participatory management approaches seem to be the future in a world which becomes ever more technology and knowledge intensive. While warehouse operations, in particular in the food industries, are supposed to be a low-skill work activity, there can be no doubt that technological progress will also arrive there and that, as a consequence, skill requirements will become more demanding. With work complexity increasing, decentralised decision-making will become more important and hence semi-autonomous supervision approaches will be expected as the standard. Consequently, future logistics management training and retraining programmes predominantly should be teaching trust and satisfaction-based management concepts. Second, regarding best-practice lessons, our empirical findings suggest that the rather intangible concept of warehouse service quality is not only an end in itself but that it is an effective means for achieving tangible

company results. Trust and satisfaction therefore work simultaneously in several different ways and that is a message that managers should take on board.

Future academic research may investigate in more depth the links between the supervision types and individual logistics operations or activities such as picking, replenishing, packing and receiving goods. For some of these activities, trust and satisfaction-based management concepts may be more important than for others.

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Appendix A

Scaling used for this study

Construct	Item description	Codes
<i>Semi-autonomous supervision</i> (Warr et al., 1979; Champion et al., 1993)	• I determine the procedure with which the work gets done	Saws1
	• I make my most work-related decisions rather than by my bosses (my managers)	Saws2
	• Sometimes immediate bosses (my managers) allow me to decide on some customer/supplier discounts	Saws3
<i>Traditional (authoritarian) supervision</i> (Warr et al., 1979; Champion et al., 1993)	• Bosses determine the procedure with which the work gets done	Tws1
	• Bosses make my most work-related decisions rather than I	Tws2
	• Bosses do not allow me to decide on customer/supplier discounts*	Tws3
<i>Trust in management</i> (Cook and Wall, 1980)	• Management at work does not do an efficient job*	Tst1
	• I feel quite confident that the company will always try to treat me fairly	Tst2
	• Most of my bosses cannot be relied upon to do as they say they will do*	Tst3
<i>Satisfaction with management</i> (Warr et al., 1979)	• I have good working relationships with management	Sat1
	• My immediate boss is not a good boss	Sat2
	• I am satisfied with the way my boss manages our team	Sat3
<i>Warehouse service quality</i> (Chen and Paulraj, 2004; Aramyan et al., 2007)	• We provide deliveries on time	Ser1
	• Delivery timing often is changed on customer request	Ser2
	• We fulfil 100% order rates	Ser3
<i>Company growth</i> (Aramyan et al., 2007)	• Profit is increasing	Gro1
	• Sales is improving	Gro2
	• Market share is decreasing*	Gro3

*Items reversed

The constructs used in this study were compiled based on the previous work mentioned above and adjusted to the purpose of this investigation. That is, the constructs used in this study are not exact duplicates of the ones previously used and described in the literature.

Appendix B

Evaluation of measurement models (confirmatory factor analysis), reliability and validity

Constructs	Codes	Cronbach's α	Factor loadings	Construct reliability	Average variance extracted
<i>Semi-autonomous supervision</i>		0.96		0.96	0.89
	Saws1		0.96		
	Saws3		0.90		
	Saws3		0.97		
<i>Traditional supervision</i>		0.92		0.92	0.80
	Tws1		0.86		
	Tws2		0.87		
	Tws3		0.95		
<i>FCs' trust in management</i>		0.93		0.93	0.81
	Tst1		0.92		
	Tst2		0.88		
	Tst3		0.90		
<i>FC's satisfaction with management</i>		0.86		0.87	0.69
	Sat1		0.88		
	Sat2		0.69		
	Sat3		0.90		
<i>Warehouse service quality</i>		0.86		–	–
	Ser1		*		
	Ser2		*		
	Ser3		*		
<i>Company growth</i>		0.91		–	–
	Gro1		*		
	Gro2		*		
	Gro3		*		

*Multicollinearity among items Ser1, Ser2 and Ser3, and Gro1, Gro2 and Gro3, respectively