

Compliance with International Standards: The EDIFACT and ISO 9000 Standards in Japan

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International standards play an increasingly important role in the world economy. Research in the field of economics on standardisation has focused on addressing the question of how and in which situations standards should be generated. While this analysis is important, it tends to overlook the subsequent process of implementation, despite its importance for an appropriate standard setting. This paper uses empirical evidence from Japanese firms in order to identify the reasons why and under which conditions firms do not comply with international standards. The Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT) standard, which defines data exchange networks, and the ISO 9000 standard, which defines quality management processes, are the two case studies. I also draw comparisons to the implementation of these standards in Germany. I conclude that non-compliance with standards is a common phenomenon with specific, regional characteristics. At the end, I make preliminary conclusions about new ways of thinking about how international standards are set.

1. Introduction

International organisations such as the World Trade Organisation (WTO) or the Organisation for Economic Cooperation and Development (OECD) increasingly demand that standards be harmonised, whether for the sake of creating a sustainable base for worldwide trade or the necessity of replacing federal responsibilities with private regulation. The General Agreement on Tariffs and Trade Standards Code of 1979 and the WTO's Agreement on Technical Barriers to Trade of 1995 in particular placed emphasis on the former. Both considered national and regional varieties of technical standards as possible barriers to trade. The latter became an important theme in the European New Approach of 1985.¹ These developments have triggered remarkable growth in international (and regional) standards, such as standards of the International Organisation for Standardisation (ISO), the International

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1. Thank you to one of the anonymous referees for this insight.

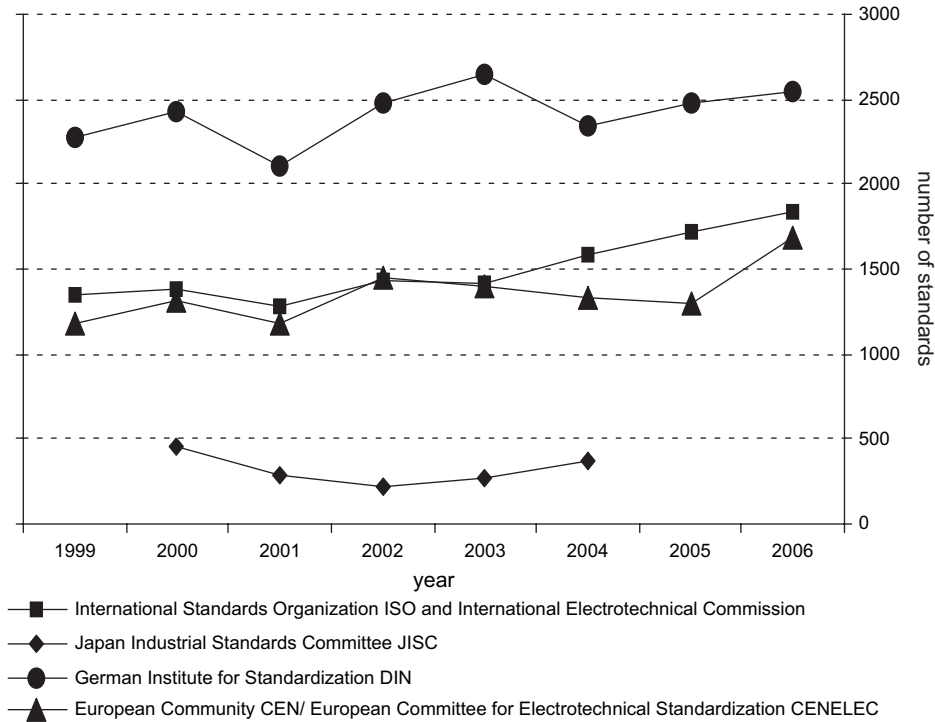


Figure 1. New International and National Standards by Year.

Source: Author's own arrangement based on data from European Community CEN/European Committee for Electrotechnical Standardization CENELEC annual reports, ISO and annual IEC reports. Statistic data provided by the DIN and Nihon Kōgyō Hyōjun Chōsakai, Dai-10-kai Sōkai (September 2005).

Electrotechnical Commission (IEC) or the European Committee for Electrotechnical Standardisation (CEN/CENELEC).² Even if the number of German standards is still the highest, Figure 1 makes clear that especially the number of international standards (ISO, IEC, CEN) has grown.

The changing *quality* of international standards is even more important. At their inception, international standards defined merely technical infrastructure, such as for mechanical joining elements like screws (Technical Committee/TC 2 in ISO) or for basic communication networks such as Open System Interconnection (OSI) (TC 97). Nowadays, standards apply to management issues as well, such as quality management (TC 176) or environmental management processes (TC 207).³ This development has evoked the impression that our world is becoming increasingly homogeneous through the increasing dominance of international rules.

Given this empirical background, economic research on standardisation has focused on the question of how and under which conditions standards should be set. One result of this research is that

2. In French, CEN/CENELEC is Communauté Européenne/Comité Européen de Normalisation Electrotechnique.

3. The empirical evidence for this contribution refers to the EDIFACT standard formulated in TC 154 and the ISO 9000 standard formulated in TC 176.

standardisation should be restricted to situations in which there is a common interest in standardising and in which the advantages of the common standard are greater than what the existence of several individual standards would have achieved in a comparable situation. The results of such a cost-benefit analysis are important since a too low or a too high number of standards may possibly induce negative welfare effects. In this paper, however, I analyse the subsequent implementation process and focus my attention on the reasons why adopted standards are not complied with. Specifically, I study Japanese firms' non-compliance with international standards and their reasons for not complying. I then draw conclusions about the consequences of non-compliance. I argue that a lack of compliance not only stems from weak monitoring systems, a condition stressed in the literature as 'soft law', but that it is also influenced by the quality of international standards and by a specific institutional environment—an environment that leads to specific complementarities between established standards and business processes on the one hand, and weak representation in international standardisation organisations on the other. Selected comparisons to German firms provide evidence that non-compliance is not restricted to Japanese firms. I also argue that after implementation 'one standard is not one standard' since the adaptors construct their own standard through strategies of mixing, decoupling and—to a certain extent—compliance.

Why are these considerations relevant? First, my findings run against the conventional wisdom that globalisation induces uniform, homogeneous and standardised processes since firms are able to decouple internal business processes from externally demanded standards. Popular scientific books that compare the standard ISO 9000 with the 'black ships' by which Commodore Perry forced Japan in 1853 to open the country after 200 years of self-selected isolation (Nichizawa 1995; Hosotani 1994), or the widespread and somewhat anxious reports on the increasing relevance of *gurōbaru sutāndādo* (global standards)⁴ are indicators of how sensitive the issue is in Japan. Second, if some standards—Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT) and ISO 9000 are good examples—are not necessarily superior standards and are in their quality even lower than already existing national or firm-level standards, the decoupling of structures and actions cannot be regarded as a problem but rather as an alert entrepreneurial response towards the increasing relevance of international standards. Japanese firms were confronted with a situation in which the relevance of EDIFACT and ISO 9000 clashed with their own well-tried institutions of Just in Time (JIT) and Total Quality Management (TQM), both of which were accepted as important elements of Japanese competitiveness. Third, non-compliance may well be problematic for international standardisation organisations and for civil society in general, for what sense does it make to formulate international standards if they are not complied with? Finally, this question leads back to the traditional question posed by standardising economics, namely, to the question of how standards should be formulated.

Drawing upon two international standards, EDIFACT and ISO 9000, I examine the specific reasons why Japanese firms comply or do not comply with them. I selected these two standards for three reasons. First, they both are very well known internationally. EDIFACT is one of the most widespread standards for Electronic Data Exchange (EDI) networks, and ISO 9000 is, with more than 776,000 certified companies in total, one of the most successful standards worldwide. Second, ISO 9000 in particular had an immense impact on the sensibility of Japanese actors towards international standards. Given the importance of ISO 9000 in international transactions, Japanese actors perceived

4. See Fujita and Kawahara (1998), Higashitani (1998), Nakakita (1997) and Nakakita and Watanabe (2001).

themselves as being backward in international standard setting due to their limited influence in this process and their late implementation of ISO 9000, which finally ran against their own economic interests. This spurred comprehensive political support for a stronger role for Japan in international standard setting. In one interview, an organisation affiliated with the Ministry of Economy, Trade and Industry (METI) clearly identified as one of its goals the idea ‘to formulate world standards that start from Japan’ (*Nihon kara hassha suru wārudo sutandādo*). Finally, from a more general perspective, there are two classes of standards, quality and compatibility standards, and I chose a representative of each. While non-compliance with the quality standard ISO 9000 may be imaginable, it is particularly astonishing that the compatibility standard EDIFACT, whose compliance should be in the self-interest of the introducing firm, is only partially complied with. Although more anecdotal, one of my German interview partners just could not believe that non-compliance with a compatibility standard exists. He expected that a standard introduced to create compatibility between electronic data systems should achieve exactly that after implementation. The more technical passages on EDIFACT in this paper may thus seem somewhat awkward; however, it is only through an examination of both types of standards that it becomes clear that the phenomenon of non-compliance is related to all types of standards.

This paper intends to make two contributions to our knowledge on standardisation. First, I focus on the oft-neglected implementation phase, providing empirical evidence for the decoupling of action and structures in Japanese firms. Second, I examine these firms’ reasons for non-compliance. Based on empirical results, I carefully draw conclusions about the consequences of decoupling with regard to international standard setting. This approach is new in the literature. Important contributions on standard implementation have been made by the ‘varieties of capitalism’ literature, which stresses varieties in standard architectures (e.g. Okumuro 1992; Casper and Hancké 1999; Tate 2001; and Walgenbach 2001 on EDI networks). In contrast, this paper is less about variations (as we also find from QWERTY to QWERTZ) as it is about compliance and non-compliance. Other standard-related papers describe how standards are used as a barrier to market entry and as a strategy to reduce price competition (see several contributions in Schaeede and Grimes 2003). This paper, however, chooses another approach to non-compliance by arguing that there is a sufficient number of cases where non-compliance is less a problem and more an alert entrepreneurial response towards institutional complementarities on the one hand and the quality of international standards on the other. Finally, while there are many papers that discuss Japan’s weakness in penetrating international markets with private standards (Noguchi 2003; Anchoroguy 2005; Storz and Moerke, eds. 2007) or vice versa, and papers that discuss how Japanese firms are successful in standard setting (Ratliff 2002), this paper is on committee-based standards and its focus is on their implementation.

This research is based on in-depth interviews with representatives of Japanese firms. In the case of EDIFACT, a total of 19 interviews were conducted in Japan in 2001: seven firms, mostly belonging to the automobile, machinery and electronics industries; three related associations;⁵ three public, administrative bodies (METI, city of Sakai, and Osaka Science and Technology Center); two consulting agencies; three individual researchers and one research institute. Empirical evidence for the German

5. These four associations include Japan Association for Simplification of International Trade Procedures [JASTPRO (Nihon Bōeki Kankei Tetsuzuki Kan’ika Kyōkai)], Japan Auto Parts Industries Association [JAPIA (Nihon Jidōsha Buhin Kyōkai)], Next Generation Electronic Commerce Promotion Council of Japan [ECOM (Jisedai Denshishō Torihiki Suishin Kyōgikai)] and Osaka Science and Technology Center (Osaka Kagaku Gijutsu Sentā).

situation is presented by Reimers (1995). Additionally, one German (electronics) firm and two associations⁶ were interviewed.

For ISO 9000, 38 interviews were carried out between 1999 and 2004 in Japan: 14 firms, from which the majority belonged to the automobile, machinery and electronics industries; four business associations;⁷ the Japanese Standards Association; three auditors [Japan Audit and Certification Organisation for Environment and Quality (JACO, Nihon Kankyō Ninshō Kikō), Japan Quality Assurance Association (JQA, Nihon Hinshitsu Hoshō Kikō) and Technischer Überwachungsverein (TÜV)]; six key personalities in public ministries and public consulting/testing institutes (METI, prefectural technology centres) and 10 research institutes and individual researchers were interviewed. For Germany, empirical evidence on ISO 9000 is presented by Walgenbach (2001) and contained in three interviews: two firms from the machinery sector and one with the national standardisation organisation DIN.

The remainder of the paper is organised as follows. Section 2 briefly defines and describes functions of compatibility and quality standards to which the selected standards EDIFACT and ISO 9000 belong. In Section 3, I discuss the economic approach to compliance. I then present my empirical evidence from the surveys carried out in Japan in Section 4. Section 5 focuses on specific reasons for the lack of full compliance with the international standards EDIFACT and ISO 9000. Finally, in Section 6, I summarise the results and discuss potential consequences for the design of international standards.

2. Institutions and Standards

Economic transactions need to be based on a set of common institutions since they channel the behaviour of different actors into a certain direction so that their products or processes become comparable and compatible. In order to achieve the channelling function, institutions have to be sanctioned externally (e.g. by auditing) or internally (e.g. by norms or self-interest). Standards are a type of common institution as they define similarities of products and processes.

Standards can be generated by the market, committees or the state. They can be formulated at different functional (e.g. sectoral) and spatial (e.g. national or international) levels. In this paper, I focus on committee-based standards set up by the ISO, which are intersectoral in nature and often intend to procure a public good.⁸

Standards can be divided into compatibility and quality standards. Compatibility standards enable coordination, such as plug and power outlets or compatible interfaces between data banks, so that their non-existence may induce market failures. When a compatibility standard is set, compliance with the standard lies in the adaptor's interest; otherwise, the important provision of compatibility does not come into being (Farrell and Saloner 1988; Thum 1994; Farrell 1996). The EDIFACT standard examined in this paper creates interfaces between the EDI networks of firms. EDIFACT enables firms of

6. The two associations are Deutsches Institut für Normung (DIN) and Deutsche Gesellschaft zur Vereinfachung von Handelsverfahren und Förderung der EDI-Anwendung (DEPRO). DIN is the German National Standards Institute and DEPRO is the German association for the facilitation of procedures and promotion of EDI applications.

7. The four business associations are Naniwa Industrial Park (Naniwa Kōgyō Danchi), Japan Iron and Steel Federation (Nihon Tekkō Renmei), JAPIA and Society of Automotive Engineers of Japan (Jidōsha Gijutsukai).

8. On the national level, private standards are generated by the Japan Industrial Standards Committee (JISC) in Japan and by the DIN in Germany. In contrast to Germany, where the DIN is a private organisation, the JISC is formally affiliated with the METI.

different industries to send data in the value-added chain beyond national borders without manual interventions. It thus contributes to the dismantling of geographic technology borders. With EDIFACT, a firm should be able to transfer electronic data to all other firms that have also implemented EDIFACT automatically. In contrast, quality standards are definitions and classifications of the requirements a product or process should fulfil or the characteristics they should possess. Quality standards may also correspond with the adaptor's self-interest, such as a signalling device in the face of imperfect information. However, signalling does not necessarily require compliance with the standard, so that external (or internal) sanctions are needed. Quality standards aim to make products and processes comparable, thereby reducing transaction costs. The ISO 9000 standard examined here is a process-based quality standard that aims to build a basis for quality management processes. It does so by defining 20 requirements, such as 'Management Responsibility' (4.1), 'Quality Management System' (4.2), 'Contract Review' (4.3) or 'Design Control' (4.4). Put in more technical terms, ISO 9000 aims to construct an infrastructure for international trade by providing a common institution.

Despite their different properties, compatibility and quality standards are similar in that they are both institutions that aim to channel behaviour in a certain direction. I thus refer to both generally as institutions in the following analysis.

3. Economic Approaches to Non-Compliance

Compliance with an institution means to produce consistency between an institution and actions (e.g. business processes). *Full compliance* is achieved when actions are adapted to an institution. When full compliance exists, there is thus a consistency between the institution and the action, for example, between an externally demanded, logistic-related standard and internally existing logistic processes. In contrast, formal compliance (or *non-compliance*)⁹ means a lack of compliance since in this case only the presentation of the action has been changed in order to pretend that an action is in accordance with the standard. A 'common standard' that firm A and firm B have implemented thus may include both a 'real' common standard in the case of full compliance or a 'formal' common standard when only the presentation of practice has been changed.¹⁰ In analytical terms, *partial compliance* lies between full compliance and formal compliance. However, I refrain from using this analytical category for two reasons. First, my interview partners viewed the standards more as an 'empty shell' and identified partial compliance as a minor fact. Second, and more importantly, the division between full compliance and non-compliance is an ideal-type of division. One will always find (even very minor) parts of a standard that are complied with or parts that are not complied with. It is thus difficult to find a criterion that can indicate when partial compliance becomes non-compliance and when non-compliance becomes partial compliance. This paper thus restricts itself to an ideal-type distinction between full and formal compliance. I now turn to the reasons why people do not comply with standards.

3.1 Institutional Reasons

The concept of path dependency traditionally explains why even new and superior standards are not implemented. It has been transferred from the world of standards to the world of institutions

9. One referee suggested the term '*tatemae* compliance', which is indeed a charming one.

10. Brunsson and Jacobsson (2002) present an interesting paper on standard implementation. The terms 'changing practice' and 'presentation' are common terms in the literature on the social shaping of technology.

(North 1990). According to the theory of standards, path dependency results out of uncertainty, complementarities and transaction costs. Generally, behaviour follows routines and actors favour the standard they are more familiar with. Knightian uncertainty thus hinders people from switching from one standard to another; and the higher the uncertainty, the higher the tendency is to adhere to the established standard. Moreover, complementarity between the already established standard to other institutions refers to the fact that the value of the established standard depends on other standards and institutions to which the standard fits. From this perspective, the whole body of standards and formal and informal institutions are inherently consistent. Changes in one standard necessitate changes in other, related, complementary standards and institutions. As a result, the introduction of a new standard can imply considerable switching costs. Together with sunk costs, which result from the fact that invested capital is devaluated in the case of change, transaction costs may become a significant barrier to change (Arthur 1990). If at all, only minor variations are possible (e.g. from QWERTY to QWERTZ; cf. David 1985). Path dependency is thus the main reason why firms that already have a data exchange standard—be it EDIFACT or an in-house standard—do not simply switch to new standards, be they the ‘superior’ XML, EDIFACT or other EDI solutions.

The concept of path dependency is mostly used to explain a yes/no decision towards the diffusion of new standards. In other words, it explains why standards are not adopted (but not why standards are not complied with). However, the concept of institutional complementarities also explains why new standards, even if they are adopted, may not be complied with and thus how and why internal complementarities in the firm may lead to only formal compliance with externally demanded standards. Meyer and Rowan (1977–1978) were one of the first who paid attention to the ‘decoupling’ of structures and actions, arguing that decoupling is a rational strategy to maintain a certain level of internal coherence and stability, given the high number of ‘institutionalised environmental expectations’ (Beck and Walgenbach 2007: 860). In other words, complementarities and the avoidance of switching costs are understood less as a (problematic) path dependency, but as a necessary precondition for stability (cf. DiMaggio and Powell 1983; Beck and Walgenbach 2007). Kreps (1990) makes a somewhat similar point when examining the function of corporate culture. He finds a trade-off between (short term) efficiency and (long term) reputation. Permanent adaptation to new, externally demanded institutions would lead to disintegration, dissolving of complementarities and to high switching costs. An externally demanded standard may well be adopted; however, due to (intended and unintended) decoupling strategies, the behaviour is the same as it is in the situation without the standard. In other words, the standard is only formally complied with. Non-complementary, externally demanded institutions are thus one reason why actors decouple their actions from the demanded institutions: decoupling reduces switching costs; formal compliance is cheap compliance.¹¹

3.2. Standard Quality

We assume that a ‘good’ standard possesses two properties: the quality of the standard itself and compliance to the standard, assured by internal or external sanctions.

The first problem is to identify which standards are high-quality standards or, more technically, ‘optimal standards’. Optimal standards are understood as standards that lead to individual utility maximisation. There is a long discussion about this issue and the answer is clear: it is not possible to classify standards according to their quality. Korn (2003) refers to the model of Demski (1972), who shows

11. Thanks go to Sebastian Schäfer for the suggestion of this well-fitting term.

that there exists no standard that can be termed ‘optimal’ independent from the preferences of individuals. Nevertheless, while it remains unclear what exactly an optimal standard is, there is considerable consensus that under certain conditions, a standard may be appropriate, such as in the case of market failures for basic products and processes. Here, standards represent a collective good that would otherwise have not or only insufficiently been supplied by the market (Farrell and Saloner 1986, 1988; Katz and Shapiro 1986; David and Greenstein 1990; Blankart and Knieps 1993). On the practical level, however, the problem of what actually constitutes a collective good arises, resulting in the issue of committees trying to determine which technical problems need standard setting. EDIFACT and ISO 9000 make this point clear. In contrast to earlier international standards—which merely defined basic infrastructure, such as OSI—EDIFACT is a compatibility standard that defines criteria for the electronic exchange of data. Since its reach is deep into concrete transaction processes, economic theory tends to focus on EDIFACT’s inappropriateness (Knieps 1994: 58).¹² The same applies to ISO 9000. Although not explicitly discussed in literature, it is questionable whether ISO 9000 procures a common, general infrastructure and thus provides a collective good, as the standardisation organisations implicitly claim.¹³ This question is supported by the observation that ISO 9000 defines a relatively specific management concept. It thus lacks in abstraction and only leaves room for interpretation to a certain degree, similar to reaching into concrete management processes (Beck and Walgenbach 2007). This study thus starts from the assumption that EDIFACT and ISO 9000 do not provide a general infrastructure and thus do not constitute collective goods.

If one takes a closer look at the standard setting process, it is not unusual to find that standards are often inappropriate. The reality of standard setting is less driven by the need for standards than it is by the participating committee members’ interests (Mattli and Bütte 2003). Revsine (2002) and Revsine *et al.* (2002) refers to ‘rent-seeking’ actors. He argues that standard setting organisations are so much under pressure by lobbyists that they are simply not able to formulate appropriate standards. In the case of ISO 9000, for example, its basics can be traced back to the British quality process management standard BS 5750 in 1979 and to professional interests (Furusten 2002; Ho 1994: 79).¹⁴ Finally, we can also observe that standardisation increasingly takes place in private standardisation forums, outside of established, international standardisation organisations. This means that the shift to international standards that go beyond the definition of basic infrastructures is also a strategy for these organisations not to lose their relevance, suggesting that more processes than needed are standardised. Given this background, decoupling may not be a problem but a solution for the increasing number of international standards and the related interests of professional groups. Actors may assess already established institutional solutions as superior and necessarily reconstruct the newly adopted rule according to their own assessment (Williams and Edge 1996; Jørgensen and Sørensen 1999;

12. The standard has been set by the ISO. The standardisation levels of ICT standards of the ISO are classified into (a) physical connection, (b) communication, (c) information, (d) application and (e) business processes. (a) Mere infrastructure and (e) the concrete application level. ISO/OSI is settled on (b) communication, EDIFACT on (c) information; ISO 9000 can be settled on (e) business processes (Jakobs 2002).

13. It is postulated, for example, that ISO standards transfer know how, avoid wasting resources and safeguard public health and safety (ISO 2006a).

14. The British standard was originally formulated for the military sector. A number of publications on the social shaping of technology (i.e. construction of technology) refers to standardisation as a process of competition among visions or early variants of a technology (Russell and Williams 2002). For a comparison on the social construction of technology, see Bijker (1987).

Werle 2000; Hanseth 2002; King and Lenox 2002; Matten 2003). Non-compliance must thus not necessarily be a problem but rather a clever entrepreneurial answer towards increasing external pressure to introduce 'superior' international standards.

Non-compliance can, however, become a problem when the standard is deemed to be appropriate for a given situation. Sabel (1997) and Kerber and Vanberg (2001) have shown that non-compliance is a ubiquitous problem if firms are not externally sanctioned. Westphal and Zajac (1998) show in their paper on corporate governance reforms that the introduction of new institutions may even have paradoxical effects: External control decreases even in the case of non-compliance since the new institution is interpreted as a sign that processes have changed. It is therefore clear that the quality of standards should be assured by organisations that carefully monitor adherence to rules. Sanctions may be realised by publishing the name of non-complying organisations, by imposing fines, or by withdrawing certificates. Firms that decide to comply with a standard (or do not) will consider which sanctions they have to expect and the probability that their misconduct will be discovered. Effective sanctions are generally equated with external sanctions, but there may be situations in which internal sanctions work well as a substitute.¹⁵ Frey (1997) and Feld and Frey (2002) have shown that well-functioning internal sanctions require that the institution is widely accepted as legitimate, for example, in those situations in which an institution participates in the standard-setting process.

I should add that the question of how auditing institutions should be designed and whether they should be private or public remains open. It can be observed that with the increasing relevance of private standard setting, monitoring is also being delegated to private auditing authorities. The quality of auditing authorities depends on the ability and competence of the auditor and on his or her incentives to disclose non-compliance. When the auditor is selected by the board of the firm that is to be certified, then the incentive is strong to recognise standards that are not complied with as well as those that are, since disclosing non-compliance would mean that the auditor was not acting in his/her client's best interests.¹⁶

4. Non-Compliance: Empirical Evidence from Japanese Firms

This chapter provides the reader with the results of a survey on Japanese firms and their compliance with the EDIFACT and ISO 9000 standards. Where appropriate, comparisons to German firms are drawn.

4.1 The EDIFACT Standard

EDIFACT is a compatibility standard which defines rules of syntax in order to create interfaces for EDI.¹⁷ In terms of numbers of users, EDIFACT is quite successful. In Germany, as in Europe in general, EDIFACT is widespread among large companies: about 40% of firms use it (von Westarp *et al.*

15. In the case of soft law, some argue that under certain conditions actors have incentives to comply with private institutions, namely, in order to maintain their reputation. Attitudes may work as a substitute for external sanctions (Frey 1997). This point is irrelevant for this paper, since the internal motivation for introducing ISO 9000 is in general low.

16. At the same time, however, it may be that in the case of a disclosure of non-compliance, the auditor may lose his reputation. These effects are considered by Stefani (2002). See Korn (2003) as well for comparison.

17. To put it more precisely, EDIFACT consists of 210 types, such as the types INVOIC (invoice) or DELFOR (delivery and schedules) (DIN 2003). In the surveyed Japanese companies, mainly invoice, and delivery and schedules have been implemented.

1999). The existing investments are so significant that companies find little reason to replace the functioning system with, for example, an XML-based system despite the trend to use XML-formatted documents. In general, companies stick to the principle ‘never change a running system’.¹⁸ In Japan, the most widely used EDI standards are in-house standards. The most widely used meta-in-house standards are the national standard CII followed by the international standard EDIFACT and recently the American standard ANSI X.12.¹⁹ While CII is the most used standard (MSK 2005), EDIFACT is used by about 13–26% of the firms (JEDIC 1999*a*, 1999*b*).²⁰ There is a strong political interest in introducing one of these meta-in-house EDI standards into Japanese small and medium enterprises since the multitude of enterprise-specific EDI standards is identified as one reason for their low productivity (interviews with warehouse M and METI).²¹ In every nation, there are specialised bureaus that support the introduction of EDIFACT; in Japan it is JASTPRO.

EDIFACT was formulated by the Working Party on the Facilitation of International Trade Procedures (WP.4), today UN/CEFACT²² of the United Nations Economic Commission for Europe (UNECE). EDIFACT was formulated in 1987, and one part of it, the EDIFACT syntax rules, was agreed upon in the ISO committee TC 154 as an international standard in 1988 (ISO 9735). More than 10 years later, in 1999, and also much later than Germany (1991 as DIN EN 29 735), the standard was accepted in Japan as a Japanese industrial standard (JIS X7011). In Japan, EDIFACT is common primarily in distribution, textiles and food sectors, and is being increasingly implemented in the automobile sector as well (MSK 2005).

EDIFACT’s syntax rules consist of three levels. The *first level* is the level of mandatory data, which are established *ex ante* and have to be implemented by the adaptor.²³ More importantly, the *second level* is the level of optional data—to which, for example, data for sectoral sub-sectors belong. The standard’s producer suggests a variety of data from which the adaptor can choose and build his or her own subsets. If different industries choose different data (which, for example, is the case in Europe), then every exchange of data necessitates communication between the involved companies that want to communicate and exchange data. Nevertheless, since industries use the data suggested by the standard, communication is relatively easy as the standard itself suggests these variations and data can be transferred with a (more or less) standardised manual intervention. This is different in the *third level*, where so-called ‘free text’ can be introduced. On this level, the firm implementing the standard can add whatever content it deems necessary (thus also named ‘add-on’). Since this content is not intended by the standard’s sender, this text is really ‘free’. The addition of free text has the advantage that the standard can be adapted to the local firm’s needs, but it also has the disadvantage that an enormous amount of communication about the content of the free text becomes necessary

18. Thanks go to Kai Jakobs (Standardization and Innovation in IT Technology, Aachen, Germany) and Anders Tell [United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)] for these insights.

19. ANSI stands for American National Standards Institute.

20. Further comparison of data is difficult for two reasons. First, there exist different data for single countries. For example, JEDIC gives in a later publication for EDIFACT in Japan also the share of 13% (JEDIC 2002). Second, data sets are different. The German figure of 40% refers to large firms, whereas the figure of MSK (2005) is not restricted to large firms.

21. For a general introduction into EDI standards, see Nelson and Shaw (2003).

22. Since 1998, UN/CEFACT is the successor of WP.4. In contrast to WP.4, UN/CEFACT is open to participation from all UN member states, whether or not they are from the UNECE region. The restructuring process is obviously a reaction towards the international demand to make the formulation of EDI standards more open and transparent (JEDIC 1999*a*).

23. Only 5% of data elements in the case of EDIFACT belong to this group of data.

since no data are *ex ante* standardised. Thus, because it relies on free text to a large extent, this open, international standard in effect may become a proprietary, in-house one.

Empirical evidence for German firms shows that non-compliance with EDIFACT is a minor problem. German firms use the second level of the standard, the sectoral subsets solution. This complicates the communication between different industries. However, since they follow the second level's guidelines, they comply with the standard so that communication in one industry is possible without additional manual interventions. The conflict between standardisation and individual needs for variety in Germany is solved by drawing upon the specifications of the standard (Reimers 1995; Soskice and Hancké 1996; Casper and Hancké 1999).

This contrasts with the Japanese case. As in Germany, the aim of introducing EDIFACT is to create external interfaces. From the mid-1980s on, production sites have been shifted to South East Asia so that the compatibility of external interfaces has become increasingly important. The established in-house standards considerably hindered communication flows since affiliated firms and suppliers of different Japanese manufacturers always needed to adapt to the different in-house standards of their customers. This problem was compounded by the fact that Japanese subsidiaries at foreign production sites often had a relatively strong position towards the parent company in Japan so that they, too, could enforce their own in-house EDI standards. One interview partner, a firm in electronics, reported that 85% of the cooperating firms in Asia use different EDI standards. In order to smoothen the whole communication process, several Japanese firms decided to adopt EDIFACT at first, but then refrained from doing it (interview, electronic firm S). This is a typical example of path dependency in the sense that a new standard is not adopted due to expected complementarities and switching costs. Other firms, however, decided to adopt the standard since they estimated complementarities and related costs as lower, or they saw switching costs as investments in more efficient communication networks. Realising that complementarities and costs were higher than expected, all firms interviewed in the automobile and electronics industry decided to add free text to a considerable degree. In one case, up to 70% of the share in relation to the given optional data was added. Because of the intense use of free text, electronic data cannot be exchanged automatically even after the introduction of EDIFACT. Thus, the presentation changed: firms introduced EDIFACT for data exchange, but their business processes followed the former, in-house EDI standard. The main problem was identified as lying in the difference between the EDIFACT structure and real firm processes:

Our system of invoice is different from EDIFACT. We have an internal standard and used pretty free text . . . The other way around, to adapt our invoice processes to the standard, would have been too expensive. This would have meant that we would have to adapt all related invoice processes—those with our suppliers, our co-operating firms, our producers, and with our sellers. This would have been too expensive (interview, electronic firm S).

The interview partner, an engineer, laughed at this point, knowing full well that the intense use of add-ons is against the intention of the standard. As for the automobile industry, the pressure to implement free text is even higher. Because JIT constructs extremely detailed and densely coordinated logistic processes, EDIFACT is unusable in several subsets. Another interview partner mentioned the mere quantitative problem of the way order processes in Japanese automobile firms are structured. He gave the number on an average 28 elements that Japanese carmakers follow versus only five segments in EDIFACT (interview, ECOM). Often the general problem is different information densities. With raw materials, for example, the information in Japan is much more differentiated and much more precise than in western countries (interview, ECOM). For example, Japanese suppliers have to inform their customers about the exact percentage of carbon in ferrous parts, whereas in other countries

rough declarations are sufficient. As a result, the implementation of related EDIFACT parts was realised by add-ons, not by drawing onto the second level, as German firms did. The Japanese Association for Suppliers in the Automobile Industry, which has hoped for more simplified transaction processes, criticises the EDIFACT implementation pattern, arguing that the intense use of free text is against the intention of the standard.

Still, some automobile makers identified the problem less in quantitative and more in qualitative terms:

The segments of EDIFACT and our processes simply do not fit. It is not the problem of different numbers of segments, they just do not fit. Our processes are much more detailed With regard to delivering goods, for example, we differentiate between 'daily unit', 'daily shares units', 'truck units', and 'detailed delivery plans'. EDIFACT does not make such detailed differentiations (interview, automobile maker H).²⁴

Obviously, the two institutions—EDIFACT and JIT—are neither quantitatively nor qualitatively complementary to each other. As a result, firms did not adapt their processes to the standard. Rather, they adjusted the standard to fit existing processes, thereby constructing their own standard. It may be named EDIFACT, but in reality it is a private, in-house standard.

4.2 The ISO 9000 Standard

ISO 9000 was formulated in 1987, and data on certification exist from 1993 until today. In 2000, the standard was revised and is presently called ISO 9000:2000. For our purpose, the changes are negligible. In 1991, ISO 9000 was accepted as a Japanese standard (JIS Z 9900) and was adopted in Germany in 1987 (DIN EN ISO 9001:1994). During the 1990s, Japanese organisations were very reluctant to implement ISO 9000, but later they became eager to introduce it. Today, Japan belongs to the leading top three countries with ISO 9000 certifications. From 2001, more Japanese than German firms were certified (Figure 2).

As with EDIFACT, the reason behind the standard is to further integrate firms on an international level. The ISO argues that this trend makes it necessary to have a common basis for quality management processes. Today, ISO 9000 certificates are often demanded as a minimum requirement for national and international transactions. Since the standard requires that cooperating partners possess an acknowledged quality management system, non-certified firms are smoothly forced to introduce ISO 9000. Since the opportunity costs are high, most firms decide to introduce the standard.²⁵

The documentation of quality management processes is based upon a list of 20 requirements (e.g. attribution of responsibility, documentation of the whole quality management process and regular revisions). If they are fulfilled, a firm normally applies for a certification of conformity by an auditor in order to signal that it complies with the standard. In Japan, as in most countries, the certificate is issued by private auditing organisations (e.g. JQA or JACO) and accredited by a public organisation. The certificate or the licence for auditing, respectively, may be withdrawn in the case of misconduct.

Judging by the number of certifications, ISO 9000 is a success. In 2006, 776,608 firms were certified worldwide, among which 53,771 were Japanese. The high number of certifications does not

24. Exactly the same problem exists in the self billing invoicing of SAP R/3, where the existing functions and data fields are insufficient in order to exchange data between Original Equipment Manufacturer (OEM) and its supplier (Mueller 2007).

25. Grajek (2004) has analysed the impact of ISO 9000 on trade. He shows that ISO 9000 adaptations benefit bilateral exports and that ISO 9000 certified firms tend to trade with each other more than with uncertified firms. ISO 9000 thus has a substitution effect.

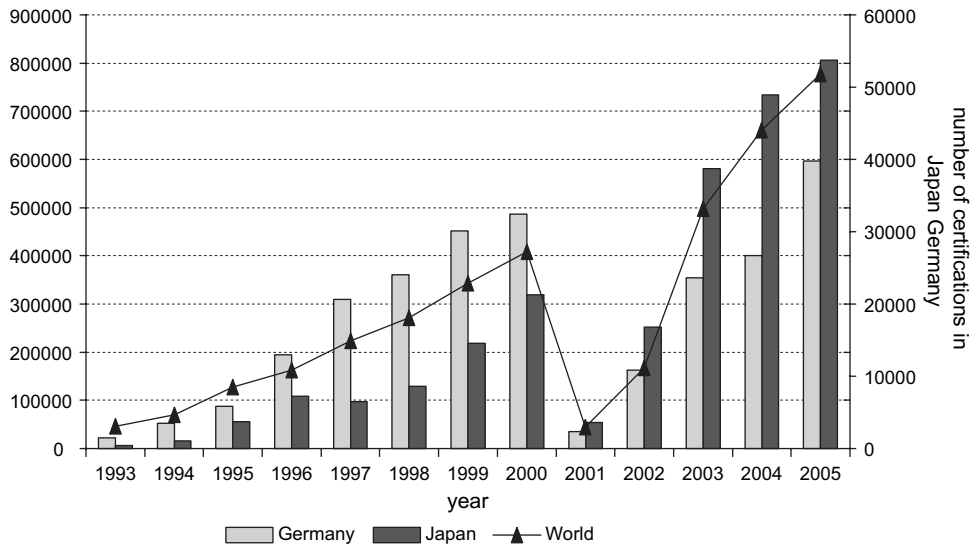


Figure 2. ISO 9000/9001 Certifications per Year.

Source: Author's own arrangement based on ISO (2000), ISO (2001), and ISO (2005).

mean, however, that the standard is complied with, i.e. that the action in the certified firms has been adapted to the standard. In all interviewed firms, respondents stated that the standard is only formally complied with. A typical answer of my Japanese interview partners was that 'the certification with ISO 9000 is only an empty shell' (*katachi dake de owatte iru*) (interview, Japanese electronic firm S).

In German firms as well, decoupling was admitted in a surprisingly open way:

ISO 9000 was demanded by our customers. Different to interface [compatibility] standards, the decision to introduce the standard was not in our own interest. To put it another way, our motivation was irrelevant, and we use the standard only as a marketing tool. Anyway, [compliance with] standards in general cannot be controlled for. Another example is European CE labels,²⁶ according to which the producer has to declare that his machine is conforming to the guidelines. Smaller producers are never able to assert this (interview, German machine firm B).

Most Japanese firms put forward the question, what positive effects has the introduction of the standard had for improving their business processes. In their view, the investment of an average \$25,000 to \$50,000 (including internal costs, consultants and audit) was in fact an investment in lasting transactions, but it did not have any relevant effects on actual management processes (which is not astonishing given the fact that the standard is seen as an empty shell). In order to better understand what mere formal compliance means, the interview partners were asked to identify one issue where the gap between the standards' requirements and actual processes is especially large. Most of my Japanese

26. CE stands for Communauté Européenne. The producer has to self-declare that the product fulfills certain European requirements. European directives define which products have to be declared with the CE label.

interview partners (six out of 14) referred to those requirements that demand attributing responsibility to individual persons. Not one German firm mentioned the issue of responsibility, and it was not an object of public discourse, as it was in Japan. The journal *Hinshitsu Kanri* (Quality Management), published by the Union of Japanese Scientists and Engineers (Nihon Kagaku Gijutsu Renmei), took up the different concepts of TQM and ISO 9000 and published a series of seven articles on their complementarity, devoting one issue to the complementarity of the concepts of ‘responsibility’ (*sekinin*) in TQM and in ISO 9000. One candy firm is a typical example, whose interview partner admitted that responsibility is ascribed individually as the standard requires, but that the firm in fact only formally attributes it to an individual:

Even with ISO 9000, we have chosen an imprecise attribution of responsibility in our documentation. Thus, we fulfil the requirement for the attribution of responsibility of ISO 9000 only *tatema*e. This is not in the sense of the standard, but we can hereby retain our flexibility (interview, candy producer G).

One researcher responded:

After having introduced the standard, the practice of attributing responsibility in an ambiguous way mostly has not changed. Problems are solved in teams. The common understanding of the standard is that the first step is the documentation of the respective responsibility. It is only in the second step [which most certified firms did not yet reach] that individual responsibility is really attributed (interview, research institute S).

These statements do not mean that there is no individual attribution of responsibility. In the TQM System, responsibility is ascribed, for example, to the leader of the TQC Promotion Committee (TQC Suishin Iinkai), the TQC Promotion Unit (TQC Suishinshitsu) or the Department of Quality Assurance (Hinshitsu Hoshōbu). However, there are two major differences between this type of attribution and that of ISO 9000. First, the attribution is less precise in the established TQM system. In ISO 9000, responsibilities are ascribed to highly specialised functions, for example, for ‘personnel who manage, perform and work’ (cf. the standard 4.1.2.1. a–e). TQM does not account for such a specific description. Since the attribution of responsibility takes place in different requirements of the standard, this is a persistent point of non-compliance. Second, in TQM, the factual responsibility is not as much attributed to individuals as it is to groups. This procedure results out of the dominance of consensual decision making in circulation procedures (*ringi seido*) or conferences (*kaigi*), for example, in which functional entities (and not individuals) bear responsibility (*Hinshitsu Kanri* 1998a, 1998b; Maruyama 1998; interview, electronics firm A). It thus can be assumed that the externally demanded institution ISO 9000 lacks complementarity to the existing institution of TQM and its related sub-institutions. As a result, ISO 9000 reaches only into management processes at the periphery if at all, leaving the already existing quality management processes for the most part undisturbed.

Further complementarities were expected between the existence and use of tacit knowledge and the low amount of documentation in TQM. Concretely, many interview partners feared that the intense documentation required by the standard would devalue tacit knowledge and the strategies that made use of it. There was a diffuse fear in the popular management literature as well that documentation and the ability of Japanese firms to make use of tacit knowledge may devalue knowledge holders. Much of the literature on the integration of TQM and ISO 9001 is devoted to this problem (Maruyama 1998; Tsunoda 1998; Yano 1998; Itō 1999; Karatsu 1999; Low 1999). Nonaka and Takeuchi (1995) have argued that this ability is specific to Japanese firms and is one explanation for their competitiveness. However, ISO 9000’s more comprehensive documentation processes did not influence tacit knowledge stocks, according to all interview partners. In this case, their wrong assessment of the standard is an example of overestimating complementarities due to the bounded

rationality of the adopting actors, and stands in contrast to the situation with EDIFACT, where actors underestimated complementarities.

5. The Japanese Case: Reasons for Non-Compliance

5.1 Institutional Reasons

The complex, technical structures of EDI systems, which include not only internal and external hardware and software but are also complementary to the whole communication process in the firm's networks, make it obvious that the established, in-house EDI system cannot just be replaced with a new standard. Some firms thus decide not to introduce EDIFACT, which is a case for path dependency in the sense that a 'no' decision towards a new technology is chosen.

Interestingly, however, other firms expected lower complementarities between the standard and their own established businesses processes and introduced EDIFACT in order to have more open and less costly information flows. They expected that the investment in the adaptation of processes would be feasible since it would outweigh the switching costs in the medium term, given the dynamics of the increasing internationalisation of Japanese firms. Globalisation will make the lack of external interfaces in the future even more costly. Although there might have been some pressure by leading Japanese associations to introduce EDIFACT as a new, 'modern' standard, this pressure was—in comparison to ISO 9000—negligible. The barrier to compliance that occurred was the unexpected complementarity between 'mere technical standards' and the multitude of internal and external business processes. In particular, the complementarity between JIT and the related invoice and ordering processes on the one hand as well as the long-term cooperation and the denser information exchange on the other hand were insufficiently understood *ex ante*. Due to JIT and long-term relationships, Japanese firms often set up accounts in trust with a longer period of invoicing. This different and much more comprehensive invoice process is insufficiently represented by EDIFACT. Furthermore, due to JIT, firms produce small charges, which again is insufficiently represented by the standard. Finally, the process of price negotiation is much longer and cannot be represented either, such as tentative prices. Compliance with EDIFACT would thus have devaluated successful management methods in logistics and quality management. It is highly questionable that the efficiency gains realised by EDIFACT would have compensated for the losses resulting out of compliance. In addition, with regard to compliance, high switching costs inside the firm and in interfirm relations could have been expected. Inside the firm, IT-related engineers responsible for the firm's EDI networks would devalue their invested capital. The same is true for all employees whose functions are related to the standard, either in ordering or in invoicing. Even higher costs would have resulted from restructuring the highly interrelated networks of *keiretsu* and related business processes.

Moreover, interview partners identified a complementarity between clear attribution of responsibility to an individual in the standard and the abandonment of collective attribution of responsibility if they did not decouple the standard from the processes. Individual attribution as required by the standard would have reduced internal flexibility and communication flows and might have increased conflicts:

[In our firm,] the areas of responsibility overlap. We chose this approach since this increases our flexibility. Not every problem can be attributed to a single function. Additionally, there may be a certain wariness regarding assigning individual responsibility. By overlapping responsibilities, dense information exchange is possible, and this is what our production management is dependent on. If we circumscribed areas of competences more clearly, contrasting views and conflicts may arise more easily, and this is what we want to avoid (interview, Japanese firm G).

One leading automobile firm that did not introduce ISO 9000 argued:

Our quality management processes are cutting edge worldwide. External control means to adapt to the requirements of the auditor. But we do not want to be controlled in this issue by a third party, nor do we want others to determine the extent and depth to which responsibility is attributed If errors are identified, we do not look for the individual ‘culprit’, but rather we collectively look for improvement (interview, firm T).

Clear individual attribution would thus give misleading incentives, inducing individual behaviour to run against the firm’s collective interests—a problem which may show some similarities to the conflict between seniority-based and individually based performance pay.

Nonetheless, it has to be added that at the same time, ISO 9000 even offered new instruments to overcome hitherto weaknesses in traceability and knowledge transfer, especially in error analysis:

There is obviously one strong point of the standard: It becomes possible to store knowledge. Hitherto, knowledge was related to persons. This sometimes hindered the identification of technical failures. With ISO 9000 it becomes easier to analyse problems (interview, Japanese candy firm G).

Another firm spoke about a (partial) transformation of tacit into explicit knowledge (interview, Japanese electronics firm N). Similarly, firm A added:

By documentation, processes become more traceable in the sense that it is easier to identify why a certain development process took two years instead of the expected one-year (interview, Japanese machinery firm A).

5.2 Standard Quality

5.2.1 Standard Setting

The EDIFACT standard was first generated at the level of the UN Working Party 4 (UN/WP.4) and was later partly recognised as an ISO standard. Its official members were Europe and North America; Japan participated with an observer status. EDIFACT was introduced in Japan in 1999. The finally formulated standard reflects more ‘western’ usages in the way business processes are represented. This is not unusual, given Japan’s observer status.

As for ISO, its structure is based on TCs, each of which establishes its own subcommittees and working groups. Each national group selects its own members. The process of creating a standard starts with the TCs—presently 233—whose members decide how the task they solve should be structured. Formally, all drafts are summarised in a committee draft that the members must approve by consensus (in the sense of an absence of sustained opposition). In practice, consensus means that at least two-thirds of the permanent members are in favour of the proposed draft. In this process, the chairman and the secretary play an important role in channelling the members’ different interests. A low share of these important positions thus signals relatively low impact on decision making. Japan possesses a leading function in only 12 TCs (in 10 TCs Japan fills both chairman and secretary functions and in two TCs Japan has two secretaries). Due to its historically strong role in international standardisation organisations, Germany plays a prominent role by leading 41 TCs (19 chairmen and 22 secretaries).²⁷ As a result, of the 1,000 proposals for international standards which were

27. Germany’s strong position is a kind of heritage. Japan came to ISO when only a small number of chairs remained open. Since the end of the 1980s, Japan has increasingly taken over chairman and secretary positions. A comparison of newly established TCs during the years 1990–2000, for example, would better reflect the dynamics of this process. However, what I want to stress is the result for the present situation: Japan’s weak position in international standard-setting processes.

submitted to ISO/IEC in 1999, only 67 were submitted by Japan (Sangyō Gijutsu Kankyōkyoku 2001). Japan did not even participate in the first meetings in which ISO 9000 was designed (Jō 2001; Nakakita 2001: 37).

One reason for Japan's low profile in international standardisation organisations can be seen in absent institutional complementarity between international and national standardisation architectures, as Mattli and Büthe (2003) have suggested for explaining the different degrees of national power in international standard setting. Indeed, standardisation in Japan takes place in co-ordination with the JISC, a section within the METI, which leads to a preference for governmental regulation and administrative guidance towards private standards, as the relatively low number of national Japanese standards indicates (Tate 2001; Figure 1). In my interviews, the respondents also stressed that the reputation for standardisation activities and the firms' budgets for inter-firm standardisation activities are quite low, at least in comparison to Europe. Finally, a very simple lack of complementarity lies in the use of English in international organisations. As a result, there are first movers, mainly European and especially German, who set the international standards agenda, and there are second movers, such as Japan or the US, who pay for higher switching costs. One way to avoid switching costs is through the strategy of formal rather than full compliance.

Some interview partners further criticised the quality of ISO 9000 since it reflects the knowledge of only some international actors. The majority of firms interviewed were convinced that their quality management is leading worldwide and were less inclined to import a standard from Europe whose basis goes back to a British quality process management standard. When the standard was introduced for the first time in Japan, there was an intense discussion about whether the new standard may eventually even lead to comparative competitive disadvantages by devaluating the strengths of Japanese quality management (i.e. TQM, JIT) or by increasing the burden of documentation costs. The vast literature on an appropriate combination between the 'Japanese-style' TQM and ISO 9000 published during the first years after the standard had been introduced to Japan can be interpreted as an indicator of the high level of uncertainty that accompanied the standard. This discussion was precisely the reason why Japanese firms were late to introduce the standard; they paid more attention to its 'appropriateness' than to its strategic role. After having detected that decoupling is an option and that international standards are less important for their quality than they are for their strategic value, Japanese firms introduced ISO 9000 at a high rate. Many even made ISO 9000 into a private business, such as training or auditing (various interviews; Tate 2002). Obviously, Japan belongs to the leading countries in ISO 9000 certifications not because the standard is assessed to be more economically rational or superior to existing standards, but rather because they *perceive* the standard to be economically rational and superior. A firm certified with ISO 9000 proves that it has taken care of its responsibility towards its stakeholders, especially its shareholders. The introduction of and certification with an international standard signals credibility and legitimacy, even if the standard is only formally complied with, since the environment—specialists, policymakers, investors, consulting institutes and the public—equates the certificate with institutional quality. International organisations and auditors strengthen this perception by equating international standards with 'best universal practice' (Leong, Falk, and Tarhanne 1997: 14). The (supposed) independence of international organisations and auditors on the one hand and the relatively high costs for certification on the other hand again increase the reputation of the standard. On the flipside, the legitimacy of firms that have not introduced ISO 9000 becomes more questionable as more firms implement the standard. In this context, institutional theories have asked why institutions diffuse in a S-shape pattern. For ISO 9000, Wey (2004) argued that this pattern is the result of positive feedback. Given the decoupling option, however, it is more convincing that the institutional context creates imperatives for conformity in order to gain

legitimacy (Meyer and Rowan 1977–1978; Westphal, Gulati, and Shortell 1997; Guler, Guillén, and Macpherson 2002).

This ‘pressure for conformity’ applies to every firm independent of the national system in which it is embedded (Walgenbach 2001). It may be argued that Japanese firms find themselves under more pressure to build up an international reputation due to the Japanese economy’s long phase of stagnation. The ‘lost decade’ impaired the country’s firms’ reputation insofar as they were criticised for not being able to adapt enough to the changing necessities of the new economy. Moreover, the decline of cross-shareholdings made it for the first time necessary for Japanese firms to actively search for investors, to implement an investor relationship management and to apply ‘neutral’ communication channels. Nevertheless, it is difficult to compare ‘pressures’. German firms, for example, have been under pressure as well to harmonise their standards given their strong role in European standardisation.²⁸ It can thus only be stated that, given the fact that Japan belongs to the leading countries in ISO 9000 certifications, formal compliance should quantitatively be associated with a higher number of certified firms. To summarise, weaknesses in the standard setting process and a resulting lack of legitimacy are factors that explain the tendency of Japanese firms to leave existing and well-proven institutions unchanged.

5.2.2 Monitoring

A further element of a standard’s quality is a well-functioning monitoring system. A monitoring system for EDIFACT does not exist since it is assumed that self-interest enforces standard compliance. Since ISO 9000 is a quality standard where actors have incentives to defect, the design of a monitoring system is an important factor on the road to achieving compliance. However, distinct weaknesses do exist in every national environment as far as ISO 9000 goes since there is no international policy on the accreditation of ISO registrars. The standard itself is related to concrete business processes, but it does not prescribe any concrete data (e.g. concrete quantitative and qualitative requirements). It is thus difficult to determine when defection from the standard takes place and when the standard is still being complied with. Even handbooks for ISO 9000 implementation indirectly grasp the problem of non-compliance in that they note the problem that different auditors may have in interpreting the standard (Kōjō Kanri 2000). Moreover, since auditors are mostly consulting organisations, they regard themselves more as consultants than as controllers, such that self-interest becomes a factor in having loose certification practices. The fact that there is no information on the withdrawal of accreditation of ISO 9000 by the auditors or the accreditation agency itself is at least an indication that monitoring practices are not transparent and that auditors refrain from effective monitoring, such as publishing the names of the non-certified or not re-certified firms.²⁹ On the international level, data for withdrawals and the reasons for them have been collected since 2001 in the ISO Survey. However,

28. Thanks go to one of the referees for this helpful comment.

29. The leading Japanese accreditation organisation for international standards is the Japan Accreditation Board for Conformity Assessment and the leading certification organisations are the JQA and JACO. On the homepage of the JQA, there is a search function for certification withdrawals, but no firm is listed (cf. http://www.jqa.jp/service_list/jis_a/service/kensaku/jis_seihinkensaku.html). The same holds true for the German auditor DQS, which lists only certified firms. JACO is an exception in that it publishes withdrawals, including the names of the firms; however, this takes place in a not transparent way (cf. <http://www.jaco.co.jp/index.htm>, ‘what’s new’; an example can be found at <http://www.jaco.co.jp/info/t97.htm>). Regarding the international environmental management standard ISO 14000, which is in its structure quite similar to ISO 9000, there was a report by Nikkei Ecology that the accreditation of one out of a total 37 certification organisations had been withdrawn temporarily for six months (Nikkei Ecology 2002, 2003).

first of all the survey does not publish names (which would be a sanction), and second it shows that withdrawals are seldom. The survey for 2001 indicates that only one Japanese organisation failed to re-certify (ISO 2001).³⁰

Even if Japanese auditors themselves argue that they do carry out the screening of companies relatively rigidly due to self-interest (an argument we know from the above discussion on soft law), and even if all interviewed Japanese firms described the certification and re-certification processes that take place every three years as being relatively strict, the number of companies that are not certified or re-certified is, also according to the interviews, very low. It is not the case that firms pay extra fees, but the auditors' self-interest in re-certification seems to smoothen the process. Japanese auditors themselves argue that they evaluate the present capability in management processes less than they do the credibility of the certified firm to improve given processes. The auditing process is thus understood more as a consulting rather than a monitoring process. I should also stress that lax monitoring practices are definitely not a Japanese-specific problem. My German interview partners confirmed that the concrete certification is felt as being strict and that they fear not being (re-)certified. In fact, the actual number of not certified (or re-certified) firms is very low. Lenient monitoring practices are thus one important reason for non-compliance.

6. Discussion and Conclusion

In this paper, I have examined non-compliance with two classes of standards, compatibility and quality standards, based on a qualitative survey carried out in Japanese firms. I identified and analysed non-compliance with EDIFACT, the most common international standard for transferring EDI data, and with ISO 9000, perhaps the most well-known international quality standard for quality management processes. My findings show that non-compliance takes place in conjunction with institutional complementarities between the standard, the standard-setting process and the existing institutions on the one hand, and of the quality of standards on the other. As for the compatibility standard EDIFACT, I found that different industrial structures and related business practices induce non-compliance. Japanese firms transfer much denser information, be it in the field of ordering, invoicing or the quality of input factors such that EDIFACT's standardised data fields fit neither quantitatively nor qualitatively to the firms' processes. Japanese firms decided not to adapt their processes to the standard, but to adapt the standard to existing processes, which means that they added a large amount of free text. The result is a standard which has, in many ways, nothing to do with EDIFACT. It does not create interfaces between the EDI networks of different firms and does not enable Japanese firms to send data in the value-added chain beyond national borders without manual interventions, as the standard intends. Japanese implementation contrasts with the German case where firms implement EDIFACT's general sectoral subsets. These results are supported by recent findings from Mueller (2007), whose empirical study on the implementation of SAP R/3 in Japanese firms shows that add-ons via free text are common in the Japanese automobile sector, making out of the open standard SAP R/3 a closed, in-house one (Mueller 2007).

30. According to the ISO Survey, there have been 1,197 withdrawals in Japan. This includes all firms that have discontinued ISO 9000 activities. The most important reasons for withdrawing certification were 'other reasons', 'organisation ceased activities' or 'organisation changed certification body'. The extremely low percentage of failed re-certifications is about the same for almost all countries in the survey.

As for the quality management standard ISO 9000, I found that almost all firms regard the standard as an empty shell, leaving already existing processes and related institutions unaffected. When asked for concrete fields of non-compliance, most survey entries drew attention to the standard's requirement of attributing individual responsibility. In the former TQM system, responsibility was in fact attributed to individuals as well, but this attribution was much less detailed and much less documented so that, in reality, responsibility was attributed to those groups where decisions were made (e.g. to conferences or to production teams). The main reason why firms decided to decouple was strategic: The attribution of collective responsibility simplifies quality management processes in the sense that the analysis of the process itself is the focus of error analysis rather than the identification of the responsible person. It is instructive that not one German interview partner mentioned the requirement of attributing individual responsibility as being difficult.

In sum, the main reasons why Japanese firms did not fully comply with both standards—EDIFACT and ISO 9000—lie in a lack of institutional complementarities between existing institutions and standards and in the quality of these standards. Institutional complementarities exist within the firm (e.g. between the informal institution of collective responsibility and error analysis), in the firms' *keiretsu* networks (e.g. between ordering and JIT processes) and within standardisation architectures (e.g. between the position of METI and the low number of JIS standards). However, it is interesting that complementarities with regard to the compatibility standard EDIFACT were underestimated and were—with regard to the quality standard ISO 9000—overestimated. Further research might examine under which conditions an underestimation or overestimation of institutional complementarities takes place.

The quality of standards refers to the quality of the standard itself and its monitoring process. It is questionable that EDIFACT and ISO 9000 are appropriate standards since they do not procure a public good—a precondition for a committee-based standard. Moreover, both standards go beyond defining merely infrastructure, as international standards should do and have done in the past. Instead, both of them reach much further into actual business processes.

In addition, EDIFACT and ISO 9000 are not good standards with regard to their formation process. The standard-setting process has been governed de facto by European standardisation organisations and European professional interests. The TCs in ISO and the positions of chairman and secretary, which are decisive for standard setting, are dominated by European firms, so that Japan makes only few proposals for international standards. As a result, first movers are setting the international standards agenda and second movers like Japan are paying for information asymmetries. Since these costs are higher the more the standard is complied with, formal rather than full compliance is a rational strategy to reduce switching costs. Finally, ISO 9000 lacks credible monitoring practices. Japanese certification and accreditation agencies refrain with few exceptions (as German agencies do as well) from withdrawing certificates when confronted by cases of non-compliance and from publishing the names of non-complying organisations.

The fact of non-compliance has important consequences. First and foremost, it draws our attention to the fact that globalisation does not induce uniform and homogeneous processes. Second, in contrast to what the literature on symbolic management or on soft law dealing with 'appropriate' standards discusses (Westphal and Zajac 1998; Kerber and Vanberg 2001; King and Lenox 2002; Matten 2003), non-compliance is in the case of EDIFACT and ISO 9000 not a problem but a solution to a problem, namely, to the problem of the increasing formulation of inappropriate international standards. Non-compliance enables Japanese firms to avoid switching costs and, even more importantly, to maintain their competitive strengths in the established management processes TQM and JIT. Non-compliance is thus a clever entrepreneurial strategy meant to keep the organisation functioning and competitive.

Third, however, non-compliance may become a problem. For one, non-compliance does not boost the reputation of international standardisation organisations. Second, non-compliance can become a problem for civil society in those cases when a standard is widely accepted as appropriate and necessary. Third, due to the general tendency of transferring the formulation and monitoring of rules to the private sector, those rules that have been set primarily by public agencies—for example, environmental, safety or health-related rules—are also increasingly being transferred to private bodies. My findings support scepticism towards the increasing role of private standardisation. The issue of which rules should be formulated at the private level and how compliance can be achieved should be discussed in much more detail. If formulation via an international standardisation organisation is evaluated as being appropriate, the formulation should be restricted to those cases in which the provision of a public good is necessary. Moreover, the legitimacy of standards should be strived for by reaching a more balanced representation of the member nations in international standardisation bodies. The political stance that Japan is taking at the moment, which external observers sometimes interpret as ‘aggressive’, to strongly support more appropriate representation in international standardisation organisations (not only by numbers but also by corresponding research projects), may be one way to overcome present deficiencies. If Japan is successful, and the increasing share of leading TCs may be such an indicator, this strategy may be a useful model for developing countries as well.

Given the difficulties of monitoring international quality standards, further research might examine the limits and identify the sources of compliance. For example, one could design a study assessing whether international standards should be restricted to basic technical standards or examine how the monitoring system on the international and national level can be strengthened. My findings suggest that in the face of the increasing relevance of private standardisation, a reflection on the function of private international standard setting is becoming increasingly urgent.

This study extends prior research on standardisation, especially on the process of standard implementation in Japan. At the same time, it raises several questions for future research. While the empirical results of this study are based on in-depth case studies primarily in Japanese automobile and electronic firms, future research might include other sectors. While this study examines in an ideal-type way formal compliance and non-compliance, future research might also address the question of partial compliance by defining a corridor between 5 and 15, for example, as requirements for partial compliance. One could also extend this study by examining appropriate standards, such as the ISO 14000, which provides a public good as it is aimed at curbing environmental degradation. The research reported here could be fruitfully complemented by quantitative research that explores compliance on a broader level, most feasibly confined to single standard requirements. Finally, the future development of compliance theories could stimulate a valuable new stream of research on the consequences of formal compliance and the challenges associated with private standardisation.

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