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Quality Management Standards, Institutionalization and Organizational Implications: A Longitudinal Analysis

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Abstract:

We explore longitudinally how the institutionalization of quality management standards would lead to paradoxical performance implications. Specifically, we examine the organizational consequences of ISO 9000 adoption when the standard was increasingly institutionalized in the manufacturing industry in the early years. Based on hierarchical linear modeling of panel data of manufacturing firms, we find that the sales revenues of ISO 9000 certified firms increased steadily when the standard is increasingly institutionalized. However, operational efficiency significantly deteriorates at the same time, so as the shareholder value (measured by Tobin's *q*). We further reveal that the institutionalization of ISO 9000 leads to higher CEO compensation, despite deteriorating operational efficiency. We argue that when process systems like ISO 9000 are institutionalized, they lead to certain negative consequences. To make management standards less susceptible to institutional forces, we believe that a fact-based, result-oriented approach in the implementation should be stressed.

Keywords: Institutional theory, quality management, sales revenue, operational efficiency, compensation

1. Introduction

The past decades have witnessed a widespread diffusion of management standards in various sectors of the manufacturing industry worldwide. These standards are seen as a new "management technology", which is likely to have a profound impact on operations management. Quality management standards such as ISO 9000 and ISO/TS 16949 are particularly widely adopted in the global supply chain. Yet rigorous empirical research on this area is very limited. In particular, previous research studies did not look beyond traditional operational indicators to examine the wider organizational implications of quality standards, nor did they consider the factor of institutionalization – a social construction process by which quality management standards become instilled with symbolic value among various internal and external stakeholders (Glover et al., 2014).

Institutionalization refers to the social construction process thereby the structural models, policies and practices of firms become instilled with value and eventually "taken-for-granted" by different stakeholders (Selznick, 1996; Tolbert and Zucker, 1983). Institutional theorists (e.g., DiMaggio and Powell, 1983; Meyer and Rowan, 1977) argue that the institutionalization of organizational systems often scarifies efficiency criteria, leading to unintended consequences. Ironically, conformity to institutionalized rules confers organizational legitimacy, which serves as a means to achieve certain objectives (Dacin et al., 2007; Sine et al., 2007; Ye et al., 2013). Strategic compliance to institutional norms is considered as an instrumental means to achieve certain organizational purposes, leading to positive

performance outcomes (Sandholtz, 2012). In fact, the contradictory organizational consequences in the institutionalization of management systems like ISO 9000 are one of the most intriguing research topics in operations management.

In this research we look into some important consequences of the institutionalization of ISO 9000 – a quality certification that has emerged as an important common operational practice in the global supply chain (Guler et al., 2002; Heras-Saizarbitoria and Boiral, 2015). We seek to investigate if ISO 9000 certification really makes organizations more effective, or such technical objectives are distorted due to institutionalization (Boiral, 2003). We look into the wider organizational implications, including operational efficiency, sales revenue, shareholder value, and senior executive compensation. We conduct this research using longitudinal data of manufacturing firms in the U.S. from 1990 to 2006 when the standard was increasingly institutionalized in the U.S. manufacturing industry.

2. Background and Research Hypotheses

2.1. The Process of Institutionalization

Organizations often encounter pressures to comply with certain institutional norms of practice (Oliver, 1988; Scott and Meyer, 1991; Glover et al., 2014). Economists believe that people and organizations are rational in maximizing their own benefits (Nelson and Winter, 1982). The institutional perspective, however, assumes that people and organizations are imposed by institutional forces that they have to adopt certain standards, whether or not they

are effective in solving problems (Palmer et al., 1993; Castka et al., 2015).

Economic actions for efficiency are embedded in a normative and socially constructed context (Granovetter, 1985). Normally, technical reasons are the primary consideration for a firm to adopt organizational innovations (Ritti and Silver, 1986). As an increasing number of organizations have adopted an organizational practice, it becomes progressively institutionalized, or widely understood as both appropriate and necessary (Tolbert and Zucker, 1983). An organization adopting such a common practice acquires legitimacy with its stakeholders to the extent that they regard the organization is consistent with prevailing "institutional logics" (Zajac and Westphal, 2004). Over time, the organizational practice acquires social and market legitimacy, which simulates later adopters to implement it (Tolbert and Zucker, 1983). Institutionalization can be a self-reinforcing process fueled by the "rhetoric of success" circulating among the constituents (Zbaracki, 1998; Glover et al., 2014). The discourse of an organizational innovation could lead to the development of an overly optimistic view that commonly fuels institutional forces.

2.2. Research Hypotheses

Institutional theorists maintain that the survival and prosperity of an organization depend not only on its technical efficiency, but also on positive images from stakeholders (Hannan and Freeman, 1984). The social and normative context actually motivates organizational actors to seek approval or legitimacy from major constituents, particularly their customers.

Institutional environments legitimate a firm's operations and outputs, while legitimacy contributes directly to sales revenue by making the firm easier to attract customers and increasing the demand for its products (Oliver, 1997). Market legitimacy refers to the licenses and rights to conduct business or compete in a certain industry (Dacin et al., 2007). Purchasers look for legitimate suppliers with related certifications in their industrial sectors, which are perceived to be more reliable. ISO 9000 provides a firm with an efficient means to communicate its legitimate organizational practice to the market and provides buyers with a positive image for their commitment to quality (Clougherty and Grajek, 2008). As ISO 9000 is increasingly institutionalized, the certification is increasingly being used as an important criterion for selecting suppliers and business partners by multinationals, local enterprises or government organizations (Douglas et al., 1999).

In fact, marketing forces commonly drive the institutional adoption of quality management standards (Boiral, 2003; Hayes, 1994). As a quality management standard has evolved to become a "passport" for international business (Christmann and Taylor, 2001; Delmas, 2002), non-certified firms face the risk of being screened out from customers' potential supplier lists. In particular, ISO 9000 certification is especially important for organizations involved in international trade (Clougherty and Grajek, 2008). The signaling effect of quality certification itself attracts customers, leading to higher sales revenue. Accordingly, we developed the first hypothesis:

H1: The institutionalization of ISO 9000 is positively related to sales revenue

The original objective of quality management standards was to ensure that organizational resources are utilized efficiently through management systems. However, as organizations become increasingly institutionalized, technical efficiency becomes less a concern. In the process of institutionalization, organizations passively respond to isomorphic adoption pressures, instead of actively seeking unique opportunities for improvement (Meyer and Rowan, 1977; Scott, 1995; Westphal et al., 1997). This makes quality management systems increasingly symbolic and ineffective in the process of institutionalization. Consequently, we developed the second hypothesis as below. It is worthwhile to note that we hypothesize that the process of institutionalization lowers the efficacy of ISO 9000 adoption, not that ISO 9000 adoption decreases operational efficiency directly.

H2: The institutionalization of ISO 9000 is negatively related to operational efficiency

If the institutionalization of ISO 9000 improves a firm's sales as a result of market legitimacy without necessarily enhancing its operational efficiency, how would it affect the firm's shareholder value? According to institutional theory, even if the implementation of ISO 9000 does not provide the certified firm with substantial operational benefits, the certification by itself confers legitimacy on the firm, improving corporate image and reducing perceived risk (Bansal and Clelland, 2004; Walgenbach, 2001). This improved image and reduced

perceived risk are likely to be reflected in the firm's market value (Bansal and Clelland, 2004; Dowell et al., 2000). In particular, organizations that adopt ISO 9000 are adhering to some standardized prescriptions in the institutionalized environment, acting to collectively valued purposes in a proper manner, which might be valued by investors.

Institutional theory highlights that the behaviors of investors are influenced by institutional forces that sometimes compromise market efficiency (Zajac and Westphal, 2004). Studies in investment psychology have shown that investors often make decisions based on collectively believed evaluation rather than individual assessment of a firm's economic performance (Abolafia, 1996; Cetina and Bruegger, 2002). In particular, the actual technical benefit from ISO 9000 implementation in individual firms cannot be accurately evaluated by investors. Instead, the signaling effect of ISO 9000 certification is likely to have a more significant impact on investors (Clougherty and Grajek, 2008). We therefore proposed the following hypothesis:

H3: The institutionalization of ISO 9000 is positively related to shareholder value (measured by Tobin's q)

In theory, institutional compliance might also lead to personal benefits, particularly senior executives (Scott, 1995; Yeung et al., 2011). Institutional approvals and legitimacy of firms can help senior executives obtain recognitions, whether or not they improve process efficiency (Staw and Epstein, 2000). If senior executives really improve firm performance by

adopting quality management standards, they will certainly be rewarded with higher compensation. However, even if quality management standards are not technically effective, senior executives still obtained legitimacy by bringing the organization some reputation. Previous studies have shown that organizational leaders can act symbolically to comply with institutional norms to gain personal legitimacy (Zajac and Westphal, 1995). In particular, the adoption of quality management standards can lead to higher short-term and long-term compensations of the senior management (Yeung et al., 2011). Subsequently, through compliance to quality management standards, the CEO's own reputation is enhanced, which justifies increases in their compensation. From this perspective, we developed the fourth hypothesis:

H4: The institutionalization of ISO 9000 is positively related to CEO Compensation

3. Research Design

3.1. Data Sources

Most studies in quality management standards are conducted in the western context. Although it would be interesting to study quality management standards in emerging countries such as China, the longitudinal data in the country are often insufficient as we had attempted. As a result, we have turned to explore our empirical questions based on stock listed firms in the U.S. We focused on the manufacturing industries because they are highly institutionalized for quality management standards. The organizational performance and CEO's compensation

data were obtained from COMPUSTAT and EXECUCOMP databases, respectively. Since ISO 9000 was first adopted in the U.S. manufacturing industry in 1990, we obtained organizational performance data covering the period 1988-2006.

3.2. Variables

3.2.1. Dependent Variables

We considered sales revenue as the total sales income excluding special items. We were interested in the sales revenue, instead of the profit from sales, which might be more related to organizational efficiency. For operational efficiency, we adopted two commonly used measures in the manufacturing industry – return on asset (ROA) and labor productivity (Grant et al., 1988; MacDuffie et al., 1996). ROA is net operating income (before depreciation, interest and taxes) divided by total assets. Labor productivity is defined as net operating income – net value added – per employee (Lieberman and Demeester, 1999). We obtained performance (or compensation) data for four successive years upon and after certification (i.e., t to t+3; assuming t was the year of certification). This is because ISO 9000 certification is likely to have an impact on organizational performance not only in the year of certification, but some years after certification. Repeated measures would enable us to obtain more reliable performance results.

We used Tobin's q as a proxy for shareholder value (Anderson et al., 2004). Tobin's q is a forward-looking and market-based measure that captures increases in shareholder value in

the capital market due to unmeasured intangible assets such as reputation, goodwill and legitimacy (Bharadwaj et al., 1999). Tobin's *q* differs from performance measures such as ROA or labor productivity in that the former is the future value of a firm anticipated by investors. Tobin's *q* is the ratio of the market value to the replacement costs of its tangible assets. Using the formula of Chung and Pruitt (1994), we calculated market value as the sum of equity value, net current liabilities and long-term debt in book value, and. Replacement costs are the total assets of the firm in book value.

We focused on the cash compensation of CEOs (i.e., salaries and bonuses). We did not consider long-term incentive pay because it comprises primarily stock options and other forms of equity-based compensation. Salaries and bonuses are *ex post* measures that reinforce appropriate results and reward the CEO directly for their current performance. Since our objective was to study the consequences of ISO 9000 certification given that the standard is increasingly institutionalized in the manufacturing industry, salaries and bonuses better suited our research.

3.2.2. Independent Variables

There are two proxies for the level of institutionalization, which are the time of adoption and the proportion of adopting firms. First, previous research on institutional theory has shown that the level of institutionalization of organizational innovations is highly related to the time of adoption in that the later the adoption, the stronger the institutional pressure

(Tolbert and Zucker, 1983; Young et al., 2001). Second, the impetus of institutional forces also depends on the relative number of firms in a particular industry that have adopted an organizational innovation. We took the weighted proportion (based on total sales) of ISO 9000 certified firms in an industry as our measure. The proportion of certified firms in different years in a particular industrial sector was considered an industry-level variable (refer to the section of "Hierarchical Linear Modeling"). We took the 2-digit SIC code as most of the previous studies in this area.

3.2.3. Control Variables

We selected four control variables, which are firm size, pre-certification performance or compensation, the relative performance change of the control group and R&D intensity. Firm size was taken as the natural logarithm of a firm's total assets. Pre-certification performance was taken as the sample firm's own performance two years (i.e., year *t*-2) before it adopted ISO 9000. A period of two years was considered to be appropriate since it normally takes 9-18 months to implement ISO 9000. Figure 1 shows the timeline of our measurements. We took the relative performance of the control group as a control factor. The use of control group in this research minimized the confounding factors in a particular industry or due to time-dependent economic issues (Barber and Lyon, 1996). We first matched each sample firm with one or a few control firms of similar firm size (33%-300% of total assets) in the same industry (2-digit SIC). The control firms must also have similar pre-certification performance

of the matched sample firm (90% to 110% of the performance or compensation level) (Barber and Lyon, 1996). Table 2 presents some descriptive statistics of the sample and control firms. If a sample firm could not be matched with any control firm based on the criteria above, we dropped that observation to ensure the accuracy of our analysis. Finally, we included also a firm's R&D intensity, which is its R&D expenses over total sales. Previous research has shown that ISO 9000 tends to be less effective in technology intensive firms since process standards will crowd out explorative innovations, threatening the long-term adaptability of such firms (Benner and Tushman, 2002).

3.3. Hierarchical Linear Modeling

Hierarchical Linear Modeling (HLM), which can account for correlated and heterogeneous variances, is widely adopt to examine multilevel data (Bloom and Milkovich, 1998; Raudenbush and Bryk, 2002). HLM overcomes the statistical issues arisen from nested organizational data (Hofmann, 1997). It reduces concerns about aggregation bias and provides a method for directly modeling how a predictor variable measured at one level affects dependent variables at another level (Bloom and Milkovich, 1998). For each analysis, we first specified a null model where there is no predictor variable. Next, we specified a baseline model, which include all the control variables. Subsequently, we added to the model year of ISO 9000 certification, which is a firm-level predictor variable. In the final model, we added the proportion of adopting firms, which is an industry-level predictor variable. Following are

the equations for our firm- and industry-level models:

Firm Level Model (Second Level):

$$
\begin{aligned}
Y_{ti} = \quad & \beta_{0i} + \\
& \beta_{1i} * (\text{Firm Size}_{ti}) + \\
& \beta_{2i} * (\text{Pre - certification Performance}_{(t=-2)i}) + \\
& \beta_{3i} * (\text{Relative Performance of Control Group}_{ti}) + \\
& \beta_{4i} * (\text{R \& D Intensity}_{ti}) + \\
& \beta_{5i} * (\text{Time of Adoption}_{i}) + e_{ti}
\end{aligned}
$$

Industry Level Model (Third Level):

$$
\begin{aligned}
Y_{tij} = \quad & \gamma_{00} + \\
& \gamma_{10} * (\text{Firm Size}_{tij}) + \\
& \gamma_{20} * (\text{Pre - certification Performance}_{(t=-2)ij}) + \\
& \gamma_{30} * (\text{Relative Performance of Control Group}_{tij}) + \\
& \gamma_{40} * (\text{R \& D Intensity}_{tij}) + \\
& \gamma_{01} * (\text{Proportion of Adopting Firms}_{tj}) + \\
& u_{0j} + u_{1j} + u_{2j} + u_{3j} + u_{4j} + e_{tij}
\end{aligned}
$$

where

Y is the post-certification performance of sample firms of firm *i* at year *t*

t is the number of years before or after ISO 9000 certification;

i stands for organizations in a firm level;

j indicates the sectors in an industry level.

4. Results

Table 1 shows a correlation matrix and general descriptive statistics. The average pre-event total assets and sales revenue of our sample were 1,851.13 and 1,692.50 million dollars, respectively. The average number of employees of our sample firms was 9,632. The correlation matrix shows that the relationship between CEO compensation (i.e., salaries and

bonuses) and firm size (e.g., total assets) was quite strong. However, the relationship between CEO compensation and performance (e.g., ROA) was generally weak.

H1 predicts that the institutionalization of ISO 9000 is positively related to post-certification sales revenue. The results are presented in Table 3. Model 1, the Null Model, shows that there was a significant variance in sales revenue across firms to be explained ($p < 0.001$). Model 2, the Baseline Model, shows that firm size ($p < 0.01$), pre-certification performance ($p < 0.001$) and relative performance of control firms ($p < 0.001$) were significant control factors for sales revenue. Since sales revenue was highly related to firm size, pre-certification performance and relatively performance of control group, these control factors explained 93.66 percent of the total variance in sales revenue. The change in chi-square value was -246.063, which is highly significant ($p < 0.001$). Model 3 shows the impact of time of adoption on post-certification sales revenue. The results clearly show that time of adoption was a significant factor for post-certification sales revenue. The un-standardized coefficient for time of adoption was 44.838 (standard error [s.e.] = 15.539), which is significant at $p < 0.01$. The χ^2-value for Model 3 dropped by 15.524, which is also highly significant ($p < 0.001$). Time of adoption explained an additional 1.00 percent of the variance in sales revenue. Similar results were obtained for proportion of adopting firms (Model 4). The un-standardized coefficient for proportion of adoption was 902.791 (s.e. = 246.250), which is highly significant at $p < 0.001$. The variance explained for Model 4 was

2.38 percent, indicating that the weighted proportion of adopting firms had a higher explanation power for sales revenue than time of adoption. The χ^2-value dropped very significantly by 26.194 ($p < 0.001$). Hypothesis 1 was fully supported in that both time of adoption and proportion of adopting firms are positively related to post-certification sales revenue.

H2 predicts that the institutionalization of ISO 9000 is negatively related to operational efficiency. The results for ROA and labor productivity are presented in Tables 4 and 5, respectively. Model 3 in Table 4 shows that time of adoption was a significant predictor for ROA. The un-standardized coefficient for time of adoption was -0.006 (s.e. = 0.001), which is highly significant at $p < 0.001$. Time of adoption explained an additional 4.50 percent of the variance in ROA after the control factors were included. The chi-square value dropped by 3.987, which is significant at $p < 0.05$. Model 4 shows that the un-standardized coefficient for proportion of adopting firms was -0.096 (s.e. = 0.022), which is highly significant at $p < 0.001$. The variance explained for Model 4 was 4.86 percent and the change in chi-square value was -13.447 percent ($p < 0.001$). Similar results were obtained for labor productivity as presented in Table 5. The un-standardized coefficient for time of adoption (Model 3) and proportion of adopting firms (Model 4) were -0.892 (s.e. = 0.400, $p < 0.05$) and -15.325 (s.e. = 5.836, $p < 0.05$), respectively, implying significant drops in labor productivity. The chi-square values dropped by 4.947 ($p < 0.05$) and 12.205 ($p < 0.001$) for Models 3 and 4,

respectively. The variance explained for Model 3 and Model 4 were 1.29 percent and 1.42 percent, respectively. Hypothesis 3 was fully supported as both time of the adoption and proportion of adopting firms are negatively related to ROA and labor productivity.

H3 predicts that the institutionalization of ISO 9000 is positively related to higher shareholder value as indicated by Tobin's *q*. The un-standardized coefficient for time of adoption (Model 3) and proportion of adopting firms (Model 4) were -0.032 (s.e. = 0.014; $p < 0.05$) and -0.382 (s.e. = 0.227; $p < 0.1$), respectively. Contrary to our hypothesis, we found that both time of adoption and proportion of adopting firms were *negatively* related to Tobin's *q*. However, the change in chi-square values was not significant for both models ($p > 0.1$). The variance explained for Model 3 and Model 4 were 1.67 percent and 0.49 percent, respectively. H3 was not supported.

Finally, we predicted that the institutionalization of ISO 9000 is positively related to CEO compensation. The results for salaries and bonuses are presented in Tables 7 and 8, respectively. Model 3 in Table 7 shows that time of adoption was positively related to CEO salaries. The un-standardized coefficient for time of adoption was 6.890 (s.e. = 3.430) which is significant at $p < 0.05$. Time of adoption explained an additional 2.70 percent of the variance in salaries after the control factors were included. The chi-square value dropped by 8.300, which is significant at $p < 0.01$. Model 4 shows that the un-standardized coefficient for proportion of adopting firms was 227.351 (s.e. = 46.003), which is significant at $p < 0.01$.

The variance explained for Model 4 was 14.6 percent and the chi-square value dropped by 32.355, which is very significant ($p < 0.001$). Very consistent results were obtained for CEO bonuses as presented in Table 8, where we also obtained a very good model fit ($p < 0.001$). H4 was fully supported. In general, proportion of adopting firms is a better predictor than time of adoption for CEO compensation, with a better model fit and a higher percentage of variance explained.

5. Discussion

We found that the institutionalization of a quality management standard actually leads to paradoxical organizational consequences. A summary of the results is illustrated in Figure 2. First, the institutionalization of ISO 9000 is related to increases in sales revenue, but such increases are decoupled from the technical benefits from its adoption. As ISO 9000 certification is increasingly institutionalized, certified firms can gain wider market access. Institutional environments in the industrial or consumer markets legitimate an ISO 9000 certified firm's operations and outputs, with legitimacy contributing directly to its sales performance. Industrial markets operate in socially constructed environments in that they favor legitimate suppliers with quality certifications. Although technical performance is a major concern in the manufacturing industry, technical considerations are not independent of institutional environments. As the value of ISO 9000 becomes increasingly taken-for-granted among industrial buyers, the technical performance from the standard becomes increasingly

less relevant.

Our findings support an institutional perspective on how industrial markets value ISO 9000 certification and challenge the predominant perspective that industrial markets, unlike civil service organizations, social agencies or public schools, are operating in a highly technical environment with little institutional pressure (Meyer et al., 1983; Oliver, 1997). Although previous research has shown that institutionalization is in conflict with technical performance, very few studies have demonstrated the decoupling between market legitimacy and technical reality in industrial supply chains. Industrial markets are highly competitive, but they are also highly institutionalized simultaneously. Such a conflict certainly warrants more attention from both academics and practitioners.

Second, although we found that the institutionalization of ISO 9000 positively leads to higher sales revenue, it does not improve the Tobin's *q* of a firm – ISO 9000 is not positively evaluated by the investment community as it is in industrial markets. We expected that following the institutionalization of ISO 9000, the standard becomes a symbol for quality management and operational legitimacy. Investors should react to organizational legitimacy and evaluate the firm more highly (Arthur, 2003). Although previous research on top management team legitimacy and work-family initiatives (Arthur, 2003; Cohen and Dean, 2005) supported such a perspective, our research on ISO 9000 has come up with different findings. One possible explanation is that stock investors, unlike industrial customers, have a

rather different perspective on quality certifications like ISO 9000. Industrial customers select their suppliers based on ISO 9000 certification, but the stock market is less institutionalized with it. In fact, institutional theorists have suggested that there are different sources of organizational legitimacy (Dacin et al., 2007) – ISO 9000 confers only market legitimacy but not investment legitimacy. Another possible reason for the lack of positive stock market response is due to the fact that we looked into long-term market evaluation of ISO 9000 up to a few years after the certification, instead of short-term market reactions (e.g., a few days immediately after the announcements of ISO 9000 certification). Although adopting ISO 9000 could confer a positive image on the company in the short-term, the long-term market valuation of the firm might principally rely on its actual performance, in terms of operational efficiency. Investors, unlike industrial buyers, might evaluate the value of a company based on its actual operational and financial performance.

Finally, in supporting both H2 and H4, we found decoupling between technical benefits and symbolic value of ISO 9000 to top management or board of directors. The compensation of the CEO of an ISO 9000 certified firm is increased along with decreases in operational efficiency. This paradoxical phenomenon suggests that the CEO obtains benefits from ISO 9000 adoption not necessarily because of improved organizational efficiency, but in recognition of its symbolic value when ISO 9000 is increasingly institutionalized in the manufacturing sector. According to institutional theorists (e.g., Palmer et al., 1993),

organizational leaders select to implement innovation programs on the basis of efficiency considerations only at the times when the programs are initially introduced. ISO 9000 certification might be seen as an indicator of the competence of the CEO in managing the firm when the standard becomes increasingly institutionalized. Socially legitimate leaders are positively evaluated by observers of the organization (e.g., board of directors).

In particular, we believe that the institutionalization of quality management standards could be highly related to personal interest (DiMaggio, 1988; Goodrick and Salancik, 1996; Yeung et al., 2011). The adoption of ISO 9000 might be a 'strategic choice' for personal legitimacy of organizational leaders. If the CEO of a firm has advanced knowledge of the institutional environment, they could actively evoke the symbolic value of process certificate in their firm. Subsequently, ISO 9000 certification enhances their personal legitimacy, which justifies increases in their salaries and bonuses. The CEO can make use of the authority and resources associated with their position to facilitate the creation and diffusion of ISO 9000. They have the power to interpret what is important to their organization and create the institutional needs internally.

In this research we documented how the institutionalization of ISO 9000 could have led to conflicting organizational outcomes and negative consequences. A relevant question to this research is what can be done to resolve this decoupling issue. We believe that process standards like ISO 9000 might focus too much on systems and procedures, but not enough on

results and outcomes, making it particularly susceptible to institutional forces. Academics have observed that although quality management ideas originated from statistical quality control, which is highly fact-based and result-oriented, they subsequently evolved into an unmeasured, rhetorical set of formality (Hackman and Wageman, 1995; Zbaracki, 1998). Industrial buyers and supply chain managers might need to pay special attention to the institutional decoupling issue and not to rely on the use of institutionalized management systems as the primary criterion in selecting suppliers, products or services. Process driven approaches are not necessarily a fault by itself, but as process systems are institutionalized, they may lead to unanticipated and often negative consequences.

6. Conclusions and Future Research

We found that the institutionalization of ISO 9000 leads to paradoxical organizational consequences. First, the institutionalization of ISO 9000 is related to increases in sales revenue, but such increases are decoupled from the technical benefits from its adoption. Second, although we found that the institutionalization of ISO 9000 positively leads to higher sales revenue, it does not improve the Tobin's q of a firm. It seems that ISO 9000 confers only market legitimacy but not investment legitimacy. Finally, we revealed that the institutionalization of ISO 9000 leads to higher CEO compensation, despite deteriorating organizational performance. In an institutionalized environment, ISO 9000 certification leads to personal legitimacy and higher compensation for the organizational leaders. We further

argued that management's own interests could drive the adoption of institutionalized management systems like ISO 9000.

We make two suggestions for future research. First, we believe that it would be interesting to investigate the organizational consequences of the adoption of other quality management practices such as ISO/TS 16949 (Boiral, 2007), and examine the potential conflicting organizational outcomes. Second, it would be interesting to investigate to what extent industrial markets learn and realize that ISO 9000 no longer assures quality and efficiency as the standard has become highly institutionalized. As we have observed, some industrial customers are realizing that ISO 9000 certification does fully assure quality and efficiency as they have expected.

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FIGURE 1

Time of Measurements in Research Design

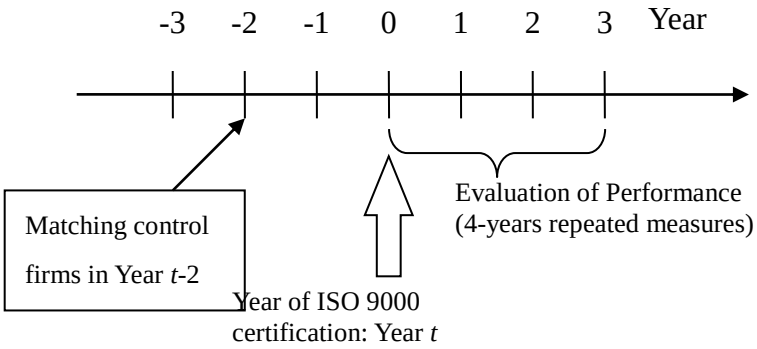

FIGURE 2

The Performance Effects in the Institutionalization of ISO 9000

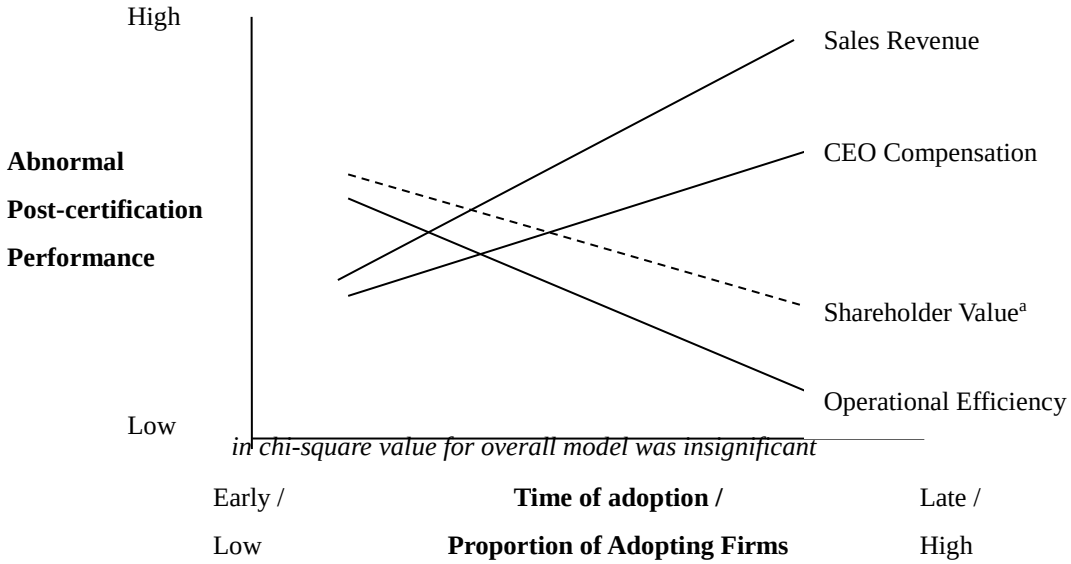

TABLE 1

Descriptive Statistics and Correlations[a]

	Variables	N[b]	Mean	s.d.	1	2	3	4	5	6	7	8	9
1	Total Asset (Million Dollars)	531	1851.13	5249.60									
2	Sales Revenue (Million Dollars)	531	1692.50	4508.56	.96								
3	ROA	523	0.115	0.171	.08	.13							
4	Labor Productivity (Thousand Dollars)	438	27.22	24.76	.20	.12	.44						
5	Tobin's *q*	461	1.46	1.56	.04	.05	.15	.13					
6	CEO Salaries (Thousand Dollars)	134	506.44	213.88	.66	.66	-.02	-.05	-.07				
7	CEO Bonuses (Thousands Dollars)	113	533.37	422.90	.42	.37	.07	.15	.10	.46			
8	R&D Intensity	523	0.12	0.39	-.06	-.08	-.48	-.54	.10	-.19	-.00		
9	Time of adoption	523	8.73	3.61	-.10	-.13	-.21	-1.1	.07	-.06	-.07	.16	

[a] Correlation coefficients greater than .07 are significant at $p < .05$

[b] N is the number of firms

TABLE 2

Comparison of Sample and Control Groups at Year *t*-2

Variables	N[b]	Sample	Control
Total Asset	531	US$ 1851 millions	US$1843 millions
Sales Revenue	531	US$ 1693 millions	US$ 1685 millions
ROA	523	11.51%	11.41%
Labor Productivity	438	US$ 27,220 /employee	US$ 27,168 /employee
Tobin's *q*	461	1.457	1.454
CEO Salaries	134	US$ 506,440	US$ 503,529
CEO Bonuses	113	US$ 533,370	US$ 534,280

[b] N is the number of firms

TABLE 3

Results of HLM Estimation for Sales Revenue

	Model 1: Null Model	Model 2: Baseline Model	Model 3: Time of Adoption	Model 4: Proportion of Adopting Firms (Weighted)
Firm Level Indicators				
Intercept	5927.976 ***	-482.829 *	-1015.416 ***	-1144.202 ***
	(1624.326)	(234.544)	(298.680)	(294.646)
Firm Size		127.319 **	137.903 ***	141.729 ***
		(42.250)	(42.230)	(41.976)
Pre-certification Performance		1.074 ***	1.077 ***	1.074 ***
		(0.019)	(0.019)	(0.019)
Relative Performance of Control Group		0.540 ***	0.533 ***	0.536 ***
		(0.037)	(0.037)	(0.037)
R&D Intensity		70.694	-24.865	-53.823
		(300.573)	(300.856)	(299.022)
Time of Adoption			44.838 **	
			(15.539)	
Industry Level Indicator				
Proportion of Adopting Firms (Weighted)				902.791 ***
				(246.250)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	25872.676	25626.613	25611.089	25600.419
Change in Chi-square ($\Delta\chi^2$)		-246.063 ***	-15.524 ***	-26.194 ***
Change in Variance Explained (ΔR^2)		93.66%	1.00%	2.38%

Notes: N = 1,858 at firm-year level; N = 531 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

TABLE 4

Results of HLM Estimation for ROA

	Model 1: Null Model	**Model 2: Baseline Model**	**Model 3: Time of Adoption**	**Model 4: Proportion of Adopting Firms (Weighted)**
Firm Level Indicators				
Intercept	0.099 ***	-0.002	0.057 **	0.063 **
	(0.007)	(0.015)	(0.021)	(0.021)
Firm Size		0.010 ***	0.008 ***	0.008 **
		(0.003)	(0.003)	(0.003)
Pre-certification Performance		0.513 ***	0.491 ***	0.489 ***
		(0.035)	(0.035)	(0.035)
Relative Performance of Control Group		0.034	0.030	0.027
		(0.028)	(0.028)	(0.028)
R&D Intensity		-0.032 *	-0.030 *	-0.029 *
		(0.013)	(0.013)	(0.013)
Time of Adoption			-0.006 ***	
			(0.001)	
Industry Level Indicator				
Proportion of Adopting Firms (Weighted)				-0.096 ***
				(0.022)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	-1486.629	-1789.668	-1793.655	-1803.115
Change in Chi-square ($\Delta\chi^2$)		-303.039 ***	-3.987 *	-13.447 ***
Change in Variance Explained (ΔR^2)		53.34%	4.50%	4.86%

Notes: N = 1,820 at firm-year level; N = 523 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

TABLE 5

Results of HLM Estimation for Labor Productivity

	Model 1: Null Model	Model 2: Baseline Model	Model 3: Time of Adoption	Model 4: Proportion of Adopting Firms (Weighted)
Firm-level Indicators				
Intercept	30.440 ***	-6.109	2.475	3.077
	(1.782)	(4.741)	(6.085)	(5.872)
Firm Size		2.485 ***	2.173 **	2.192 **
		(0.726)	(0.736)	(0.730)
Pre-certification Performance		0.838 ***	0.864 ***	0.854 ***
		(0.058)	(0.059)	(0.058)
Relative Performance of Control Group		0.197 ***	0.201 ***	0.195 ***
		(0.035)	(0.035)	(0.035)
R&D Intensity		-40.729 †	-36.729	-30.509
		(22.340)	(22.300)	(22.550)
Time of Adoption			-0.892 *	
			(0.400)	
Industry-level Indicator				
Proportion of Adopting firms (Weighted)				-15.325 *
				(5.836)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	11869.691	11665.325	11660.378	11653.120
Change in Chi-square ($\Delta\chi^2$)		-204.366 ***	-4.947 *	-12.205 ***
Change in Variance Explained (ΔR^2)		42.08%	1.29%	1.42%

Notes: N =1,571 at firm-year level; N = 438 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

TABLE 6

Results of HLM Estimation for Tobin's *q*

	Model 1: Null Model	Model 2: Baseline Model	Model 3: Time of Adoption	Model 4: Proportion of Adopting Firms (Weighted)
Firm Level Indicators				
Intercept	1.514 ***	0.792 ***	1.170 ***	1.033 ***
	(0.062)	(0.180)	(0.242)	(0.230)
Firm Size		-0.008	-0.016	-0.015
		(0.027)	(0.027)	(0.027)
Pre-certification Performance		0.507 ***	0.516 ***	0.516 ***
		(0.038)	(0.038)	(0.038)
Relative Performance of Control Group		0.256 ***	0.256 ***	0.257 ***
		(0.029)	(0.029)	(0.029)
R&D Intensity		0.010	0.032	0.032
		(0.107)	(0.107)	(0.107)
Time of Adoption			-0.032 *	
			(0.014)	
Industry Level Indicator				
Proportion of Adopting Firms (Weighted)				-0.382 †
				(0.227)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	4333.567	4181.385	4182.795	4179.680
Change in Chi-square ($\Delta\chi^2$)		-152.182 ***	1.410	-1.705
Change in Variance Explained (ΔR^2)		27.51%	1.67%	0.49%

Notes: N = 1,606 at firm-year level; N = 461 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

TABLE 7

Results of HLM Estimation for CEO Salaries

	Model 1: Null Model	**Model 2: Baseline Model**	**Model 3: Time of Adoption**	**Model 4: Proportion of Adopting Firms (Weighted)**
Firm Level Indicators				
Intercept	641.587 ***	-69.477	-154.914 *	-238.653 ***
	(22.507)	(58.573)	(71.812)	(64.655)
Firm Size		41.870 **	47.035 ***	46.604 ***
		(13.164)	(13.261)	(12.373)
Pre-certification Performance		0.781 ***	0.761 ***	0.772 ***
		(0.087)	(0.086)	(0.081)
Relative Performance of Control Group		0.169 **	0.167 **	0.113 †
		(0.064)	(0.064)	(0.062)
R&D intensity		-140.436	-197.942 †	-258.819 **
		(97.398)	(100.462)	(94.250)
Time of Adoption			6.890 *	
			(3.430)	
Industry Level Indicators				
Proportion of Adopting Firms (Weighted)				227.351 **
				(46.003)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	4527.399	4292.381	4284.081	4260.026
Change in Chi-square ($\Delta\chi^2$)		-235.018 ***	-8.300 **	-32.355 ***
Change in Variance Explained (ΔR^2)		83.00%	2.70%	14.6%

Notes: N = 455 at firm-year level; N = 134 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

TABLE 8

Results of HLM Estimation for CEO Bonuses

	Model 1: Null Model	Model 2: Baseline Model	Model 3: Time of Adoption	Model 4: Proportion of Adopting Firms (Weighted)
Firm Level Indicators				
Intercept	778.844 ***	-562.360 *	-978.057 **	-963.193 **
	(58.898)	(239.954)	(323.721)	(306.413)
Firm Size		148.453 ***	172.596 ***	163.374 ***
		(36.608)	(38.194	(36.880)
Pre-certification Performance		0.537 ***	0.514 ***	0.518 ***
		(0.126)	(0.125)	(0.124)
Relative Performance of Control Group		0.324 ***	0.321 ***	0.323 ***
		(0.072)	(0.072)	(0.072)
R&D Intensity		-953.824 †	-1138.619 *	-1138.758 *
		(487.214)	(492.141)	(489.002)
Time of Adoption			29.858 †	
			(13.986)	
Industry Level Indicator				
Proportion of Adopting Firms (Weighted)				467.014 *
				(226.27)
Goodness-of-fit				
-2 Log-likelihood (Deviance)	4383.750	4303.163	4292.192	4286.263
Change in Chi-square ($\Delta\chi^2$)		-80.587 ***	-10.971 ***	-16.900 ***
Change in Variance Explained (ΔR^2)		52.70%	2.40%	3.20%

Notes: N = 354 at firm-year level; N = 113 at firm level; N = 20 at industry level.
Standard errors in parentheses; †$p < 0.1$, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$

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