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Analysing the relationship between QM, performance appraisal and pay for performance

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The purpose of this paper is to analyse the relationship between quality management, performance appraisal and pay for performance in a sample of 203 manufacturing plants (including firms that do not apply quality management) in Spain employing at least 20 workers. We make a distinction between collaboration with suppliers, customer focus and the use of quality tools. This consideration of quality management as multidimensional will help to disentangle the complex interrelationships with performance appraisal and pay for performance. Our findings point to a positive association of customer focus, collaboration with suppliers and quality tools with performance appraisal evaluating results and behaviours. Regarding pay for performance, closer collaboration with customers is positively related to individual pay for performance. The use of quality tools is positively related to individual and firm pay for performance. The managerial implications point out that there is still room for improving the effectiveness of quality initiatives by incorporating changes in pay for performance and performance appraisal oriented to the adaptation to the principles of quality management. From the theoretical perspective, our paper underlines the importance of not considering quality management as a unidimensional reality when examining its relationship with other management practices.

Keywords: quality management; performance appraisal; pay for performance

1. Introduction

There is a wide consensus in the scholar and practitioner literature about the fit of some HRM practices such as empowerment and training with QM (Bakotić & Rogošić, 2017; Tarí & Sabater, 2004). However, this unanimity on the positive association between QM does not exist for performance appraisal (PA, henceforth) and pay for performance (PFP, henceforth) (Escrig-Tena et al., 2016). In fact, these practices have been considered the most controversial (Jiménez-Jiménez & Martínez-Costa, 2009).

According to DeNisi and Murphy (2017), PA refers to

> a formal process, which occurs infrequently, by which employees are evaluated by some judge (typically a supervisor) who assesses the employee's performance along a given set of dimensions, assigns a score to that assessment, and then usually informs the employee of his or her formal rating.

From the perspective that the individual is capable of, and responsible for, influencing the way things get done in an organisation, PA is a tool intended to help managers to make personnel decisions and employees to improve their performance and acquire skills (Schleicher et al., 2019).

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On the other hand, PFP refers to compensation schemes which link part of the wages of the worker to a measure of performance, either individual or collective (Bayo-Moriones et al., 2013). Many authors, such as like Rynes et al. (2005), have acknowledged the potential of PFP as a crucial motivational incentive for developing individual capabilities and improving results.

Although the design of PA schemes which sustain quality has been the focus of substantial conceptual attention, the empirical analysis of whether quality-driven organisations have adopted different PA configurations has been subject to less scrutiny (Soltani et al., 2004a). This absence of empirical evidence is even more severe for PFP. However, empirical evidence (along with debate and discussion) on the issue is scarce since research has been more oriented at developing conceptually appealing alignments than at validating them (Haines et al., 2004).

This paper intends to contribute to this debate by empirically analysing the relationship between QM and PA and PFP in a sample of Spanish manufacturing plants. More specifically, we examine the incidence of results-based PA, behaviour-based PA, pay for individual performance and pay for firm performance.

Our empirical approach is different from that adopted by most of the empirical work so far. Whereas earlier research examines PA and PFP practice in firms that have embraced QM, our paper studies whether those companies with a more intense adoption of QM are different from those with lower QM use as regards their PA and PFP practices. That is, our sample does not only include quality-driven organisations, but also firms with no use of QM.

Another contribution of our paper is that we make a distinction between two different core elements in QM (Marodin et al., 2016): collaboration with suppliers and customers and the prevention approach to errors by the use of tools for process improvement, since a theoretical grounded examination of the issue requires distinguishing between the soft and hard dimensions.

Collaboration with customers and suppliers is a key element in the soft approach to QM. In fact, the participation of the different actors within the supply chain in the development of QM strategies is even gaining momentum (Hong et al., 2018). This involves direct and frequent contact and sharing information in the different stages of the production process (Soltani et al., 2003). Customer focus is one of the most generally agreed precepts of QM (Salau et al., 2015) and there is also ample empirical evidence that recognises the central importance of developing close, long-term cooperative relationships with suppliers in quality-driven organisations (Calleja et al., 2018).

The prevention of errors with quality tools constitutes the hard approach to QM and aims to ensuring the correct functioning of production processes (Cardy, 1998) through better control of work processes and reduction in performance variation (Soltani et al., 2010). Examples of tools included are statistical process control, process flowcharts and cause and effect diagrams (Escrig-Tena et al., 2018). They allow the detection of the causes of quality problems in order to prevent their repetition, avoiding the flow of problems to the next production stages (Saleh et al., 2018).

In the debate on whether and how PA and PFP should be used in quality-driven companies, literature has treated QM as unidimensional, without making distinctions between their elements. However, from a conceptual perspective, the relationship between the different elements of QM and PA and PFP use does not necessarily have to be identical, in spite of both being part of QM. Their characteristics are different and therefore they may relate differently to the variables that the mainstream theoretical frameworks propose as determinants of the use of PA and PFP.

The remainder of the paper is structured as follows. The next section reviews the previous literature and develops the hypotheses of the paper. The third section describes the sample and the variables used in the empirical analysis. Then the results are explained and the article finishes with the conclusions section.

2. Theory and hypotheses

2.1. *Theoretical framework*

In the literature, there are two main approaches to explain why PA and PFP are not used (or used with different intensities) in all firms and for all workers. The predominant perspective highlights the importance of the work context in explaining different patterns of use of PA and PFP. According to this approach, there are some characteristics of production processes and jobs that make PA and PFP especially suitable for evaluating performance and motivating workers (Prendergast, 1999), as opposed to other methods such as direct supervision or promotions. In this perspective, the underlying assumption is that tangible rewards, either explicit or implicit, are the only motivators (Marsden & Belfield, 2010).

The second approach emphasises the role of aspects such as values and beliefs as determinants of why some companies use PA and PFP and others do not. Studies attributing inter-country differences in the incidence of these schemes to cultural dimensions such as individualism, uncertainty avoidance and masculinity (Gooderham et al., 2018) are included in this approach. At the firm level, this perspective justifies variation between firms in PA and PFP diffusion in the differences in managerial values and beliefs. Empirical evidence shows that, although managers in general support the principle that contributions must be rewarded, they do not agree that PA and PFP schemes are effective and fair in the achievement of that purpose (Harris, 2001). Whereas some managers believe that these practices improve employee motivation, others believe that they lead to erosion of commitment and growth of uncertainty and anxiety. In the first case, the company will be more likely to use PA and PFP; in the second, managers will motivate workers with practices such as recognition or job enrichment. These differences in cause–effect beliefs have their origin in differences in management values and philosophy (Arthur et al., 2016), such as the importance of collaboration and cooperation as means to achieve competitive success.

Quality management is expected to help to explain the incidence of PA and PFP from the two theoretical perspectives. In the first approach, the core explanatory factor of PA and PFP was the work context, which is strongly influenced by production processes and work organisation. Quality management impacts them through its hard elements (Wilkinson et al., 1998). These hard elements include tools oriented to the reduction of variability, the ensurance of performance standards or continuous improvement (Dubey & Singh, 2012). These tools modify job characteristics in aspects such as the measurability of performance or the uncontrollable risk in the results obtained by the worker. These dimensions are key in determining whereas PFP is adequate as a tool to motivate workers.

In the second approach, beliefs and values were the drivers of PA and PFP adoption. Quality management is also expected to play a relevant role in this approach since it is based on different principles and values than traditional management. This has been called the soft part of quality management. This component represents the management system, whereas the hard is the technical system (Tarí & Sabater, 2004).

This involves that the analysis of the relationship between quality management and PA and PFP should not be made taking quality management as unidimensional. A theoretical grounded examination of the issue requires distinguishing between the soft and hard dimensions.

In our paper we will focus on two key components of QM that define well its hard and soft sides: a prevention approach to errors by the use of tools for process improvement and collaboration with suppliers and customers (Marodin et al., 2016). Although there are theoretical models which include more dimensions (Dubey & Singh, 2012), the ones we select are at the core of QM. In fact, they are the dimensions used in parsimonious models of QM using a small number of dimensions (see, for example, Bayo-Moriones et al., 2008; Bello-Pintado & Merino-Díaz-de-Cerio, 2013).

The prevention of errors rather than detection aims to ensuring the correct functioning of production processes (Cardy, 1998). Inspection becomes an integral part of the work process and not a separate activity that takes place later. The advantage of this approach is that a better identification of defective products is achieved, conforming to predetermined requirements is achieved, customer dissatisfaction is reduced and there are less direct material and indirect intangible costs (Deming, 1986; Zeng et al., 2014). This is associated to greater control of work processes and reduction in performance variation (Soltani et al., 2010). In order to reach this minimum variation of output, quality tools and techniques are used in what constitutes the hard approach to QM (Wilkinson et al., 1998). Tools like statistical process control, process flowcharts, cause and effect diagrams not only diagnose quality problems, but are also useful to improve system performance and reduce its variance (Soltani et al., 2003). These tools and techniques constitute the tangible element of QM (Escrig-Tena et al., 2018) and allow for the determination of the causes of quality problems in order to prevent their repetition, thus avoiding the flow of problems to the following production stages (Saleh et al., 2018). There is consensus in the literature about the crucial role of supply chain management in QM (Flynn & Flynn, 2005; Soares et al., 2017). Customer focus is one of the most generally agreed precepts of QM and it is mentioned in the work of all quality management gurus, practitioners and scholars. A quality-driven company should not be a closed organisation, but include customers and suppliers, managing external relationships adequately (Salau et al., 2015; Soltani et al., 2003).

In addition, putting the customer in the centre provides a common goal for all the organisational activities and members by focusing on meeting and exceeding customer expectations (Green et al., 2019). This involves direct and frequent contact with customers, collaborating and sharing information with them and gathering information about their expectations and satisfaction (Soltani et al., 2003). Collaboration with customers creates an environment that has a positive influence on the implementation of internal quality practices.

Regarding the relationship with suppliers, Aquilani et al. (2017) have pointed out that one of the key elements of an efficient QM policy is the assurance of an adequate supply of raw materials and components of the right quality at the right moment. Jayaram, Vickery, and Droge (2008) state that QM should include long-term relationships with the main supply chain partners, since the performance depends on the extent to which knowledge is shared in supplier-customer relationships (Danese et al., 2018). Both Flynn and Flynn (2005) and Green et al. (2019) consider that a close collaboration with a supplier will lead to benefits in both quality and SCM, including reduced cycle time, increasing inventory turnover ratio and improving on-time delivery rates. Besides, collaboration and long-term relationships encourage suppliers to become involved early in the design phase and to be more willing to offer suggestions, creating a positive effect on process management by reducing complexity and eliminating variability in materials and parts (Chang et al., 2016).

The managerial implication here is that the integration of supplier operations will impact positively internal quality initiatives and vice versa, but can be a complex task. Being that, this kind of collaboration requires frequent communication and trust among partners (Eslami & Lakemond, 2016). Moreover, by being involved in product design, suppliers are more likely to effectively meet buyers' requirements, which is closely related to quality control systems (Dubey et al., 2018).

As explained above for QM, the analysis of its relationship with PA must take into account that PA is not uniform and that there is variety in how it is implemented by firms. Two main approaches to PA have been identified that differ in nature, goals and expected behaviours from workers (Bayo-Moriones et al., 2020). The first perspective could be termed evaluative and represents the traditional approach to PA in which performance is assessed through results, the purpose is administrative and the goal is to motivate workers by rewarding good performance. The second approach, however, differs in that performance is evaluated through behaviours, the purpose is developmental and the goal is to improve the potential of the worker by detecting possible deficiencies. These important differences between the two approaches to PFP make reasonable to expect that their relationship with QM and their different elements does not have to be necessarily identical. Next, we develop our hypotheses based on this argument.

2.2. *Quality management and performance appraisal*

PA has been strongly criticised by many of the most influential gurus in QM for being counterproductive in quality-driven organisations (Soltani et al., 2003). PA is deemed to fail to achieve both firm demands and workers' expectations (Soltani et al., 2003).

The main concern about PA has to do with the argument posed by Deming (1986) about the strong dependence of performance on systems rather than on individuals, so that local causes of variation in performance are minor as compared to common causes. Whereas PA places a heavy emphasis on individual people as the main contributors to organisational performance, QM highlights system-level features (Arunachalam & Palanichamy, 2017). PA attempts to improve performance by changing people, whereas quality initiatives are intended to change processes (Deming, 1986).

The principle underlying PA is that individuals are very important in the determination of performance variation and that company performance can be managed properly by evaluating the performance of individual employees (Wilkinson et al., 1998). For this reason, employees must be held accountable for their performance (Soltani et al., 2004a). As a result, PA does not take into account the variability of the production system, and so the worker is made responsible for mistakes that are not her responsibility but have their origin in aspects out of her control such as defects in supplies, lack of co-worker support, poor coordination, equipment breakdowns or absence of proper training and direction by management (Soltani & Wilkinson, 2020).

Further, PA requires fine discriminations among employees reaching similar levels of performance which differ in outcomes mainly because of system factors (Chang et al., 2010). Therefore, from a quality perspective, the foundations of PA are based on an incorrect understanding of variation in performance, including worker performance (Cardy, 1998). One of its consequences is the emergence of feelings of unfairness in the workforce for being held responsible for errors due to faults in the system, which might lead to demotivated, stressed and discouraged workers who stop trying to excel and who lose their pride in workmanship (Soltani et al., 2005).

Contrary to the continuous improvement principle, PA does not focus on identifying the final causes of performance variation in the production system, but only on compliance with work instructions and task attainment by workers. Traditional PA is oriented to ensure that minimum standards are maintained and rewards employees for doing well in the system (Soltani et al., 2004a), but not for improving it, focusing attention on the past and not on future performance (Snape et al., 1996). As Soltani et al. (2010) underline, if the objective of QM is keeping the production process under control, managers should focus on the performance of the whole system and not on monitoring the performance of individual workers. In addition, there is a tendency for safe goals to be established during the PA procedure and the focus is only on short-term achievements (Salau et al., 2015).

However, according to the postulated by Soltani and Wilkinson (2020), PA may come into conflict with the main objectives required by QM, since it is a reward for individual effort, which can be an obstacle to favouring behaviours oriented towards cooperation, creativity, and organisational commitment. In the best of cases, PA can demotivate or discourage workers in their creative process of seeking continuous improvement; In the worst case, workers can be involved in a series of uncooperative behaviours in order to be competitive in the general scheme of appraisal performance that jeopardises quality (Cappelli & Tavis, 2016). Further, the measurement tools applied in the PA are not always reliable, since in many cases it is difficult to reflect the contribution of each employee, which can lead to a detriment to the work environment and therefore go against the principles of the QM (Neely & Bourne, 2000). Along the same lines, Petrick and Furr (1995) postulate that, in fact, it is impossible to measure the contribution of a worker in a differentiated way, separating what corresponds to the individual performance from that which comes from the system. Others, like Scholtes (1993) add that the AP tries to achieve a series of objectives, but does not achieve any of them.

In addition to the conflict of interest related to individual behaviour mentioned above, most of the criticism from QM academics and professions to the implementation of AP practice seems to be directed towards organisations traditional results evaluation schemes. That is measurement of employee performance through objectives based on the analysis of results (Soltani et al., 2005), thus reinforcing supervision instead of leadership (Salau et al., 2015). Such is the case, that considering this approach, the purpose of the AP is merely evaluative, which is why its use is often highly questioned by not recognising effort, motivation or simply helping to implement a series of actions that provide support to the employees. Soltani (2003) affirms that this focus only on results can generate a series of organisational practices to improve objectives at any cost (including employee stability).

Hypothesis 1a: collaboration with customers is negatively associated to the use of performance appraisal evaluating results.

Hypothesis 1b: collaboration with suppliers is negatively associated to the use of performance appraisal evaluating results.

The proposed relationship for quality tools is, however, different. PA oriented to results seems to fit well with the idea of control inherent to the use of these tools. Whereas PA controls the employees, quality tools control the processes. Several authors have warned about the risks that QM might result in increased control of the worker and not of the process itself (Soltani et al., 2010). In addition, the scope of these tools is more limited and, therefore, more suitable to individual evaluation. In many of these quality tools, such as six sigma setting and achieving targets is very important (de Menezes & Escrig-Tena, 2019). Quality tools are applied at the job level, and PA oriented to results is applied to the employee who occupies that job. Moreover, as opposed to customer and

supplier collaboration, it is easier to find an objective indicator of performance. For example, the rate of defection could serve to evaluate whether the employee has been successful or not in controlling her job process. This proposed positive relationship between quality tools and PA evaluating results could help to explain why a high proportion of QM organisations include management by objectives in their PA (Soltani et al., 2003; Soltani et al., 2004a), in spite of the recommendations of the QM conceptual framework. Soltani et al. (2010) also find that many quality driven companies use PA schemes emphasising managerial control of objective measures. Quality tools provide managers with more reliable measures of individual performance and, therefore, help to determine more objectively the contribution of workers. This guarantees that the decisions made with this information in the HRM area (for example, in internal promotions) are perceived as fairer by employees as opposed to a situation where subjective measures are used.

Hypothesis 1c: quality tools are positively associated to the use of performance appraisal evaluating results.

In response to the arguments about the incompatibility of QM principles and PA, some authors have suggested that this is not always harmful, since there are some approaches to PA likely to be suitable to QM (Wilkinson et al., 1998). This means that there is good and bad PA from the QM perspective. PA is considered inevitable since it is the way in which a company regularly assess whether it and their workers are doing well or not (Soltani & Wilkinson, 2020), so instead of removing PA, efforts should be directed to broaden it. This could reconcile the principles of QM with the needs of individual workers for recognition and development (Soltani et al., 2006). The continuous improvement aspect of QM suggests that, even if most performance variance is generated by systems-level factors, the true quality-oriented organisation should consider any potential sources of variance, including person-related.

If designed and conducted properly and in an adapted way, PA can be necessary and beneficial even in QM contexts (Salau et al., 2015). Rather than being contradictory in nature, PA could add value to the operations of QM in the interest of the whole organisation if certain PA principles are adopted (Soltani et al., 2005). These principles must be congruent with those underlying QM (Soltani et al., 2010). Some kind of balance is required in order to evaluate individual and system performance and requirements, if PA is to be customised to support quality (Haines et al., 2004).

Since the QM philosophy considers errors to be largely caused by system factors and not by worker actions, the emphasis in PA should be placed on processes rather than on outcomes or contents (Cardy, 1998). Therefore, PA should evaluate the methods and how work is done, which is better captured by behaviours than by results (Haines et al., 2004). This means that PA should be oriented towards the detection of needs and feedback instead of judgement as the traditional measurement of what workers do and not what they achieve (Soltani et al., 2006). Behaviours are observable, are related to the job and can be controlled by the worker (Soltani et al., 2003).

This focus on behaviours intrinsically associated to the purpose of PA as the development of workers instead of rewarding or punishing them, which could be helpful in achieving successful QM implementation (Aquilani et al., 2017). Authors in this stream propose that in a quality environment the goal of PA should be the development of the skills and competences of the workers in order to improve their performance in the future (Haines et al., 2004). In this line of reasoning, PA can be compatible with QM if it provides information and solutions to current problems (Jiménez-Jiménez & Martínez-Costa, 2009), which can only happen if focused on measuring behaviours.

This focus of PA should depart from control on results and shift to assessing behaviours, emphasising the importance of workers' potential (Soltani et al., 2005). This involves defining performance criteria reflecting job requirements instead of outcomes (Chang et al., 2010). Assessing performance against behavioural standards instead of results allows performance feedback from different sources (colleagues, subordinates, etc.) with the aim of continuous improvement of performance (Soltani et al., 2010).

This idea is confirmed in the empirical analysis conducted by Haines et al. (2004), who find that work behaviour criteria are deemed more important in firms with a stronger emphasis on quality. PA in a quality environment should motivate workers and be used as guidance for their development (Soltani et al., 2005). Soltani (2003) also found in his study of a sample of QM organiszations that PA was focused on behaviours and mainly used for training and developmental purposes.

As a consequence of these arguments, we consider that both collaboration with customers and suppliers and the use of quality tools are positively associated to PA oriented behaviours. In the case of quality tools, evaluating behaviours is consistent with the principle of continuous improvement, to which they are oriented. Joiner (2007) states that quality tools can be used to reinforce employees' commitment and dedication to improving the quality of products and services. Further, this developmental PA can promote changes in behaviours, so that processes are improved by encouraging employees to adopt a more proactive attitude towards error prevention and elimination (Bakotić & Rogošić, 2017). Continuous improvement associated to quality tools requires those issues that need improvement to be clearly identified. This can be done only with PA oriented to behaviours, since behaviours constitute the ultimate level at which actions on the job are made. The development of workers involves that they are provided with specific suggestions about how they should modify the way they perform their job and this can only be achieved when their behaviours are evaluated in detail.

As far as collaboration with customers and suppliers is concerned, PA oriented to behaviours can promote the necessary helping and cooperative actions needed in workers to more satisfactorily meet customer demands and efficient relationships with suppliers (Cardy, 1998). PA schemes evaluating behaviours allow the incorporation of the opinion of customers in the performance evaluation process, since they are better informed about the actions of workers regarding customer orientation (Soltani et al., 2004a).

Hypothesis 2a: collaboration with customers is positively associated with the use of performance appraisal evaluating behaviours.

Hypothesis 2b: collaboration with suppliers is positively associated with the use of performance appraisal evaluating behaviours.

Hypothesis 2c: quality tools are positively associated with the use of performance appraisal evaluating behaviours.

2.3. *Quality management and pay for performance*

Pay for performance (PFP) schemes link the wages employees receive to a measure of performance. As happened with PA, under this term we can find a variety of schemes that share the elements of the definition but at the same time also display substantial differences. The main distinction in PFP has to do with the levels at which performance is assessed. Whereas the most usual and traditional form of PFP is that based on individual performance, there are also PFP schemes that link the wages of employees to the firm where she is employed (Bayo-Moriones et al., 2013). This difference has consequences for the behaviours that the schemes motivate in workers. Whereas in collective PFP

cooperating behaviours are encouraged, in individual PFP the focus is on increasing performance in the individual job. These differences might have implications for the relationship between QM and PFP, since not all PFP schemes will fit QM requirements equally. In the next lines, we elaborate this idea further in the development of the hypotheses.

Deming (1986) argued against incentive payment by highlighting the importance of non-monetary rewards such as employee recognition in the motivation of workers. Crosby included employee recognition as one of the fourteen points for achieving quality (Almutawa et al., 2018). In a QM context, social recognition is intended to recognise and reinforce desired employee behaviours fundamental to quality improvement such as those related to participation and involvement (Haines et al., 2004).

QM, as a management philosophy, has emphasised the importance of stimulating positive work attitudes in workers, such as loyalty to the organisation or pride in work (Roldán-Bravo, et al., 2017). This cannot be achieved with monetary rewards, since their effect is temporary and commitment requires deeper changes in the beliefs of employees (Krajcsák, 2019). Permanent identification of employees with organisational goals is a key ingredient in QM, and PFP cannot contribute to it since they promote short-term behaviours.

In this line, a critical assumption in the quality movement is that employees are intrinsically motivated to perform well (Cardy, 1998). Therefore, the objective of QM is to remove system obstacles to performance so that workers have the opportunity to apply their natural motivation (Soltani et al., 2004). As a result, extrinsic motivators such as PFP are not needed and can even have negative consequences for employee motivation and commitment.

Consistent with these principles, a recurring proposed motivator in the QM literature has been leadership. Top management support has been mentioned as a significant variable in explaining the success of QM implementation (Roldán-Bravo, et al., 2017). One of the sources for this relevance comes from the motivating effect that leadership has on employees, since a leader committed to QM is expected to positively influence worker commitment (Arsić et al., 2012).

As part of the management system of QM, it is presumed that the principle of collaboration with customers and suppliers is associated with a lower use of individual PFP: To this philosophical argument, we could add those reasons mentioned in our discussion on PA about the importance of the system as opposed to the individual when explaining variation in performance.

> *Hypothesis 3a*: collaboration with customers is negatively associated with the use of individual pay for performance.
>
> *Hypothesis 3b*: collaboration with suppliers is negatively associated with the use of individual pay for performance.

Following the hypothesis on the relationship between quality tools and PA oriented to results, we also expect this QM component to be positively associated to individual PFP. The concept of uncontrollable risk used in incentive theory (Pendleton & Robinson, 2017) can help to justify this proposition. Uncontrollable risk encompasses those factors out of the control of the worker that have an impact on performance (Sloof & van Praag, 2010). When this risk is high, the use of PFP should be avoided so that the worker will not be affected by elements he does not control. Since quality tools reduce individual performance variation and uncontrollable risk, the use of individual PFP is more suitable.

Another problem associated to individual PFP schemes such as piece rate that has been largely highlighted in the literature on incentives is that they motivate workers to allocate

their effort in a way that may be detrimental for the firm: this is the well-known multitasking problem (Prendergast, 1999). Piece rate fosters an increase in the number of units produced and this could be achieved at the expense of reducing quality. As long as quality tools allow a better control of quality, the danger that workers paid according to individual productivity PFP achieve larger quantity of units by neglecting quality is substantially reduced, since the reductions in quality would be fully detected.

This is consistent with the available evidence pointing to a prevalence of individual performance management in QM organisations (Soltani et al., 2005). For example, Escrich-Tena et al. (2016) find that a substantial proportion of quality organisations recognise individual performance through individual incentive programmes.

Hypothesis 3c: quality tools are positively associated with the use of individual pay for performance.

In spite of the reluctance regarding PFP in the QM literature, some authors acknowledge that rewarding can be also a useful instrument to achieve successful implementation within the plant (i.e. functional units in which workers are grouped, either by projects, processes or specialty). That is, quality initiatives are intended to encourage cooperation and teamwork (Escrig-Tena et al., 2016). So much so, that it is expected that workers will not only perform their assigned tasks with the best possible performance, but will go one step further, cooperating, collaborating and helping their colleagues so that the total performance is not only the sum of the individual returns, if not, that additional added value is generated.

In addition, the collective PFP (or the one referred to as the firm one) lacks many of the deficiencies that the individual one presents and that the QM literature highlights. Haines et al. (2004) asserts that the quality mindset performance is largely determined by the system, and collective performance plays a more important role than the individual ones. Performance at the organisational rather than at the individual level greatly betters the interdependencies and cooperative actions necessary for a proper application of QM principles. In this line, we must keep in mind that teamwork is one of the accepted principles in QM regarding people (Roldán-Bravo, et al., 2017).

Emphasising the importance of firm performance can facilitate the identification of the systemic roots of poor-quality performance (Zeng et al., 2014). For these reasons, rewarding collective results at the firm level may be considered a good practice in QM organisations (Arunachalam & Palanichamy, 2017). In spite of this theoretical support, we must acknowledge that the limited empirical evidence shows that a low percentage of quality-driven organisation have implemented collective incentive schemes such as gainsharing and profit-sharing (Haines et al., 2004).

This would apply both to collaboration with suppliers and customers and quality tools. In the first case, the expectation is clear, since cooperation is central to it and pay-for-performance based on firm results can help to elicit this kind of helping behaviour (Bayo-Moriones et al., 2013). In addition, collaboration across the supply chain is especially associated to a vision of collective responsibility for quality. This means that it is the interaction of the different actors what determines organisational performance. By linking their pay to the performance of the company, workers are held responsible for the outcomes of the quality initiatives (Soltani et al., 2006).

In the case of quality tools, they are not just control techniques, but are also oriented to the improvement of production processes, with positive consequences for later production stages and, therefore, for the whole company. The implementation of quality tools provides workers with the opportunity to improve the performance of the entire production process,

so firm PFP serves as a motivator to put more effort into the continuous improvement of the manufacturing system.

Hypothesis 4a: collaboration with customers is positively associated with the use of firm pay for performance.

Hypothesis 4b: collaboration with suppliers is positively associated with the use of firm pay for performance.

Hypothesis 4c: quality tools are positively associated with the use of firm pay for performance.

Summarising the subsections above, Figure 1 illustrates the aforementioned framework, that is, the relationships between the different variables and their associated hypotheses related to collaboration with customers, collaboration with suppliers and quality tools.

3. Methodology

3.1. *Sample and data collection*

The data used for the empirical analysis come from a survey conducted to managers of 203 manufacturing plants in Navarra (Spain), employing at least 20 workers. The survey was conducted in establishments of this size because smaller plants often show a less formal and more variable way of organising the production process (Cappelli & Neumark, 2001). The plant was taken as the unit of analysis, instead of the firm, because the practices examined in the paper are used and introduced at the plant level. Moreover, the data collected with reference to the plant provides more reliable information. It is in the plant, rather than the headquarters, where there is a better knowledge of the management practices applied on the shop floor. When the plants fulfilling the above-mentioned requirements were identified, the sample was designed to guarantee representativeness of size and activity sector. A target of 200 plants was determined in order to guarantee an acceptable sampling error. When a selected plant declined participation, another plant in the same industry and size interval was contacted until the target for the stratum was met.

The questionnaire was developed according to the methodological recommendations offered by Nunnally (1978) and Podsakoff et al. (2006). In order to define the different questions of the survey tool, a review of the relevant theoretical and empirical literature was carried out. We based our measures in variables already used in the literature. Different response formats were used in order to avoid common method bias problems. An initial version of the questionnaire was pre-tested in several manufacturing plants in order to

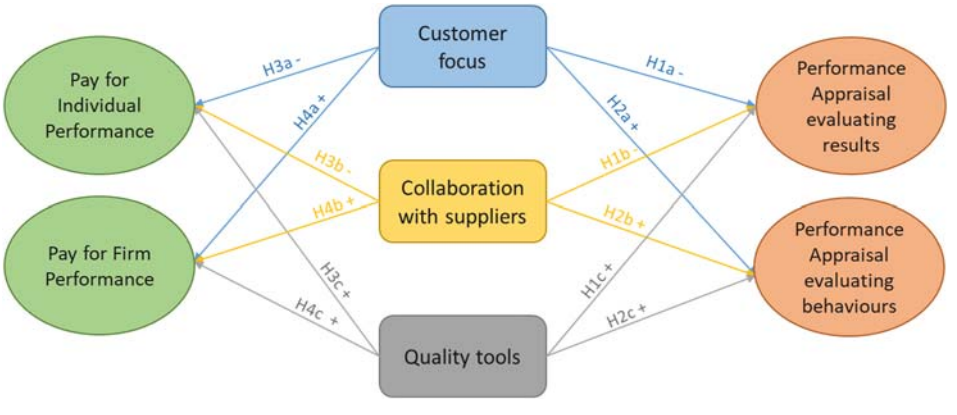

Figure 1. Summary of hypotheses.

ensure that the questions were unambiguous and were clearly understood by the respondents. Based on the results of the pre-test, some changes were incorporated into the questionnaire, giving rise to the final version to be used in the fieldwork.

The data collection process started with the submission of an introductory letter to the general managers of the plants explaining the objectives of the research and asking for their collaboration. They were also informed that the firm in charge of the fieldwork would contact them to arrange an appointment for completing the questionnaire face-to-face with a surveyor. Anonymity was fully guaranteed to reduce evaluation apprehension as well as to avoid social desirability bias by the respondent. On average, the completion of the questionnaire took 40 minutes. The respondent was a manager of the plant, who in most cases was either the general manager or the operations manager.

Among different alternatives for the implementation of a survey, we opted for face-to-face surveys. This allows a higher rate of response (Frohlich, 2002). This was 47% in our case, which is an acceptable rate when compared with other survey-based research in the area (see, for example, Bou-Llusar et al., 2009; Camilleri, 2019; Soltani et al., 2004). In addition, it minimises the potential problem of non-respondent bias (auto-selection problem) and the synchronous communication of time and place (Wengraf, 2001).

3.2. *Measures*

3.2.1. *Performance appraisal and pay for performance*

The application of PA to the majority of production workers is measured by a dummy variable. This measure has been used in the main empirical articles examining the determinants of PA adoption (Addison & Belfield, 2008; Brown & Heywood, 2005; Jirjahn & Poutsma, 2013). In addition, we use two other dummy variables. The first captures whether there is PA using objective measures to evaluate results and objectives such as meeting targets, quantity produced or defective rates, whereas the second reflects if there is performance appraisal evaluating behaviours, such as collaboration with co-workers or commitment. These variables are based on the research by Bayo-Moriones et al. (2020) on PA dimensions. Therefore, the PA variable captures whether any kind of performance appraisal, either using objective or subjective measures or both, is applied to the majority of production workers. This variable equals one if PA evaluating results or PA evaluating behaviours or both take value one.

The existence of PFP is captured by a dummy variable that takes value one if the majority of the production workers are covered by this kind of compensation scheme. Similarly, two other variables measure whether pay for individual performance, or plant or firm performance plans for the majority of production workers are in place. As for PA, the PFP variable indicates whether any kind of pay for performance, either individual or firm or both, is applied to the majority of production workers. As a result, the PFP variable equals one if pay for individual performance or pay for firm performance or both take value one.

3.2.2. *Quality management*

In order to capture the implementation of QM, we consider the two components mentioned throughout the paper, subdividing collaboration with customers and suppliers into two separate variables.

The customer focus variable attempts to reflect to what extent there is closeness, collaboration and information exchanges with customers. With this aim in mind, we

considered five practices widely identified in the quality management literature (Bayo-Moriones et al., 2008; Oliveira et al., 2019) (Table 1). The respondent had to assess their degree of implementation on a one-to-five Likert scale.

The collaboration with supplier variables captures the extent of cooperation with suppliers and whether quality plays a major role in the management of relationships with them. Six items have been used based on the literature (Bayo-Moriones et al., 2008; Oliveira et al., 2019) (Table 1). As with the customer focus variable, practices were measured on a one-to-five Likert scale.

Quality tools are measured by an indicator from the degree of implementation of six methodologies and techniques which are commonly recognised as effective for continuous improvement in manufacturing (Tarí & Sabater, 2004). The use of each of them was evaluated by the respondent on a zero-to-ten scale (Table 1).

The three indices have been considered to be formative, since they meet the requirements for this measurement model: the items are causing rather than being caused by the latent variable measured, the construct is more a combination of the items than the items are explained by the construct and the items are not mutually interchangeable (Hair et al., 2016; MacCallum & Browne, 1993). This last requirement is the one which allows to see more clearly the appropriateness of choosing a formative model. For example, in the case of quality tools, statistical control process and design of experiments are not interchangeable, since one tool can be adopted without the other and they are clearly distinct. This would also apply similarly to the other two quality management variables. In addition, our formative approach for the measure of these variables is consistent with other articles in the literature (Bayo-Moriones et al., 2008).

Consequently, 'breadth of definition is extremely important to causal indicators' (Nunnally & Bernstein, 1994), among other things, because failure to consider all facets of the construct will lead to the exclusion of relevant indicators (Diamantopoulos & Winklhofer, 2001). The multicollinearity among the indicators was studied to validate the formative constructs (Podsakoff et al., 2006). In this context, a Variance Inflation Factor (VIF) below five is a good indicator of the absence of multicollinearity (Judge et al., 1988). Our three indices for Quality Management meet this criterion (see Table 1).

3.2.3. *Control variables*

As control variables, four factors usually appearing in the literature as significant determinants of human resource management practices have been considered (Laroche & Salesina, 2017). Size is measured as the number of workers in the establishment (divided by 100; mean = 0.823, standard deviation = 1.111). Age is captured by the number of years since foundation (mean = 28.907, standard deviation = 19.052). Unions are controlled through a dummy variable that takes value one if working conditions are established by collective bargaining at the plant level (mean = 0.173, standard deviation = 0.379). Finally, a variable capturing the technological intensity of the production process has been included. This variable measures the presence of advanced manufacturing technologies through a formative index on a zero-to-ten scale that reflects the degree of utilisation of several technologies: shopfloor data capture, enterprise resource planning (ERP), preventive maintenance software, bar coding, artificial vision technology, automated guided vehicles (AGV), automated warehousing, computerised numerical control machines, robotics, flexible manufacturing cells, CAD/CAM systems and laser technology (Bayo-Moriones et al., 2008). As for the quality management variables, we have used partial least square to compute the scores of this latent variable.

Table 1. Descriptive statistics for dependent and independent variables.

Variable	Definition	Mean	Std. dev.
Performance appraisal	1 if the majority of production workers are subject to performance appraisal	0.302	0.460
Performance appraisal evaluating results	1 if the majority of production workers are subject to performance appraisal evaluating results and objectives such as meeting targets, quantity produced or defective rates	0.282	0.451
Performance appraisal evaluating behaviours	1 if the majority of production workers are subject to performance appraisal evaluating behaviours such as collaboration with co-workers or commitment	0.237	0.426
Pay for performance	1 if pay for performance for the majority of production workers	0.272	0.446
Pay for individual performance	1 if pay for individual performance for the majority of production workers	0.203	0.403
Pay for plant performance	1 if pay for plant or firm performance for the majority of production workers	0.074	0.262
Customer focus	Formative index from the following items (1 to 5 scale)		
	We are frequently in close contact with our customers	4.316	0.613
	Our customers give us feedback on quality and delivery performance	4.193	0.696
	We strive to be highly responsive to our customers' needs	4.302	0.600
	We regularly survey our customers' requirements	3.396	1.180
	We regularly measure customer satisfaction	3.613	1.114
Collaboration with suppliers	Formative index from the following items (1 to 5 scale)		
	We strive to establish long-term relationships with suppliers	4.188	0.679
	Our suppliers are actively involved in our new product development process	3.153	1.133
	Quality is our main criterion when selecting suppliers	3.633	0.889
	We rely on a small number of high-quality suppliers	3.557	0.968
	Our suppliers are certified for quality	3.770	0.860
	We assess our suppliers regularly	3.174	1.270
Quality tools	Formative index from the use of the following tools for continuous improvement (0 to 10 scale):		
	Failure mode and effects analysis (FMEA)	1.559	3.314
	Design of experiments (DOE)	0.608	2.058
	Six sigma	0.668	2.181
	Statistical control process (SPC)	2.079	3.402
	5 S	2.104	3.402
	Formal methodologies for solving problems (8D, etc.)	1.737	3.389

Table 2 includes the correlation matrix of the dependent, independent and control variables. From this table we can see that the correlations between the three dimensions of QM are positive and significant, being the largest correlation between customer focus and collaboration with suppliers. The size of the correlations suggests that, although the three

dimensions have a positive relationship, they are reflecting different aspects of QM. The correlation matrix provides preliminary evidence of the relationship of QM with PA and PFP, especially for customer focus and quality tools. This is analysed more accurately in the next section with the estimation of the empirical models.

3.3. *Estimation method*

In order to test our hypotheses we have used partial least squares-structural equation modelling through the statistical software SmartPLS (Hair et al., 2016). The main advantage of this technique is that it allows to estimate formatively specified constructs (Ringle et al., 2020). This is the case with our three variables measuring QM. Therefore, our estimation method is different from the reflective measurement and covariance-based approach used in previous research in the QM literature (see, for example, Basu et al., 2018). As a result, the indicators used to evaluate both the measurement and structural model will also differ, so that in the tables we have included the information usually provided in the area of research for evaluating partial least squares models (Ringle et al., 2020).

4. Results

Firstly, the measurement model of the formative indicators was assessed by verifying the absence of collinearity. As shown in Table 3, all the VIF values are acceptable, since they are lower than the threshold of 5 suggested in the literature (Hair et al., 2019). The significance and relevance of weights were conducted with 5000 bootstrap samples. Several weights were not statistically significant, so they were considered candidates for removal. Then we considered their loadings and following the recommendation by Hair et al. (2016), we removed only those items with a low (<0.10) and non-significant external loading. This involved removing the first and fifth items of the Quality tools index. The VIF, the loading and weights and the confidence intervals bias corrected of the items retained are displayed in Table 4.

Table 4 displays the results of the estimation of the empirical models explaining the incidence of PA, PA evaluating results and PA evaluating behaviours. Therefore, it includes the tests of hypotheses 1a, 1b, 1c, 2a, 2b and 2c.

The first model in Table 4 reports that younger plants are more likely to put in practice formal PA schemes for their production workers. Two variables related to QM present path coefficients significantly different from zero. Both quality tools and customer focus practices are positively related to PA for the majority of production workers at $p < 0.01$.

In the explanatory model of PA evaluating results, the findings concerning control variables are the same as in PA. That is, more recently founded are more likely to conduct formal programmes for evaluating employee results.

The results for the quality tools and customer focus are similar to those for PA. The path coefficient of collaboration with suppliers is also significant. When there is a customer focus in operations management, plants also tend to adopt to a greater extent PA schemes that evaluate outcomes ($p < 0.01$). The existence of practices aimed at achieving a closer collaboration with suppliers also play a significant role in explaining the incidence of PA evaluating results ($p < 0.05$). These two results lead to the rejection of Hypothesis 1a and 1b. The larger the number of quality tools used in the plant, the higher incidence of PA evaluating results ($p < 0.01$). This involves the acceptance of Hypothesis 1c.

The last column of Table 4 displays the results of the model estimated to explain the application of PA evaluating behaviours to production workers. The significant control

Table 2. Correlation matrix.

	2	3	4	5	6	7	8	9	10	11	12	13
1. Performance appraisal	.95***	.84***	.27***	.26***	.18***	.07	−.07	.04	.06	.12*	−.01	.17**
2. PA evaluating results		.79***	.31***	.28***	.20***	.09	−.06	.06	.04	.10	.03	.15**
3. PA evaluating behaviours			.21***	.15**	.20***	.08	−.06	−.01	.10	.20***	.06	.21***
4. Pay for performance				.83***	.46***	.21***	−.03	.07	.07	.20***	.09	.22***
5. Pay for individual performance					.05	.21***	−.02	.09	−.02	.21***	.05	.17**
6. Pay for firm performance						.11	.01	.02	.25***	.13*	.16**	29***
7. Size							.13*	.15**	.15***	.29***	.16**	.31***
8. Age								.01	.05	.07	.06	.06
9. Unions									.20***	.11	.01	.08
10. Advanced manufacturing technologies										.33***	.22***	.27***
11. Customer focus											.32***	.30***
12. Collaboration with suppliers												.26***
13. Quality tools												

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3. Results of the measurement model.

		Confidence intervals bias corrected			Confidence intervals bias corrected		
	Loading	5%	95%	Weight	5%	95%	VIF
We are frequently in close contact with our customers	0.646	0.355	0.957	0.373	0.644	1.343	1.490
Our customers give us feedback on quality and delivery performance	0.194	−0.483	0.657	0.008	−1.199	0.572	1.746
We strive to be highly responsive to our customers' needs	0.096	−0.413	0.518	−0.061	−1.101	0.383	1.723
We regularly survey our customers' requirements	0.213	−0.326	0.717	−0.151	−1.277	0.251	2.149
We regularly measure customer satisfaction	0.634	0.265	0.954	0.451	0.621	1.503	2.028
We strive to establish long-term relationships with suppliers	0.205	−0.399	0.557	0.115	−0.503	0.433	1.181
Our suppliers are actively involved in our new product development process	0.373	0.327	0.928	0.257	−0.003	1.015	1.243
Quality is our main criterion when selecting suppliers	0.283	−0.249	0.646	−0.165	−0.994	0.171	1.650
We rely on a small number of high-quality suppliers	0.421	0.109	0.875	0.297	−0.162	0.932	1.451
Our suppliers are certified for quality	0.245	−0.070	0.707	−0.088	−0.680	0.337	1.337
We assess our suppliers regularly	0.583	0.733	0.981	0.543	0.640	1.111	1.222
of experiments (DOE)	0.602	0.349	0.895	0.112	−0.276	0.589	1.393
Six sigma	0.746	0.394	0.981	0.257	−0.374	0.964	1.578
Statistical control process (SPC)	0.944	0.869	1.000	0.535	−0.024	1.109	1.790
Formal methodologies for solving problems (8D, etc.)	0.701	0.356	0.956	0.140	−0.464	0.773	1.657

variables are the age of the plant and unions, so that more recently founded establishments and non-unionised establishments are more likely to use this kind of PA for their blue-collar workers.

The three quality management variables have a significant relationship with PA oriented to behaviour evaluation. As with PA evaluating results, the relationship between PA evaluating behaviour and customer focus is positive ($p < 0.01$). A significant relationship between collaboration with suppliers and PA evaluating behaviours has been found ($p < 0.05$). This involves acceptance of Hypothesis 2a and 2b. The relationship between PA evaluating behaviour and quality tools is positive too ($p < 0.01$), so Hypothesis 2c is accepted.

Table 5 displays the results of the estimation of the empirical models explaining the incidence of PFP, pay for individual performance and pay for firm performance. Therefore, it serves to test hypotheses 3a, 3b, 3c, 4a, 4b and 4c.

The first model in Table 5 indicates that PFP is more usual in younger plants, as occurred in Table 4 for PA. It can also be observed that the number of quality tools implemented is associated to a greater incidence of PFP ($p < 0.01$). Moreover, in those plants where management is customer-focused, the probability of rewarding the majority

Table 4. Bootstrapping results of the structural model for *Performance Appraisal*, *Performance appraisal evaluating results* and *Performance appraisal evaluating behaviours*.

	Performance appraisal					*Performance appraisal evaluating results*					*Performance appraisal evaluating behaviours*				
Variables	*Path coefficient*	*St. error*	*t-value*	*p-value*	f^2	*Path coefficient*	*St. error.*	*t-value*	*p-value*	f^2	*Path coefficient*	*St. error*	*t-value*	*p-value*	f^2
Size	−0.058	0.057	1.060	0.289	0.005	−0.046	0.059	0.800	0.424	0.003	−0.044	0.058	0.791	0.429	0.003
Age	−0.107	0.055	2.139	0.032	0.018	−0.103	0.057	2.008	0.045	0.016	−0.162	0.054	3.209	0.001	0.040
Unions	0.006	0.067	0.021	0.984	0.000	0.027	0.069	0.361	0.718	0.001	−0.090	0.054	1.799	0.072	0.013
AMTs	0.134	0.177	0.847	0.397	0.027	0.146	0.176	0.849	0.396	0.026	0.134	0.145	0.776	0.438	0.016
Customer focus	0.261	0.065	3.899	0.000	0.076	0.231	0.067	3.361	0.001	0.056	0.248	0.067	3.622	0.000	0.069
Collaboration with suppliers	0.179	0.112	1.571	0.116	0.036	0.186	0.076	2.116	0.034	0.028	0.227	0.088	2.546	0.011	0.060
Quality tools	0.197	0.064	2.913	0.004	0.042	0.196	0.068	2.665	0.008	0.039	0.187	0.072	2.434	0.015	0.036
R^2	24.8					21.6					27.9				
$R^{2\text{-}}$adjusted	21.8					18.5					25.0				

Table 5. Bootstrapping results of the structural model for *Pay for performance*, *Pay for individual performance* and *Pay for firm performance*.

Variables	*Pay for performance*					*Pay for individual performance*					*Pay for firm performance*				
	Path coefficient	*St. error*	*t −value*	*p −value*	f^2	*Path coefficient*	*St. error.*	*t −value*	*p −value*	f^2	*Path coefficient*	*St. error*	*t −value*	*p −value*	f^2
Size	0.044	0.076	0.725	0.468	0.003	0.028	0.061	0.526	0.599	0.001	0.045	0.105	0.533	0.594	0.003
Age	−0.1116	0.055	2.228	0.026	0.017	−0.073	0.060	1.407	0.160	0.008	−0.022	0.058	0.375	0.707	0.001
Unions	−0.007	0.068	0.109	0.913	0.000	0.051	0.072	0.723	0.470	0.003	−0.045	0.074	0.580	0.562	0.002
AMTs	0.202	0.119	1.242	0.214	0.023	0.212	0.240	1.171	0.242	0.092	0.234	0.077	2.226	0.026	0.027
Customer focus	0.166	0.059	2.590	0.010	0.022	0.210	0.069	2.960	0.003	0.045	0.061	0.130	0.361	0.718	0.002
Collaboration with suppliers	0.109	0.068	0.763	0.445	0.003	0.096	0.094	0.606	0.545	0.003	0.080	0.093	0.548	0.584	0.003
Quality tools	0.243	0.072	3.335	0.001	0.059	0.174	0.078	2.101	0.036	0.031	0.248	0.074	3.054	0.002	0.050
R^2	17.9						19.6				13.0				
R^{2-}adjusted	17.6						16.6				9.8				

of production employees in accordance with any PFP scheme is higher ($p < 0.01$). However, no effect on the use of PFP has been found for practices aimed at achieving closer collaboration with suppliers.

The second model in Table 5 shows the results of the model estimated to examine the determinants of individual PFP. As regards control variables, no path coefficients different from zero have been found.

The results for the QM variables very much resemble those found for any kind of PFP, a result, practices oriented to focusing on customers are positively related to the payment of production workers by their individual results ($p < 0.01$). Therefore, Hypothesis 3a is rejected because it proposed a negative association. There is no significant relationship between the collaboration with the suppliers' variable and pay for individual performance. This means the rejection of Hypothesis 3b. As regards the intensity of adoption of quality tools, this has been found to be positively related to the payment of production workers by their individual results ($p < 0.05$), so Hypothesis 3c is accepted.

Finally, the third model analyses firm pay for performance as dependent variable. It is found that plants adopting advanced manufacturing technologies show a greater tendency to link the wages of blue-collar workers to the results of the firm.

No significant effect is found for the two variables capturing vertical collaboration with customers and suppliers. So, hypotheses 4a and 4b are rejected. The quality tools variable presents a positive coefficient ($p < 0.01$), indicating that the more tools in use, the more likely pay for firm performance is for production workers. Therefore, hypotheses 4c is accepted.

5. Conclusions

In this article, we have examined the association between quality management and performance appraisal and pay for performance. We have distinguished between PA evaluating results and behaviours and between PFP based on individual performance or firm performance. Contrary to the prevailing empirical literature on this topic (see, for example, Escrig-Tena et al., 2016; Soltani et al., 2006), we have used information both from companies with and without QM. We have analysed the relationship of main components of QM separately: collaboration with customers and suppliers and the use of quality tools.

Our findings point to a positive association of customer focus, collaboration with suppliers and quality tools with PA-evaluating results as well as PA-evaluating behaviours. As far as PFP is concerned, closer collaboration with customers is positively related to individual PFP, whereas the use of quality tools is positively related to both individual and firm PFP. No relationship has been found for collaboration with suppliers for these two compensation practices.

Contrary to the recommendations of the QM gurus, we have found that companies with a greater degree of adoption of QM are more likely to use PA, evaluating both results and behaviours, and PFP, both individual and collective. Whereas most influential gurus of the quality movement contend that PA and PFP are opposed and detrimental to the effectiveness of quality initiatives (Soltani et al., 2003), our findings suggest that not only the implementation of QM is not leading to a reduction in the incidence of these practices, but is indeed associated with a broader diffusion in companies.

Our empirical result for PA is consistent with those obtained in articles focusing on quality-driven companies. For example, survey results in QM organisations by Soltani et al. (2004) indicate that a majority of respondents used some PA-based objectives. On

the other hand, Haines et al. (2004) and Soltani et al. (2003) found that criteria used in PA related to behaviours and connected to employee development are more prevalent in companies that place a stronger emphasis on quality management.

In the more recent literature on QM and PA, the benefits of evaluation focusing in behaviours are highlighted in opposition to the disadvantages of evaluations focusing on results in quality-driven organisations. Nonetheless, we have found that QM is positively associated not just to the former but also to the latter. Therefore, contrary to the arguments of authors such as Deming (1986), QM seems to be contributing to the intensification of the worker as an element of the production system accountable for performance variation within the organisation.

Nonetheless, we must also notice that the relationship between QM is stronger for PA evaluating behaviours than for PA oriented to outcome evaluation, especially for the customer focus and collaboration with suppliers dimensions. This result is in consonance with the arguments of those sustaining that there is a potential compatibility between QM and PA as far as the latter is oriented to processes instead of outcomes in order to allow performance feedback and, as a result, continuous improvement, one of the main principles of QM (Cardy, 1998; Soltani et al., 2010). However, our results do not fully support this view, since this positive association with behaviour based PA is applied together with the traditional approach to PA, based on evaluating results.

The positive relationship found in our sample between QM and individual PFP is consistent with the scarce existing empirical evidence about the use of individual incentives and rewards in organisations adopting a QM approach (see, for, example, Soltani et al., 2005 and Escrig-Tena et al., 2016). Nevertheless, our results depart from previous studies as regards the relationship between QM and collective pay for performance. Haines et al. (2004) did not find that collective PFP schemes such as gainsharing and profit-sharing were more prevalent in quality-driven organisations, whereas Soltani et al. (2004) also found a very low incidence of team PFP schemes in QM organisations. In our study, as expected, we found a positive association between quality tools and firm PFP. However, we must acknowledge that the relationship did not emerge for collaboration with customers and suppliers.

Our findings, following the arguments of the QM gurus, involve that companies using QM are not managing PA and PFP well. Supporting this view are the conclusions of Soltani et al. (2005), who found a very low consistency between QM and PA in spite of companies being aware of this lack of congruity. Additional evidence confirms that PA systems fail to meet QM expectations and contradict QM assumptions about individual and system performance by focusing on inappropriate measures (Soltani et al., 2004).

In the theoretical section of the paper, we have defended that PA focused on evaluating results and individual PFP present consistencies with the hard elements of QM, that is, the use of tools and techniques aimed at error prevention and continuous improvement. Our results show that companies emphasising this QM dimension do not face large limitations and obstacles to adjust their PA and PFP schemes to the hard elements of QM. One possible explanation is that these are the traditional ways of doing PA and PFP and, as a result, companies do not find difficulties in deepening in its use. These findings point to a dominance of hard considerations over soft aspects in the interrelationship of QM with PA and PFP. In fact, our results suggest that the efforts to fit performance management with the hard elements of QM are applied in a similar direction for soft dimensions such as customer focus, in spite of the nature of relationships being conceptually different.

According to our findings, the main problems in the adjustment of PA and PFP exist in companies emphasising customer focus and collaboration with suppliers as quality initiatives. Especially in the case of the customer focus, the problem is that companies emphasising it seem to attempt to reconcile incompatible orientations; on the one hand, an intensification of some features of the traditional approach to PA and PFP; on the other, the implementation of the approach demanded by soft QM. In the case of customer focus, the results suggest that, instead of completely removing the traditional approach, firms could be adapting traditional results based PA and individual PFP to this customer-oriented philosophy. This could be done by including indicators related to customer satisfaction in performance measurement, which is expected to be more easily accepted by the different actors in the organisation than a radical change.

Therefore, the main managerial implication is that organisations adopting the soft elements of QM should make an effort to go beyond the traditional approach to PA and PFP and incorporate changes oriented to the adaptation to the QM values. Our findings show that there are opportunities many organisations might exploit to improve the effectiveness of their quality initiatives and enhance firm performance and customer satisfaction.

PA and PFP are vital needs in the quality management context, but they need to be revisited in a direction more in line with the quality principles, since in the design of these practices quality requirements do not seem to be taken under consideration. Managers need to rethink and re-examine some of the fundamental ideas concerning the evaluation of compensation of employees.

More specifically, we have detected that those quality-driven organisations promoting collaboration with suppliers need to adopt PFP schemes that link wages with firm performance. The same recommendations apply to organisations implementing customer-oriented actions. However, in this case we have detected the need to depart from the use of traditional PFP schemes, such as those that pursue the evaluation of results and the link on pay to individual performance.

One of the contributions of the article is that we do not consider QM as unidimensional, but distinguish between collaboration with customers and suppliers and quality tools. Both the theoretical development of the paper and the findings confirm the convenience of examining the management and technical dimensions of QM separately when studying PA and PFP aspects. QM should not be treated as a unidimensional construct, but as a multidimensional one when analysing the effects on firm practises in other areas. If QM is assumed to be uniform in the degree of application of its dimensions in companies, the complex interrelationships with other elements of the firm will not be properly disentangled. Our study highlights the need to adopt this theoretical and methodological approach especially when examining the implications of QM for workers and how they are managed.

6. Limitations and further research

There are a number of limitations in our study. The data used in the empirical analysis are cross-sectional, so we cannot claim for causality in our findings, but only refer to association. Future investigations should include longitudinal data to increase the validity of the results and examine the impact of QM on PA and PFP over time. This would allow to understand in more depth the dynamics of the interaction between the different dimensions of QM and the application of the performance management practices examined in the paper.

Another limitation of the paper is that the empirical analysed has been conducted in a specific country, Spain. National characteristics in aspects such as culture or labour

regulation are strong determinants of the use of pay for performance schemes in companies. Country differences could affect not only the degree of adoption of these practices, but also have implications for the intensity of the influence of variables at the firm level such as those considered in this paper related to QM. In this line, we must interpret the results taking into account that Spain is a country where the labour market is strongly regulated, so there should be caution to generalise the findings to liberal market economies.

In addition, in this article, we have focused on one key dimension of PA: whether it is oriented to evaluate outcomes or behaviours. However, other aspects deserve further scrutiny, such as rating scale length, who conducts the evaluation, the frequency, the objectives of PA (administrative/developmental) and the participation of workers in the design of the PA practice. Although these are aspects usually interconnected to whether outcomes and behaviours are evaluated, the relationship is not always direct in the same direction.

As regards PFP, we have analysed the existence and coverage of the schemes, but have not analysed other aspects such as the nature of the indicators used, the intensity of the schemes in wage structure, their periodicity, whether they are defined only in terms of rewards or also as penalties or if they are aimed only to recognise high-performers or to reward performance at all levels. Therefore, further research would be beneficial to better understand the influence QM has on these other dimensions of PA and PFP.

Another potential future line of research deriving from our results is the examination of the mechanisms through which QM has an effect on the adoption of PA and PFP. Together with the identification of mediating variables, further research is also needed to explore the existence of moderating variables in the effect of QM on PA and PFP, since in this paper we have worked under the assumption that the relationship does not depend on work and firm contextual variables.

In this paper, we have focused on PA and PFP for production workers. Future research would benefit of considering in detail the effects of QM for the different jobs and categories in the manufacturing area of companies. In this line, a relevant area of study would be to examine whether the adoption of the different dimensions of QM is affecting the incidence of PA and PFO in similar terms to workers with and without supervisory responsibilities. The direct motivational implications of QM practices might differ between them and this could involve different implications for the use of PA and PFP for the two employee groups.

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