

I am not a fan of ISO 9000 nor do I want to improve it. I believe it to be totally off the mark as to the reality requirements of today and tomorrow.

Richard Buetow, Senior Vice President and Director of Quality for Motorola, quoted by Susan Avery (1995, p. 66).

ISO 9000 Reflects the Best in Standards.

Title of an article by Roy Rada (1996, p. 17).

In 1987, the International Organization for Standardization released the ISO 9000 series of international quality assurance standards.<sup>1</sup> To some people these standards fulfil a useful function and are well worth adopting. To others though, the standards are a waste of time and money.<sup>2</sup>

Supporters of ISO 9000 have emphasised several benefits from their widespread adoption. It should be noted, however, that not all supporters agree with all of the claimed benefits, nor does there seem to be a clear consensus about the ranking of them. Equally, there are several criticisms of ISO 9000. As is the case with supporters of the series, not all detractors agree with all of the criticisms leveled at ISO 9000, nor is there clear agreement about the relative importance of the criticisms. It turns out that both the arguments for and against the standards fall into one of three categories: that of quality and quality assurance, arguments about barriers to trade and access to markets, and the level of (private and social) costs and benefits.

One claim is that firms that adopt ISO 9000 will experience increases in the quality of what they produce, or in the efficiency of their production methods (equivalently, a fall in production costs). These may occur because going through the processes needed to adopt ISO 9000 increases the information firms have about the production techniques they use, or because the adoption of ISO 9000 fundamentally changes the way an organisation is run. In addition, it is argued that these firms will have taken a major step to having systems in place that lead to continuous improvements in the quality of

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<sup>1</sup> ISO 9000 is a series of generic standards which are intended to help sellers assure the quality of their goods to buyers, particularly in two-party contractual situations. See Jacques (1990) for the views of someone who was actively involved in writing the original versions of the ISO 9000 standards. The developers of the standards made them generic in nature so that they can in principle be used by a firm in any industry, by government organisations, by schools, and by a multitude of other organisations. The standards are known by different names in different countries. In the European Community they are known as the EN 29000 series, although each country in the European Community has a separate naming convention for them. They are known as the ANSI/ASQC 90 series in the United States and as the JIS Z9900 series in Japan.

<sup>2</sup> For differing opinions about the merits of ISO 9000 see Avery (1994b), Buetow (1994), Rada (1996), and Hilary (1996).

what they produce. It is also argued that adopting ISO 9000 provides a clear positive signal about the quality of a firm's products to actual and potential buyers. On the other hand, critics argue that there is a lack of a clear connection between the ISO 9000 standards and any objective measure of quality. This is commonly expressed with the statement that "ISO 9000 is too vague to be of any practical use". In addition, the critics are skeptical that the mere act of adopting ISO 9000 leads to continual improvements in the quality of firms' products. Some critics are concerned that organisations that adopt ISO 9000 will mistakenly (in the view of the critics) believe that they will produce high quality products without having to do anything else. In common parlance this is a fear that organisations will fall for the "lure of the silver bullet"; the belief that adopting ISO 9000 will solve all of a firm's problems relating to quality improvement.

Some supporters of ISO 9000 argue not so much on issues of product quality as on the belief that firms need to adopt ISO 9000 to ensure that they access to foreign markets, with emphasis placed on ensuring access to the European Community. Others argue that the widespread adoption of ISO 9000 will lead to reduced non-tariff trade barriers, and therefore to greater trade, since ISO 9000 is applicable to any organisation in any country (or in any industry) because it is a generic series of standards. In contrast, some critics of ISO 9000 are concerned that the standards will actually lead to increased barriers to trade. They see the European Community using it as a non-tariff barrier to hinder access of foreign firms to European markets under the guise of seemingly liberating markets in the move to closer economic integration. This concern is heightened by the potential for certificates of registration issued in one country not to be recognised in another country. This latter problem highlights another criticism of ISO 9000; the claim that it is not as general as it seems because of the lack of formal mechanisms to ensure international acceptance of an ISO 9000 certificate, regardless of where it was issued.

Finally, some supporters of ISO 9000 claim that use of the standards will lower the private and social costs incurred by individual buyers and sellers in producing information about the quality of the products of the sellers. This is based on the belief that the use of a set of generic standards will lead to fewer firm and industry specific standards being developed as well as fewer audits being conducted by buyers, compared to a situation in which several firm-specific standards are used. The response of the critics is that adopting ISO 9000 is seen as being exorbitantly and unnecessarily costly.

There is no doubt that there are conflicting assessments about the worth of the ISO 9000 series of standards. What is more there have also been changes in the assessments

of various people and organisations about the merits of them. Official representatives of the European Community were initially great promoters of the standards, but they are now taking actions to de-emphasise the importance of the ISO 9000 standards.<sup>3</sup> On the other hand, the big three automakers initially expressed their strong dislike for the ISO 9000 series of standards but ended up developing the auto industry-specific QS 9000 quality assurance standard which is based on ISO 9000.<sup>4</sup>

So why are there these conflicting and changing opinions? Importantly, is one view of the standards right and the other wrong? The consequences of the answers to these questions are not trivial given that over 95,000 organisations worldwide have already expended large amounts of resources adopting ISO 9000 and there are now many consultants and registrars whose jobs depend on the continued adoption of the standards.<sup>5</sup> This article evaluates the merits of the ISO 9000 standards. Each of the arguments for and against the standards will be examined to see how they compare with the available evidence.

## 1. The Function of ISO 9000

The first area of contention concerning ISO 9000 is about the basic function of the standards, that is, what ISO 9000 actually does. Addressing this controversy depends, however, to which of the several standards in this series you are referring. Contrary to popular impression there is no single ISO 9000 standard. ISO 9000 consists of a series of eleven standards (see Table 1 for a list of the standards) with each standard designed to do a slightly different job but with a common overriding purpose.<sup>6</sup>

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<sup>3</sup> Boehling (1990), Zuckerman (1994), and Zuckerman (1996).

<sup>4</sup> Avery (1994b) and Harrison (1996). The North American auto industry has typically used three quality assurance standards: Targets for Excellence developed by General Motors; the Q101 Quality System standard developed by Ford; and the Supplier Quality Assurance Manual developed by Chrysler. See Avery (1995). These three standards have been adopted by many auto suppliers. Recently, a common auto industry quality assurance standard, QS 9000, has been developed. This standard is based on the ISO 900 series of standards, but has been heavily amended. It is specifically aimed at firms in the auto industry and is far more comprehensive than is ISO 9000. The aim of the standard is to ensure that the quality of the goods supplied consistently meet the specifications of each of the big three automakers.

<sup>5</sup> See Rada (1996, p. 19). Over 9,000 organisations in North America have adopted one of the ISO 9000 standards.

<sup>6</sup> There are two further standards being developed: ISO 9004-5 concerning guidelines for quality plans, and ISO 9004-7 concerning guidelines for configuration management. Another standard, ISO 8042, provides lists and definitions of the vocabulary to do with quality.

**Table 1: The ISO 9000 Series of Standards.**

<b>Designation</b>	<b>Title</b>
ISO 9000-1	Quality management and quality assurance standards — Part 1: Guidelines for selection and use.
ISO 9000-2	Quality management and quality assurance standards. — Part 2: Generic guidelines for the application of ISO 9001, ISO 9002 and ISO 9003.
ISO 9000-3	Quality management and quality assurance standards — Part 3: Guidelines for the application of ISO 9001 to the development, supply and maintenance of software.
ISO 9000-4	Quality Management and quality assurance standards — Part 4: Guide to dependability programme management.
ISO 9001	Quality systems — Model for quality assurance in design, development, production, installation and servicing.
ISO 9002	Quality systems — Model for quality assurance in production, installation and servicing.
ISO 9003	Quality systems — Model for quality assurance in final inspection and test.
ISO 9004-1	Quality management and quality system elements — Part 1: Guidelines.
ISO 9004-2	Quality management and quality system elements — Part 2: Guidelines for services.
ISO 9004-3	Quality management and quality system elements — Part 3: Guidelines for processed materials.
ISO 9004-4	Quality management and quality system elements — Part 4: Guidelines for quality improvement.

The three most well known standards are ISO 9001, ISO 9002, and ISO 9003. These are the standards to which a firm can be formally registered by an independent auditor (called a registrar) as having adopted, and are usually what is meant when someone refers to ISO 9000. The standards provide generic models which any organisation in any industry or country can use to assure the quality of its production processes to external parties. An organisation chooses which of the three standards to adopt on the basis of what it actually does. For instance, if a company designs as well as makes products, as in the pharmaceutical industry, then the relevant standard is ISO 9001. A firm that does not design products, but instead produces a good or service which involves post-production relations with customers, such as a trucking firm, will likely adopt ISO 9002. ISO 9003 is relevant for firms that make products which only involves testing and inspecting activities, such as an assembler of commercially standardised components.

There are two other sets of standards in the ISO 9000 series. One set (ISO 9000-1 to ISO 9000-4) provides guidelines that help organisations choose which model of quality assurance (ISO 9001, ISO 9002, or ISO 9003) is most appropriate for their situation.

The second set (ISO 9004-1 to ISO 9004-4) provides organisations with a set of broad guidelines to help them develop and implement quality management systems. That different sectors of the economy cannot be treated identically is the reason for these two sets of standards having several parts. Finally, it must be noted that there is no formal registration scheme for the ISO 9000 or ISO 9004 standards.

The implication of this discussion is that when people are talking about ISO 9000 they are almost always talking about one of ISO 9001 to ISO 9003 — the quality assurance standards which an organisation can formally adopt. For the rest of the article the mention of ISO 9000 refers to these standards unless specified otherwise.

## 1.1 The Need for Quality Assurance

To understand fully what ISO 9000 does and in what situations it will and will not be useful, it will prove useful to review why sellers need to assure the quality of their goods to buyers. This is directly related to the characteristics of the transactions between buyers and sellers. There are two important aspects of such transactions. First, most goods and services have many attributes and firms within the same industry produce goods with different bundles of them.<sup>7</sup> Second, sellers typically have more information about the characteristics of their goods than the buyers. That is, an information asymmetry exists between buyers and sellers. This situation increases the expected profits accruing to sellers who choose to behave opportunistically and misrepresent the quality of what they produce. As a result, there is a greater probability that buyers may get ripped off — that they may pay more for a good than if they had known the true quality of what they were buying.

The presence of asymmetric information between buyers and sellers, which has been widely studied in economics, is related to the characteristics of a good or service.<sup>8</sup>

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<sup>7</sup> There are two types of characteristics. The first are vertical space characteristics in which the more of an attribute a good has, the more valuable it is to a business. Examples would be the fuel efficiency or freight capacity of a truck. Another example is durability. Quality in this case is measured by the time between the purchase of a good and its failure. Normally a business finds components with longer lifespans more valuable than those with shorter lifespans. Examples are computer hard disks and vehicle tires, both of which have finite lifespans. The second are horizontal space characteristics. In this case there is a range of possible values that a characteristic can take and different firms prefer different values of the characteristic. For example, producers of yoghurt, soft cheeses, and hard cheeses require milk as an input but each producer prefers a different proportion of fat, protein, and water in an equivalent quantity of milk. See Tirole (1990, Chapter 2).

<sup>8</sup> Nelson (1970) and Tirole (1990, Chapter 2).

There are three different types of goods based on the observability of their quality: credence; experience; and search.

The severity of the problems associated with the presence of asymmetric information depends on the type of good to which we are referring. The quality of credence goods or services, such as software programs or the services supplied by consultants, are never fully learned. The quality of experience goods or services are learned only after their use. Examples are tools like hammers or wrenches, or maintenance services. The quality of a search good is perfectly observable even before purchase, but typically there is a cost to obtaining such information. This implies that buyers are still subject to limited information since it is optimal for them to look at only a subset of the possible goods in order to economise on search costs. An item of clothing such as a uniform is a relevant example. In practice most goods and services combine more than one of these characteristics. Typically, one characteristic may dominate the others and it dictates the classification of the good in question. The problems resulting from the presence of information asymmetries are most severe in the case of credence goods and least severe for search goods. The nature of credence goods ensures that sellers that act opportunistically have a low probability of being caught. This increases the incentive for sellers to act opportunistically. In contrast, low search costs ensure that sellers have a high probability of being caught and therefore have little incentive to act opportunistically for fear of losing potential customers.

Two further factors affect the presence of asymmetric information. The more complex a good, such as a fork-lift compared to say a trolley, the greater the potential for quality variation. For example, there are more parts that can vary in quality in a fork-lift than a trolley. There are also more interactions among the parts of a fork-lift compared to a trolley. This increases the number of ways that the quality of an individual part can affect the overall quality of the fork-lift. Furthermore, a fork-lift has a greater possible range of performance characteristics compared to a trolley. The cost of assessing the quality of a good also increases with its complexity. For instance, assessing software programs can be exceedingly costly for a business as it requires a large accumulation of human capital to understand the technology being used. The presence of asymmetric information is also related to the stability of both an industry and the good produced. A good which is undergoing rapid technological change, such as a computer, or is subject to a high turnover of firms, as in restaurant meals, increases the potential for information asymmetries. If the definition of a good is changing rapidly it is more costly for buyers to ascertain its quality since knowledge about it is less readily available. This also implies that knowledge accumulated about what a

computer is and does, and hence what is meant by a low and high quality computer, quickly depreciates. There is also less certainty about what constitutes a high and low quality good because there is uncertainty surrounding the performance characteristics of the good, especially if it is at an early stage of development. A rapid turnover of sellers lowers the incentive for buyers to invest in ascertaining reputations of sellers, since benefits of such an investment only flow over a short period.

One of the classic examples which illuminates the potential problems caused by asymmetric information between buyers and sellers is the used car market. Typically the price of a new car drops by a large amount once the car leaves a dealer's lot, even though the only major change has been that the car has a new owner. A simple but illuminating model has been developed by George Akerlof to highlight why this phenomenon occurs.<sup>9</sup> Consider a situation in which there are four types of cars: new or old, and good or bad. Buyers know which cars are new and old, but they do not know which are good or bad. They do know the probability that a new car is good or bad. Sellers of old cars are assumed to know their own quality. Since buyers cannot ex-ante distinguish between good and bad old cars, old cars sell for the same price. This means that only bad old cars are offered for sale. Owners of good old cars are better off using them than offering them for sale, since they cannot get their full value due to the averaging process determining prices. In this case, only low quality goods are offered for sale, which implies that the price of used cars will be a lot lower than the price of new cars, which is socially inefficient. This is an extreme example of adverse selection on the part of the sellers.

The above example shows how the presence of asymmetric information has the potential to severely disrupt trading in a market. In such a situation buyers will rightly be wary of the possibility of buying goods whose quality is misrepresented by opportunistic sellers who produce low quality goods but attempt to pass themselves off as high quality producers. Buyers, rationally believing the worst, will expect all goods offered to be of a low quality. Without any other action available to buyers or sellers, only low quality goods tend to be produced and sold in the market because high quality producers cannot distinguish themselves from the low quality producers. As a result, markets may function poorly or even cease to function.

Even if asymmetric information is present in transactions, it is still possible that prices may optimally co-ordinate quantities supplied and demanded of a good. Un-

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<sup>9</sup> The classic article which discusses this problem is Akerlof (1970). A very accessible discussion of this material is Milgrom and Roberts (1992, Chapter 5).

der certain conditions differences in prices can signal differences in qualities.<sup>10</sup> For instance, buyers may be able to identify sellers of low quality goods if buyers receive signals that contain a little bit of information about the quality of the sellers when transacting with them. An example of such a signal may be the knowledge demonstrated by salespeople about the products they sell. It may be seen that firms that train their sales staff well are less likely to sell poor quality goods. This type of information allows prices to signal qualities, with higher quality goods being sold for higher prices than lower quality goods. This result depends crucially on the informativeness of the signals. If they are too noisy then we are back to the Akerlof situation. Situations where it is likely that prices will signal qualities involve products which are not undergoing much innovation and where the industries producing them are stable.

Studying the circumstances under which prices can signal qualities highlights two things. First, it shows that asymmetric information issues are really questions about signal extraction. Can a buyer draw enough information out of a given situation to avoid being “tricked”, even if they do not know everything? If yes, then the resulting prices will be able to co-ordinate the actions of buyers and sellers. If no, then we need other mechanisms to overcome the effects of the information asymmetry. Second, the basic underlying characteristics of the transactions between buyers and sellers are important in determining whether or not markets will function and the form the resulting transactions will take. If buyers can interact directly with sellers and obtain useful information about them when transacting then it is more likely that prices can signal the qualities of goods. As a result, markets will function efficiently without buyers or sellers being required to take any other actions.

An example that demonstrates that buyers may not know the full quality of what they are buying concerns Southern Pacific Rail Corporation’s hiring of IBM Corporation in 1995 to handle its computing needs for the following decade. A manager of the railroad company was reported as saying that expectations were not being met and the relationship was not successful. At one stage rail-car switching had to be done by hand because of computer system failures, which led to the costly mistake of rail-cars not connecting.<sup>11</sup> In this case Southern Pacific Rail misjudged the ability of IBM to manage its specialised computing needs.

The above example appears to have involved a buyer misjudging the quality of what they were buying, rather than the seller acting opportunistically and deliberately

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<sup>10</sup> Wolinsky (1983).

<sup>11</sup> *The Wall Street Journal*, (1995), 18 May, sec. A, pp. 1 and 9.

misrepresenting the quality of what they were selling. There are many examples, however, of sellers acting opportunistically. For instance, in the early 1990s there was a major problem with poorly made fasteners in the United States. Counterfeit bolts were found in M-60 tanks, aircraft carriers, and nuclear submarines in military products, and in freight vehicles, bridges, nuclear power stations, buildings, and small aircraft in civilian products. Several deaths, as well as many accidents and much damage, have been attributed to the substandard bolts. Suppliers of the bolts used fraudulent quality certificates and other misrepresentations to sell them.<sup>12</sup> An example involving consumer goods occurred when Agriculture Canada in 1994 discovered that an importer had been selling a lower grade of olive oil than that displayed on the container's label.<sup>13</sup> The importer received the higher price associated with the purported higher grade of olive oil but only incurred the lower costs of buying the actual lower grade oil. Many more historical examples are detailed in Hemenway (1975).

The presence of asymmetric information can cause buyers to suffer large unanticipated costs, as happened with the case of defective automotive seat-belts in North America. In 1995 over eight million vehicles in the United States and 900,000 vehicles in Canada were recalled to fix defective seat-belts made by Takata Corporation of Japan. Such a move is very expensive in terms of actually replacing the seat-belts and also in damage done to the reputations of the companies concerned. Even though a supplier was at fault consumers no doubt wondered about the ability of the automobile manufacturers buying the seat-belts to discriminate between suppliers of low and high quality inputs.<sup>14</sup>

In theory it seems that the presence of asymmetric information about product quality between buyers and sellers has the potential to disrupt trade, and severely so in some cases. The above examples also illustrate that information asymmetries do actually occur and that sellers can attempt to profit from them. In such a situation buyers and sellers may want to develop mechanisms to mitigate the affects of the information asymmetries. That is, sellers may want to take actions to assure buyers of the quality of their products. It turns out that such an action may be to adopt a quality assurance standard such as ISO 9000.

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<sup>12</sup> *Quality Progress*, (1990), 23 (3), p. 13; and *Quality Progress*, (1990), 23 (7), p. 12.

<sup>13</sup> See the *London Free Press*, (1994), 27 April, sec. C, p. 3.

<sup>14</sup> *The Wall Street Journal*, (1995), 24 May, sec. A, p. 4; and *The Globe and Mail*, (1995), 24 May, sec. A, pp. 1 and 7. At least 90 injuries were traced to the defective seat-belts.

## 1.2 Quality Assurance Standards and ISO 9000

The function of quality assurance standards such as ISO 9000 is to assure buyers of the quality of a seller's product. Quality assurance standards take one of three routes to performing their basic function: providing information about production processes, specifying positive or negative limits on permissible production processes, or specifying acceptable characteristics of products.

First, they can be used to produce information about a firm's production processes. Such a standard typically contains a list of common activities (or production processes) that firms use to produce a good or service. The standard is then used to check the extent to which the production techniques used by a firm conforms to the listed activities. For instance, an activity could be the testing of a product for defects after it has been manufactured. A standard may list likely techniques for product testing and a firm would be checked to see how its product testing activities conform to those listed in the standard. As an example consider the health industry. The Canadian Council on Hospital Accreditation in Canada and the Joint Commission on Accreditation of Health Care Facilities in the United States have each developed voluntary standards to which health care facilities in the respective countries can be accredited.<sup>15</sup> Hospitals are checked on activities such as the keeping of accurate and complete patient records and that the staff hired are suitably trained and competent in their fields. If a hospital is found to satisfy all of the required activities then it is accredited. This accreditation status gives buyers of hospital services information about the production processes used by the hospitals. The importance of these quality assurance standards is evident in the fact that third-party medical payers, such as Blue Cross in the United States, are increasingly using the accreditation status of hospitals in deciding payment schedules.

A quality assurance standard may also be used to place restrictions on the set of technologies available to firms. A firm that purchases inputs from many suppliers may want to prohibit or require the use of specific technologies by suppliers. This has the potential of increasing the quality of the firm's good by reducing exogenous or endogenous variation in the inputs. For instance, an auto manufacturer may purchase steel from several producers to alleviate potential hold-up problems or to increase price competition among suppliers (these are examples of contracting hazard problems). The manufacturer would obviously like the steel to be of a uniform quality. One way to ensure this is to have the steel producers adhere to the same production process. A specific example of this type of standard is the standard MoD-Std-0055 developed by

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<sup>15</sup> See Canadian Council on Hospital Accreditation (1985), Graham (1990), and Roberts, Coale, and Redman (1987).

the United Kingdom Ministry of Defence. This standard prohibits the use of assembly languages, as well as requiring static analysis (formal proof that the specifications of a program are consistent with its requirements), by producers of safety critical software in an attempt to reduce the variability of some of the characteristics of the software purchased.<sup>16</sup>

Finally, quality assurance standards may specify a minimum level of quality that a good must meet. Typically, this is achieved through specifying types of characteristics that a good is required to have, or by specifying minimum or maximum levels of certain characteristics that a good must meet. An example is the American Softwood Lumber standard PS 20-70 developed by the American Lumber Standards Committee (ALSC).<sup>17</sup> Buyers of wood produced by mills that are certified to the standard know that the moisture content of the wood that they buy does not exceed a certain level (as lower levels of moisture are associated with higher levels of quality).

The first type of quality assurance standard that was mentioned can, in principle, be very general in nature. The production processes followed in many industries have common elements, such as purchasing inputs, designing products, or testing products. This means that specifics about technologies used, or about the features of the goods produced, do not need to be part of the standard. The second type of standard tends to be more specific. While general features of production processes in many industries may be similar, specific technologies are likely to be very different. Thus to place restrictions on specific production technologies requires a standard to be industry-specific in nature. Standards that pertain to specific characteristics of specific goods are the least general of all and are invariably industry or firm specific.

ISO 9000 is a quality assurance standard of the first and most general type. It is designed to increase the information a buyer has about the production processes used by a seller. The ISO 9000 standards require that an organisation write down what it does and then prove (by being audited) that it does what it says it does. There is no “you shall do this” (other than the required documentation about what the organisation does) about purchasing of materials, employment of staff, testing of the end-product, and the many other activities that an organisation can undertake. Nor are there requirements that the goods or services produced by an organisation must meet a

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<sup>16</sup> *IEEE Software*, (1989), 6 (15), p. 95.

<sup>17</sup> See Epley (1982, p. 17).

minimum quality level. ISO 9000 is simply an information generation device.<sup>18</sup> Since ISO 9000 is a generic standard which can in principle be used by a firm in any industry, by government organisations, by schools, and by a multitude of other organisations, it cannot delve into details that apply to industry-specific technologies or products. As such it cannot place restrictions on specific technologies, nor can it describe minimum quality levels that a good must attain. To do either of these things would mean that ISO 9000 is not generic in nature, or that it is a document equivalent in length to an encyclopedia. Neither is the case.<sup>19</sup> As a consequence it is possible, in principle at least, for a firm, say, that produces boats with holes in their bottoms to be registered to ISO 9000, as long as they say that they are doing this and this is indeed what they do. Of course the fact that they do make boats with holes in their bottoms would be included in the documentation they would need to achieve ISO 9000, and this would be available to potential buyers.

### 1.3 Quality, Efficiency, and ISO 9000

While the sole intention of the developers of ISO 9000 was for it to be an information generation device, some firms have found that adopting ISO 9000 has led to benefits of improved product quality (where quality is broadly defined) or lower production costs. These include things such as reductions in delivery times and in defects. For instance, Edgecomb Metals, a United States subsidiary of French steelmaker Usinor Sacilor, reported a thirty percent reduction in customer claims and a ninety-five percent improvement in delivery time after adopting ISO 9000.<sup>20</sup> Groupe Gro Plus, a furniture manufacturer in Quebec, Canada, estimated that manufacturing defects fell from three to five percent to 0.5 percent after having adopted ISO 9000.<sup>21</sup> Square D, a United States manufacturer, experienced a twenty percent increase in on-time delivery and a forty percent reduction in their product cycle time.<sup>22</sup> These sorts of benefits can occur if by adopting ISO 9000 firms learn more about their production processes, and as a result improve them.

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<sup>18</sup> It is true that ISO 9004-4 does provide guidelines for managing quality improvement in an organisation, but none of the other standards in the ISO 9000 series have this in their title. And using ISO 9004-4 does not guarantee quality improvement; it just gives guidelines about how to manage the processes used by an organisation improving the quality of its products.

<sup>19</sup> The original 1987 version of ISO 9001, for example, was in fact less than twenty pages in length.

<sup>20</sup> Avery (1994c).

<sup>21</sup> *Report on Business Magazine*, (1995), 11 (7), p. 90.

<sup>22</sup> Avery (1994a). Other examples can be found in Avery (1994b), Peach (1992, Chapter 11), and Clark and Starkweather (1993).

While evidence exists that the adoption of ISO 9000 leads to firm-specific benefits not intended by its developers, it is hardly unequivocal. For a start while some firms do report experiencing such benefits, many do not. For instance, a survey of 620 firms in the United States that adopted ISO 9000 found that only 97 (or 15.6 percent) of them listed lower production costs as the most important internal (that is ignoring the effects on customers or markets) benefit of its adoption.<sup>23</sup> Higher product quality was not even mentioned by the firms. In another survey, this time of managers of 40 firms from Colorado, lower production costs and higher product quality were not mentioned at all as primary benefits from adopting ISO 9000.<sup>24</sup> The main benefits reported were the creation of a formal system, better documentation, and better understanding of the production processes used by the firms. Similar results were found in a survey of 290 Belgian companies that adopted ISO 9000.<sup>25</sup> As a result, any assertion about sizeable, or even positive, firm-specific benefits from adopting ISO 9000 is uncertain and only partially supported by the available evidence. At best, strong supporters of ISO 9000 on these grounds should moderate their expectations of benefits, while strong skeptics might revise their expected beliefs upward, but the bounds of uncertainty about product-specific benefits are still large.

There are also other factors that we have to allow for in weighing up the evidence. It is likely that the adoption of ISO 9000 is only one change that is affecting the firms in question. Many other changes may be affecting them as well. This suggests that the firms may be falsely assigning positive (or negative) benefits from the adoption of ISO 9000 when they may be due to the other changes affecting them. Furthermore, the reported benefits are based on surveys or anecdotal examples which suggests that we have to be careful in interpreting their findings. First, using such sources of data only highlights the fact that the reported results from adopting ISO 9000 may be contaminated with the affects of other events because of a lack of systematic statistical analysis of the effects of adopting ISO 9000. Second, the results reported may simply reflect managers trying to rationalise the adoption of ISO 9000 after the fact, or in the case of anecdotal examples, that the managers are trying to promote their firm with favourable reports about what they do. What these points suggest is that without careful empirical work (statistical analysis of firm level data, or the presence of control firms for survey or case study data) that the available data may severely mismeasure the benefits associated with adopting ISO 9000.

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<sup>23</sup> CEEM Information Services (1993, p. 2).

<sup>24</sup> This survey consisted of 40 firms in Colorado that adopted ISO 9000. The respondents could choose more than one option as an answer and the questions were open ended. See Weston (1995).

<sup>25</sup> Vloeberghs and Bellens (1996).

Finally, many of the surveyed firms that adopt ISO 9000 indicated that they believed that the primary benefit of adopting ISO 9000 would be an increase in product quality, but in fact most of the same firms do not give this as a benefit after having actually adopted it. This also seems to imply that adopting ISO 9000 has little impact on product quality. The recent actions of officials from the European Community seems to support this interpretation. Initially, the officials advocated that European firms should adopt ISO 9000 en masse as a way of improving the quality of what firms produce, and hence the international competitiveness of European firms.<sup>26</sup> The position of the European Community regarding ISO 9000 as a quality improvement tool now appears to have changed with the realisation that ISO 9000 is a quality assurance standard and not a product quality standard. Underlying this change in perception was the lack of evidence of an increase in the quality of products made by firms in the European Union that had adopted ISO 9000.

In conclusion, while there exists evidence that adopting ISO 9000 can affect quality and efficiency, the evidence to date appears to support the critics of ISO 9000. The basic function of ISO 9000 is to generate information, not to affect product quality or production technologies directly. In addition, it is far too general a standard for its adoption to be used as a way of increasing quality or lowering production costs even if that had been the intention of its developers. It is possible that a side-benefit from adopting ISO 9000 is that firms may gain extra information about how they make their products, which may help them to increase quality or efficiency. But, and with doubts about the accuracy of the available data, the evidence to date suggests that many more firms that adopt ISO 9000 do not experience increases in product quality or lower production costs than do. Furthermore, even if adopting ISO 9000 did lead to such affects, this type of benefit would occur whether or not a firm formally adopts ISO 9000. The careful detailing of the production processes that occur within a firm is not dependent on the firm adopting a standard. Thus a firm could reap such benefits without incurring the (non-trivial) costs of formally adopting ISO 9000.

Finally, since ISO 9000 does not appear to affect product quality then the criticism that ISO 9000 is mistakenly seen as a “silver bullet” that will result in continual im-

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<sup>26</sup> See Zuckerman (1996) and *Quality Progress*, (1997), 30 (1), pp. 18-21. The notion underlying the policy that nations as a whole compete against one another is incorrect. Trade between countries is based on comparative advantage as was explained by David Riccardo in the nineteenth century. Note that this does not mean that individual firms from different countries do not compete against one another — they obviously do — simply that nations as a whole do not compete against one another. This is a subtle, important, and frequently overlooked, distinction. Paul Krugman has been a vocal critic of the notion that countries compete against one another for many years. See, for instance, Krugman (1996, Introduction and Chapter 1).

provements in the quality of goods produced by firms that adopt it seems well-founded. But, while such misperceptions about the true function of ISO 9000 seem to exist, it is unlikely that they will have a permanent effect on retarding innovation in product quality as argued by the critics. Learning is obviously going on about the true function of ISO 9000 as seen with changes to government policies. Such learning is evident in the move by the European Community to de-emphasise the use of ISO 9000 as a quality improvement strategy. More importantly, there is evidence that buyers seem to realise the true function of ISO 9000 which means sellers are likely to learn from their mistakes.<sup>27</sup> A firm that does not improve the quality of its products while its competitors do, is likely to lose business and eventually fail financially.

#### 1.4 Signalling and Screening

The core function of ISO 9000 is to generate information, however, there is a debate about the amount and usefulness of the information that adopting ISO 9000 actually produces. Such concerns centre on the ability of ISO 9000 to assure the quality of sellers' goods to buyers.

As has been argued, the potential for adverse selection based on an information asymmetry between buyers and sellers suggests that ISO 9000 may be a useful tool for buyers, even if its adoption does not directly affect the quality of a product or the efficiency of production processes. This possibility occurs because ISO 9000 may be used by buyers to screen low from high quality sellers, or sellers may use ISO 9000 to signal their quality. Either way, buyers can identify sellers by their quality, which allows markets to work more efficiently. It is important to realise that the definition of efficiency in this case includes the presence and effects of the information asymmetry. This is important since without considering the presence of asymmetric information, the use of tools like ISO 9000 by individuals seems wasteful from a social point of view.

Whether or not ISO 9000 acts as a screening device or a signalling mechanism depends crucially on the information produced by its adoption. There are two possibilities: when the information produced by ISO 9000 is strongly correlated with the quality of the adopter's product, and when the correlation is weak. Consider what happens when the correlation is sufficiently strong. High quality firms that adopt ISO 9000 incur the adoption costs and the information generated will show them to be high quality firms. They will, therefore, receive prices commensurate with producing high

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<sup>27</sup> See Guerin and Rice (1996) and *Quality Progress*, (1997), 30 (1), pp. 18-21.

quality goods. Low quality firms that adopt ISO 9000 incur the adoption costs and will be shown to be low quality firms. They will, therefore receive prices commensurate with producing low quality goods. But the low quality firms would have received the lower prices in any event, given the way markets work with asymmetric information, so it makes no sense for them to adopt ISO 9000. Thus only high quality firms adopt ISO 9000. This conclusion holds even if the information produced by ISO 9000 is not perfectly correlated with the quality of the adopter's product. All that matters is that the correlation is sufficiently strong. In this case ISO 9000 works as a screening device, similar in nature to inspections of products.<sup>28</sup>

Consider what happens now if the correlation is weak and, in addition, that the quality of the good produced by the firm is only learnt after it has been bought and used. In addition, assume that buyers have an ongoing demand for the good. If the firm produces a high quality good then it is likely to be willing to undertake expenditures to induce buyers to make initial purchases. Once the buyers have bought and used the good they will find that it is of a high quality and will make repeat purchases. Adopting ISO 9000 may, for instance, be a way of inducing buyers to make such an initial purchase. On the other hand, if the firm produces a low quality good and undertakes equivalent expenditures a different result arises. Buyers make the initial purchases, discover that the firm produces low quality goods, and do not make any repeat purchases. But the low quality firm could have achieved a similar sort of result without incurring the costs of taking the action, and so it does not pay the low quality firm to undertake the costly expenditures. It is possible that adopting ISO 9000 will increase the number of initial purchases of the low quality firm's good, even if the buyers do not make repeat purchases, if the population of buyers changes over time. As long as the benefit of the extra initial purchases is less than the costs of adopting ISO 9000 then low quality firms will not adopt ISO 9000 and it can still be used by firms to signal their quality. As a result, high quality firms may undertake costly actions such as adopting ISO 9000 to signal their level of quality, even though the action they take is not directly related to the quality of their product. In this case ISO 9000 acts as a signalling device, similar in nature to some forms of advertising or warranties.<sup>29</sup>

The previous discussion highlights three immediate issues which need addressing: whether or not ISO 900 can be used to distinguish sellers by quality, conditional on a positive answer to the first issue, how it does so, and finally, its effectiveness at doing

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<sup>28</sup> The economics of testing mechanisms is discussed by Heinkel (1981).

<sup>29</sup> See Grossman (1981) and Horstmann and MacDonald (1995).

so. The second issue concerns the strength of the correlation of information produced from adopting ISO 9000 with product quality.

The evidence to date suggests that at least some buyers use ISO 9000 to help distinguish sellers by quality and comes in two forms. The first piece of evidence has to do with the substitution of ISO 9000 for another type of quality assurance mechanism — firm-specific audits. These are audits by specific buyers of specific sellers and involve buyers gathering information about the specific technologies used by firms, as well as about their general production processes. The buyers use the audits as a screening mechanism to reduce the probability of their buying from a low quality firm. If ISO 9000 produces useful information about the quality type of a firm, and it is a lower cost mechanism, then its adoption should result in fewer firm-specific audits (note that it may not eliminate such audits if there is not a complete overlap between the information produced by the two types of mechanisms). It turns out that some firms that have adopted ISO 9000 have experienced a reduction in such audits.<sup>30</sup> For example, Westvaco's Chemical Division experienced a decline in the number of customer audits, from twelve to two per year, after adopting ISO 9000. AMP has also experienced a decline in the number of audits by its customers. General Electric Plastics, Du Pont, and Phillips 66 have all reduced the number of audits they perform on their suppliers who have adopted ISO 9000.

The previous piece of evidence suggested that ISO 9000 is relatively less expensive than one other type of mechanism and therefore was used instead of it, at least in some instances. It may be the case though that instead of being substituted for other mechanisms that ISO 9000 allows more transactions to occur in total because of lower costs of assuring quality for certain classes of transactions. In the business press this is referred to as an “opening up” of sales opportunities that had previously been closed to firms because the costs of assuring the quality of their products to potential buyers were prohibitively large. Two possibilities come to mind. First, one reason for such an opening up of sales opportunities has to do with the possibility that the cost of producing information increases with the distance of the buyer from the seller and that this cost is higher for mechanisms other than ISO 9000. In this situation a firm adopting ISO 9000 may not experience a reduction in firm-specific audits if it is geographically close to its seller. The firm-specific audit may be the better option because it produces more information at little extra cost. On the other hand, if the buyer and seller are far apart geographically, say they are in different countries, then adopting ISO 9000 may significantly reduce the cost of acquiring information about the seller if it is used as a

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<sup>30</sup> See Avery (1994a). Additional examples are presented in Peach (1992, Chapter 11).

screening device, or as a credible (that is, informative) signal of the seller's quality.<sup>31</sup> In this situation instead of being audited less, a firm may experience the same number of audits, or even an increase in the number of audits, but be able to sell to more customers, particularly foreign customers, than it did previously. This would lead to increased trade, and facilitation of trade between countries was one of the main reasons ISO 9000 was developed in the first place.

The second class of transactions for which ISO 9000 may result in comparatively lower quality assurance costs is not based on the location of the sellers relative to the buyers but is instead based on the size or age of the sellers. It is possible that small or young firms may find the benefit of adopting ISO 9000 relatively higher than large or old firms. This may occur, for instance, if the reputations of firms are related to their sizes, or in particular, to their ages. Consider advertising that is used to signal the quality of firms. If larger firms have existed for many years then this fact may itself be used as a signal that larger firms produce goods of at least a reasonable quality.<sup>32</sup> Thus, buyers may find advertising about product quality done by a larger firm more credible, that is, it is more informative, than that done by a smaller firm. In addition, much more information is probably known about a firm that has been trading for many years than one which was recently formed, or about a firm that is large rather than small. Thus, buyers will have a lot of confidence in using the (informative) reputations of large or old firms to make purchasing decisions relative to the (uninformative) reputations of small or young firms.<sup>33</sup> The fact that ISO 9000 is a formal universal standard may give more

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<sup>31</sup> The latter possibility implies that firms may use screening devices such as firm-specific audits to assess the quality of local suppliers and signalling devices (in this instance ISO 9000), or even a combination of signalling and screening devices, to assess the quality of distant suppliers. The important factor is how the cost of the different types of devices varies with distance.

<sup>32</sup> Dunne, Roberts, and Samuelson (1988) and Troske (1996) report that firm age and size appear to be positively correlated. Theories on the evolution of industries such as Jovanovic (1982) predict that firms learn about their efficiency and those that are efficient grow, while those that are not efficient decline and exit the relevant industries. This would suggest that on average older firms should be larger than younger firms. Ericson and Pakes (1995) look at situations where firms can take actions to improve their efficiency. Although all firms eventually exit in their model, it is possible that older firms are also larger than younger firms on average. The findings of Dunne and Hughes (1994), Evans (1987), and Troske (1996) are consistent with these theories.

<sup>33</sup> Martinelli (1997) shows how such a phenomenon may arise in credit markets due to the presence of moral hazard and adverse selection. He argues that little is likely known about young firms and that as a consequence they face higher interest rates and borrowing constraints than older firms (which constrains their size) to induce them to repay their loans. Older firms on the other hand have a well developed credit history and thus restrictions on their borrowing are relaxed, which allows them to grow in size, in addition to their facing lower interest rates compared to the young firms. As a result, the old firms have no incentive to default on their loans because they would lose the benefit of their favourable reputations. These arguments are consistent with empirical results that show that small firms face higher interest rates than old firms and also experience credit constraints not faced by old firms. See, for instance, Berger and Udell (1995).

credibility to the advertisements of the smaller firms than would have been the case if they had not adopted ISO 9000. As a result, the benefits to using signalling devices such as advertising may increase for smaller firms if they are used in combination with ISO 9000.

The available suggests that an opening up of sales opportunities from adopting ISO 9000 has indeed occurred. For example, over sixty-nine percent of adopters of ISO 9000 gave their main reason for adopting it as the ability to bid for tenders from which they were otherwise excluded.<sup>34</sup> In addition, over thirty-three percent of firms in a 1993 survey reported that their most important external benefit was higher perceived quality.<sup>35</sup> Other surveys contain results that also seem to support increases in trading opportunities from adopting ISO 9000.<sup>36</sup> Unfortunately, none of this evidence looks at the geographic characteristics of the tenders which were opened up or at the different results experienced by firms of different sizes. Thus, the evidence hints at the possibility, but does not confirm, that ISO 9000 may be performing these roles but it is not of sufficient detail with which to confirm or reject the importance of these possibilities.

It is worth emphasising that the evidence presented is also likely to understate the impact of ISO 9000, since it is conceivable that the information generated by ISO 9000 relating to product quality may not be reflected in the number of firm-specific audits conducted. It is possible that adoption of ISO 9000 does not reduce the number of firm-specific audits, and it may even increase them if the information from them is complementary, but it decreases the costs associated with using other mechanisms such as product inspections or advertising. There appears to be no information concerning this type of effect.

The evidence presented does suggest that ISO 9000 can be useful in allowing buyers to distinguish between high and low quality sellers, at least in some cases. The next issue is whether ISO 9000 acts as a signalling or a screening device. This, as has been argued, depends upon the strength of the correlation between the information produced and product quality. It is likely that the strength of this correlation fluctuates markedly between products and industries given the different types of goods that are produced and the differences in the complexity of the processes used to produce them. For instance, knowing the basic production processes used to produce a relatively simple good like a pencil may tell a buyer a lot about the quality of the good. On the other hand

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<sup>34</sup> De Carlo (1993).

<sup>35</sup> CEEM Information Services (1992, p. 2).

<sup>36</sup> See Vloeberghs and Bellens (1996) and Weston (1995).

information produced by ISO 9000 about a relatively complex good such as medical imaging equipment may tell a buyer very little about the quality of the good. As such, in the situations in which ISO 9000 is effective we would expect industries which produce simple goods to use it as a screening device and industries that produce complex goods to use it as a signalling device.<sup>37</sup> That the correlation may differ between industries and products seems to be supported by the recent release by the ISO of a publication in which they show the correct and incorrect ways of advertising ISO 9000. The ISO emphatically emphasise that “ISO 9000 is not a product quality label...” and that ““Certified to ISO 9000” is often assumed to mean that the product of the company is of topmost quality. Little effort is made to correct this mistaken belief.”<sup>38</sup> That the ISO has taken this action indicates that the information produced by adopting ISO 9000 is not always perfectly correlated with the quality of the products of the adopters, and in some cases that the correlation may be low.

As has been argued the nature of the good in question influences how and if ISO 9000 will be used to assure quality. We would also expect the use of ISO 9000 to depend on the nature of the transactions being undertaken. In particular, the frequency of the transactions will influence whether ISO 9000 is used as a signalling or a screening device as has been discussed previously. For instance, ISO 9000 could be used as a signalling device for goods which buyers purchase repeatedly. But, if buyers make once-off purchases or infrequent purchases of some types of goods then ISO 9000 is more likely to be used as a screening device.

Some of the available evidence points to ISO 9000 being used as a signalling device. For instance, one of the main benefits ascribed to the adoption of ISO 9000 is its use as a marketing tool. In such a case ISO 9000 is effectively used as a form of advertising, and of a form which likely benefits smaller firms relative to larger firms. Other evidence, however, raises the possibility that ISO 9000 may also be used as a screening device, at least in some circumstances. One possible piece of evidence is the requirement by some buyers, such as General Electric, that firms selling to them have to have adopted ISO 9000.<sup>39</sup> If the suppliers are selling credence goods, or experience goods for which it takes a long period of time to discover their quality, then this policy of General Electric would only make sense if it was using ISO 9000 to screen sellers by their quality. The nature of the goods means that it would be very difficult for the buyer to

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<sup>37</sup> It seems likely that we can characterise simple goods as search goods or experience goods whose quality buyers learn quickly, and complex goods as credence goods or experience goods whose quality buyers learn very slowly.

<sup>38</sup> International Organization for Standardization (1997) and Dodd (1996, p. 23).

<sup>39</sup> Murakami (1994).

establish their quality from inspecting them or using them over a short period of time. Thus, ISO 9000 cannot act as a signalling mechanism through the threat of the buyer refusing to make repeat purchases from the suppliers in the future. Such a threat is not credible in this instance because everyone concerned knows that the buyer can not distinguish between the suppliers by their quality, at least in the short term. But, if the information generated by ISO 9000 about the production processes of the suppliers is strongly correlated with the quality of the suppliers' final products, it can be used to indicate the likely quality of the suppliers to the buyer.

Another piece of evidence suggesting that ISO 9000 may be used as a screening device concerns the proliferation of industry-specific guidelines and the development of more stringent quality assurance standards based on ISO 9000, such as QS 9000. One possible reason for developing the sector-specific guidelines is to ensure that the embellished versions of ISO 9000 can act as a screening device. That is, the sector-specific guidelines can be seen as an attempt to improve the correlation between the information produced by adopting ISO 9000 and the quality of the adopters products. If ISO 9000 is to be used as a signalling device then this is a wasteful move since it is only the adoption status of firms that matters in signalling the level of their quality and not the actual information produced from adopting the standard. As a result, such a move will not improve the signalling capability of ISO 9000. On the other hand such a move could ensure that the sector specific variants of ISO 9000 are able to act as screening devices because it increases the amount of information that is generated from their adoption. An implications of these actions is that if embellishing ISO 9000 enables it to be used as a screening mechanism in some industries, then there may be industries for which the "standard" version of ISO 9000 can be used by buyers to screen sellers.

The last issue concerns the effectiveness of ISO 9000. That is, the degree to which ISO 9000 allows buyers to distinguish among sellers by their quality. While it has been argued that ISO 9000 has the potential to be a useful quality assurance mechanism we would not expect ISO 9000 to be used by producers of some types of goods. For instance, if the quality of the relevant products can be readily ascertained by inspection, such as for clothing, then ISO 9000 is unlikely to be used as a signal of quality. Inspections of a firm's products is probably a cheaper method of quality assurance than having the firm adopt ISO 9000. In addition, a general standard such as ISO 9000 may be incapable of screening or signalling low from high quality sellers in cases where the quality of a good is hard to ascertain by inspection or by use, such as for software, pharmaceuticals, and many types of services. ISO 9000 is unlikely to provide sufficient information with

which buyers can use to judge the quality of the sellers. As a result, we should not expect ISO 9000 to be used in all situations nor for it to be effective in all situations.

As far as the available evidence is concerned, there is some evidence suggesting that at least some organisations are using ISO 9000 to distinguish sellers by their quality. Such evidence includes falls in the number of firm-specific audits and an opening up of new markets for firms that adopt ISO 9000. But, there is also evidence which suggests that ISO 9000 is not useful in some situations. For instance the Australian Federal Government has recently removed the requirement that its suppliers had to have adopted ISO 9000.<sup>40</sup> Initially, the Australian Federal Government thought that whether or not a firm had adopted ISO 9000 would be a useful signal of the quality of the firm's products. This view has now changed. Since this is an action rather than a claim it obviously reveals much more information about what buyers believe than if it was just an opinion given in a survey by a seller. The nature of the action gives much support to the claim that buyers cannot use ISO 9000 to distinguish between sellers. Of course, in this case it may be that the Australian Federal Government has less expertise in its purchasing activities than private companies, and so it is saying that the correlation varies not only by industry but also by buyer.

Another piece of evidence concerns a 1995 survey of European importers of forest products. Twenty-six of the twenty-seven importers surveyed did not believe that adopting ISO 9000 by itself equated to higher quality products.<sup>41</sup> Furthermore, the importers did not use whether or not a producer had adopted ISO 9000 to help choose amongst them. This piece of evidence, as well as the action of the Australian Federal Government, highlights an important point. That is, when judging the ability of the ISO 9000 to act as a quality assurance mechanism that we should look at what buyers do. Sellers of goods obviously have an interest to claim that a given mechanism is a good indicator of their quality if they have spent a lot of money adopting it. But buyers have a strong incentive — the desire to avoid being sold a 'lemon' — to ascertain the true effectiveness of the mechanism. That some buyers have stated that ISO 9000 is not a useful signal of quality therefore seems more informative than some sellers stating that it is a useful signal of quality.

A third piece of evidence is that while the reported survey results suggest that some firms have experienced a reduction in customer audits, or an opening up of markets,

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<sup>40</sup> *Quality Progress*, (1997), 30 (1), pp. 18-21.

<sup>41</sup> Guerin and Rice (1996).

from adopting ISO 9000, other firms have not experienced these effects. In other words, ISO 9000 works for some organisations but not for others.

The evidence presented suggests that ISO 9000 can be used to distinguish between the quality of sellers in some cases, but not in other cases. Most evidence suggests that it acts to signal the quality of sellers, but there is also tentative evidence that it may be used as a screening device in some situations. Finally, the available evidence suggests that ISO 9000 is a useful tool in some situations, but not in other situations. None of these conclusions should be surprising. One mechanism by itself is unlikely to solve the problem of adverse selection in the myriad number of industries that exist. The characteristics of different industries are likely to vary enormously and what may be appropriate in some situations may not work in others. The available evidence suggests that the critics of ISO 9000 may need to revise upwards their beliefs about the effectiveness of ISO 9000, while the supporters of ISO 9000 should revise their expectations downwards.

## **2. Access to Markets**

The second area of contention concerning ISO 9000 is about the belief that adopting ISO 9000 is necessary to ensure access to markets. The first type of claim in this vein is that governments are using ISO 9000 as a non-tariff trade barrier. Actual and potential problems with the registration process are typically used as evidence that this is occurring. The second type of claim is that adoption of ISO 9000 is required to be able to sell a firm's wares in the European Community. This is related to the push by countries in the European Community to establish a single European market.<sup>42</sup> The last type of claim is simply that firms need to adopt ISO 9000 to be able to sell the goods they make because ISO 9000 has become a market standard. This is seen as being particularly true when it comes to suppliers being able to sell their products to multi-national firms.

### **2.1 ISO 9000 as a Barrier to Trade**

In principle the choice of adopting ISO 9000 is voluntary in nature, and in most situations this still holds. Some governments, however, are creating regulations that explicitly require organisations to adopt ISO 9000 if they wish to sell certain types of

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<sup>42</sup> For example see Elmuti (1996, p. 5).

goods and services, or if they wish to sell to certain types of buyers. Concerns about the health and safety of consumers are typically the reasons for such regulations. For instance, firms that wish to sell certain types of medical devices in the European Community have to satisfy the Medical Devices Directive (directive 93/42/EEC). To meet this directive firms have to adopt ISO 9000 (in addition to taking other actions). In other cases firms need to adopt ISO 9000 to be able sell their products to particular government agencies. For instance, various government agencies in the United States require, or intend requiring, that their suppliers adopt ISO 9000.<sup>43</sup> One example is the United States Department of Defence which announced in 1995 that it was dropping its MIL-Q-9658 quality assurance standard and replacing it with private sector standards such as ISO 9000. Another example is the United States Food and Drug Administration which has rewritten its Good Manufacturing Practices (GMP) to incorporate ISO 9001. A firm that meets ISO 9001 will have thus satisfied the GMP requirements. Government agencies in other countries, such as the Ministries of Defence in the United Kingdom, Singapore and Canada, are also requiring that their suppliers adopt ISO 9000.<sup>44</sup> Finally, the Queensland State Government in Australia required in 1990 that firms who wished to sell manufactured products to it had to have adopted ISO 9000.<sup>45</sup> In 1991 suppliers of construction projects and services had to meet this requirement as well.

While some governments and government agencies do seem to require that their suppliers explicitly adopt ISO 9000, this by-itself does not mean that they are using ISO 9000 as a non-tariff trade barrier. For a start, requiring ISO 9000 adoption does not discriminate against firms by their country of origin per se, since it is an international standard. In addition, many governments and their agencies have only required ISO 9000 adoption once it became widely used in their economies. The general motivation behind the use of ISO 9000 by governments and their agencies seems more to do with trying to lower the costs incurred by their suppliers in assuring the quality of what they sell than to protect domestic firms from foreign competitors.<sup>46</sup>

The other main motive behind governments requiring that their suppliers adopt ISO 9000 has been the desire to increase the international competitiveness of a country. ISO 9000 registration to decide who to purchase from does not, however, discriminate by country of origin. And some governments or government agencies have either

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<sup>43</sup> *Quality Progress*, (1995), 29 (7), p. 24.

<sup>44</sup> *ISO Bulletin*, (1996), July, pp. 15-18.

<sup>45</sup> Orsini (1995).

<sup>46</sup> See Hilary (1996, p. 34) or Johnson (1997, p. 14).

dropped the requirement of ISO 9000 registration, or have de-emphasised the use of ISO 9000, as also discussed. These actions do not seem consistent with the use of ISO 9000 as a non-tariff trade barrier. Finally, no matter what motivation is behind the requirement that suppliers to governments (or to government agencies) adopt ISO 9000, governments are bound by the rules of any international trade treaties to which they belong. To actively discriminate against foreign firms using non-tariff barriers in the form of arbitrary government procurement regulations is likely to see a protest lodged against the government at an organisation such as the World Trade Organization.

From the above discussion it seems as though the motives behind governments requiring that their suppliers adopt ISO 9000 are not related to it being intentionally used as a trade barrier. The critics of ISO 9000, will respond, however, with the claim that ISO 9000 may in fact act as a trade barrier regardless of the motives behind the requiring of its adoption. This argument is tied up with how firms become registered to ISO 9000. While ISO 9000 is a generic standard and is the same for a firm that adopts it regardless of where the firm is based, the formal registration of ISO 9000 adoptions is country-dependent. Just because a firm is registered in one country does not mean that the registration is recognised in another country. So while the standards are generic, the process of registration is not. This, combined with the use of ISO 9000 by governments, is the main reason critics of ISO 9000 point to it as a potential non-tariff trade barrier. That a government in a country may claim to be free of barriers because it recognises the generic standard ISO 9000, but in fact ISO 9000 is a barrier to trade because governments and government agencies (or even private firms) refuse to recognise ISO 9000 certificates issued by foreign registrars.

To ascertain whether or not this is a valid criticism it is necessary to review the registration process. An organisation is free to use any of the standards at any time without necessarily involving any other organisation or indeed without even publicising that it is using the ISO 9000 standards. More likely, though, an organisation will adopt ISO 9000 in a formal sense by gaining ISO 9000 registration in order to assure the quality of its production processes to existing and potential customers. In this case the organisation is audited by an independent and approved “registrar” that checks to see that what it does fulfills the requirements embodied in the relevant standard (ISO 9001, ISO 9002, or ISO 9003, depending on what the organisation actually does). If conformance is found then the organisation becomes registered to the relevant ISO 9000 standard and receives a certificate saying as much. This means that it is entered into the national records of registered organisations. The organisation can then use the official ISO 9000 logo in its advertising, though not on its products. The organisation

undergoes periodic audits to check that it is still adhering to the standard; typically every six months. After roughly two to four years the organisation loses its certificate of registration and has to decide if it wants to undergo a full audit again and be re-registered to the standard. The registrar decides how frequently to audit the organisation, and the expiry date of the organisation's certificate of registration.

The registrars are themselves subject to quality assurance standards, in this case to the ISO 10000 series.<sup>47</sup> Organisations that wish to conduct officially recognised third-party audits are required to adopt these standards.<sup>48</sup> This is to ensure that there is a high-level of confidence in the auditing and registration of firms to ISO 9000. It is almost always the case that a government standard's body 'audits the auditors'; the exception being in the United States where the Registrar Accreditation Board (RAB), an affiliate of the ASQC, is responsible for auditing registrars. The fact that the RAB is not a government organisation has caused some problems with registrars based in the United States being recognised in other countries. The United States representative at the ISO, ANSI, has been working with the ASQC to address this issue.

While the way in which organisations adopt an ISO 9000 standard seems highly controlled, with a tightly controlled certification process, there is one fly in the ointment. While the standards are internationally recognised, the certification of registrars is not. The fact that an organisation has been accepted by one country's standards body as a registrar does not mean that the organisation is recognised by equivalent bodies in other countries. In this case, firms that wish to claim ISO 9000 certification in other countries may have to be certified by registrars from the other countries. Obtaining multiple registrations would obviously increase the cost of selling goods to foreign countries and this is the basis for the concern that ISO 9000 may act as a non-tariff trade barrier.

At a first glance the worry that ISO 9000 could act, or be used, as a barrier to trade does seem warranted. There have been moves, however, to reduce the likelihood of this occurring. For instance, there have been attempts to harmonise the certification of registrars through "memoranda of understanding" between national standards bodies throughout the world. The coverage of these memoranda has by no means been

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<sup>47</sup> There are four such standards: 10011-1, 1011-2, 10011-3, and 10012-1. The first three specify how auditors are to audit process systems. The last one provides requirements for measuring equipment used by auditors. Two additional standards are being developed; 10012-2 concerns the measuring equipment used by auditors and 10013 provides requirements for the development of quality manuals.

<sup>48</sup> There are three types of audits. A firm auditing itself is defined as first-party. Second-party are when a buyer audits a seller. Third-party are when a party independent of the transaction between the buyer and the seller audits the seller.

comprehensive in the past, and registrars may not have been recognised by organisations, even in countries that had signed the memoranda.<sup>49</sup> Recently, the ISO itself has taken steps to address this issue. The ISO, in conjunction with the International Electrotechnical Commission, have developed the Quality System Assessment Recognition (QSAR) programme. The aim of the programme is to ensure worldwide recognition of an ISO 9000 certificate regardless of where it was issued. Underlying this programme is the assumption that national accreditation bodies will police each other against a standard set by the ISO. As a result, an ISO 9000 certificate issued by any registrar accredited by one of the national accreditation bodies will be acceptable in any other country.<sup>50</sup> So while the registration process itself can be criticised as allowing trade barriers to be erected, institutional arrangements are being designed to mitigate this possibility.

With regards to ISO 9000 being used as a non-tariff trade barrier, the available evidence tends to favour the supporters of ISO 9000. For instance, the generality of ISO 9000 relates not only to what is being produced, but is also related to where the product is made. Thus it is unlikely that the use of ISO 9000 by itself will increase any barriers to trade (and it may even lead to lower barriers to trade). In addition, the general motivations of governments and their agencies seem to be to reduce the costs associated with assuring the quality of what they buy, or as a component of industrial policy to improve the quality of goods made within the relevant countries, rather than to use ISO 9000 as a trade barrier. What is more, the use of ISO 9000 as a quality assurance tool has really only been pushed by governments in the European Community, and even there for almost all products it is only one of many possible alternative ways of assuring quality which are consistent with government regulations. Furthermore, even if governments were to use ISO 9000 as a trade barrier, most countries are party to treaties governing international trade and this partially constrains their ability to erect barriers to trade, including the use of standards. One valid criticism of the use of ISO 9000 is that it may inadvertently act as a non-tariff barrier because of quirks in the registration process. The ISO, however, appears to be developing an institution to get around this problem.

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<sup>49</sup> See Marash and Maquardt (1994), Neville (1994), and Hutchins (1993, p. 5).

<sup>50</sup> For more details about the QSAR programme see *ISO Bulletin*, (1997), April, p. 19.

## 2.2 The European Community

A common criticism of ISO 9000 is that adoption of it is a necessity for those firms who wish to sell goods in the European Community. Some even argue that the European Community is using ISO 9000 as a non-tariff trade barrier. These criticisms are related to the signing of the 1992 Maastricht Treaty by twelve European countries which had the aim of creating a single comprehensive institution that would govern the European Community. One key goal of the Treaty was the creation of a single European market. Naturally the desire to create a single market focused attention on standards, which led to the attempt to harmonise European standards. Since ISO 9000 is a generic standard it was thus ripe for use as part of the move to harmonise standards in Europe. To the opponents of ISO 9000 the attempt by countries in the European Community to harmonise standards appears to be a move to foist an unnecessary European standard (since ISO 9000 was based on BS 5750 — a quality assurance standard developed by the British Standards Institute) on foreign firms in a bid to make it harder (that is, more expensive) for them to sell their goods in Europe. Evidence used to support this claim is the problem with the recognition of certificates of registration issued by different countries as mentioned previously. On the other hand, supporters of ISO 9000 claim that having one common internationally recognised standard will lower trade barriers and in fact increase trade.

To address these claims it is necessary to explore how the European Community deals with product safety and hygiene issues.<sup>51</sup> The new system of harmonised standards classifies goods as regulated and non-regulated. The non-regulated goods do not have to meet any European Community standards, although they may have to meet particular national standards, and are therefore not directly affected by the system of harmonised standards. The regulated goods are required to meet community set standards and to be traded in the European Community these goods require the CE Mark. The regulations are contained in product directives issued by the European Community. For instance, Council Directive 93/68/EEC concerns the safety criteria for toys, and firms selling toys in the European Community need to meet the requirements of this directive. Typically, the manufacturer of the toy (or an authorised representative) will make a declaration that the requirements have been met, and a display of this declaration occurs through affixing the CE Mark to the toy in question. In general, there are eight procedures (called modules) which a firm can implement to meet the requirements of a particular directive. One of these procedures is the registration of a firm's quality assurance system. In most cases, however, a firm can simply self-certify that the good

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<sup>51</sup> For more about the affects and implications of the move to harmonise standards in the European Community see Failmezger (1993), Herzog (1995), Hutchins (1993, Chapter 5), and Strassberg (1996).

that they make and sell meets the relevant requirements. The self-certification involves creating and maintaining a file of design and manufacturing information (known as a technical construction file) which shows how the product was designed and built to meet the requirements of the relevant directive. The file is lodged with the European Community and the directive will state the time limit during which the manufacturer must keep the file.

Some European Community product directives may promote the adoption of ISO 9000 as is the case for the Gas Appliance Directive (directive 90/396/EEC), where two of the five different procedures that a manufacturer can use to meet the requirements involve registration to ISO 9000. There are also some directives, such as the Medical Devices Directive that explicitly require the adoption of ISO 9000, as has been mentioned. But, many goods are not covered by such directives, and of those that are, there are only a few that require adoption of ISO 9000.<sup>52</sup>

While adoption of ISO 9000 is not required to be able to sell most products in the European Community, the harmonisation of standards has still had a big impact on firms outside the European Community. For instance, once all the planned directives have been passed and all transitional periods have expired then an estimated seventy-five percent of all products sold in the European Community which have been made in the United States will need the CE Mark.<sup>53</sup> As a result, many firms in the United States will be greatly affected by the harmonisation of standards in the European Community if for no other reason than they will need to check to see whether or not the products they make are regulated. But the fact that harmonisation of standards has occurred does not suggest, however, that ISO 9000 needs to be adopted to sell goods in the European Community because of legal requirements. In fact for most products ISO 9000 does not need to be adopted. The harmonisation of standards also does not mean that the European Community is using ISO 9000 as a non-tariff trade barrier. The motivation behind the harmonisation of standards was to stop countries within the European Community using standards as barriers to trade, in order to create a single market. This necessitated that the harmonised standards be generic in nature, and thus they do not explicitly discriminate against firms by their country of origin. In addition, having to meet one harmonised standard instead of many country-specific standards is only likely to lower the costs of selling goods in the European Community. As a result, the creation of a harmonised system of standards is, at least in principle, likely to lower the barriers to non-European Community firms selling their goods in the

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<sup>52</sup> See Johnson (1997).

<sup>53</sup> Failmezger (1993).

European Community, and therefore lead to greater trade, rather than act as a barrier to trade.

Part of the claim that ISO 9000 is a standard being used by European countries as a non-tariff barrier, particularly by those in North America, is the belief that the standard is a European standard and not pertinent to firms from other countries. While it is true that ISO 9000 is based on the British standard BS 5750 and has been embraced by Europe (although some in Europe appear to be less ardent supporters of ISO 9000 than others), in fact, the BS 5750, and therefore ISO 9000, standards are direct descendants of a quality assurance standard developed by the United States military in the 1950s.<sup>54</sup> Thus ISO 9000 has much more of a North American than European pedigree, and if anything would be biased in favour of North American practices. Furthermore, ISO 9000 was developed by a committee (ISO Technical Committee 176) of an international organisation which not only includes people from European countries but also people from other countries, including from the United States. The United States representatives were appointed by the American Society for Quality Control (ASQC) acting jointly with the American National Standards Institute (ANSI). As a result, if ISO 9000 was designed to be just a European standard that discriminates against non-European firms, then there has been an opportunity for representatives from the United States (and other countries) to stop this happening. Of course, it is possible that those with a vested interest to prevent imports of competing products captured the process creating ISO 9000 and as a result ensured that it could be used as a barrier to trade. But there is no available evidence suggesting that this has occurred.

To summarise the above discussion it appears that the critics are wrong. An interpretation of government announcements and actions suggests that European countries are not using ISO 9000 as a barrier to entering their markets, nor is ISO 9000 adoption required to sell most types of products within the European Community. For a start, ISO 9000 is a generic standard which militates against it being used to protect specific industries. In addition, registration is mandated for only a very small number of products. For those goods that do come under European Community safety and health regulations, adoption of ISO 9000 is only one of eight ways of fulfilling the requirements of the regulations. In many cases the simple step of self-certification is all that is needed. Importantly, the harmonised regulations treat European and foreign firms equally; there is no discrimination by country of origin. This is precisely why the European Community ended up using ISO 9000; because it was a generic and

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<sup>54</sup> This is the MIL-Q-9858 standard published by the United States Department of Defence in 1958. For more details about the history of the ISO 9000 standards see Bamford and Diebler (1994).

not a national standard. ISO 9000 was used to help remove barriers to trade between European Countries in the course of establishing a single European market. In the process this has likely caused a reduction in barriers to trade for non-European firms. In addition, countries in the European Community are bound by any treaties governing international trade to which they belong. Finally, the attempts of European countries to harmonise their standards are more likely to decrease trade barriers than to increase them. One harmonised standard would seem to entail lower compliance costs than having to comply to many national standards.

### 2.3 Private Trading Arrangements

A final criticism of ISO 9000 relates to the claim that adopting the standard is “a prerequisite to doing business” with other firms. Indeed, many firms in the private sector do indeed encourage their suppliers to adopt ISO 9000, or even require that their suppliers have adopted ISO 9000 before buying anything from them. For example, Edgcomb Metals, a United States metal service centre, became registered to ISO 9002 in 1993 and stated that while its suppliers did not have to be ISO 9000 registered, those that were were looked on much more favourably when it made its (annual) \$450 million worth of materials purchases.<sup>55</sup> Chrysler and General Motors are also moving to require that their suppliers adopt QS 9000, an industry-specific standard for the automotive industry based on ISO 9000 but which substitutes for it.<sup>56</sup> The plastic operations of General Electric required that 340 of its suppliers adopt ISO 9000 by June 1994.<sup>57</sup>

Whether or not adopting ISO 9000 is required for firms to enter into transactions with one another, however, is a question that seems premature to address. It is certainly the case that adoption of ISO 9000 is widespread in the United Kingdom whereby December 1996 over 52,600 organisations had adopted ISO 9000. But the adoption of ISO 9000 in the United Kingdom is inflated by the existence of subsidies to its adoption. In other countries, including many in continental Europe, the number of adoptions is much smaller. Adoptions of ISO 9000 numbered only a little over 10,100 in North America and 40,000 for Europe excluding the United Kingdom.<sup>58</sup> As a result it seems as though for many countries that ISO 9000 does not affect much of the economic activity that is undertaken. That is, adopting ISO 9000 does not seem to be necessary

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<sup>55</sup> Avery (1994c).

<sup>56</sup> Struebing (1996).

<sup>57</sup> Murakami (1994).

<sup>58</sup> *ISO 9000 News*, (1996), 5 (6).

for firms to enter into transactions with one another. Even if this was the case, as long as governments have not interfered in the choices of firms over whether or not to adopt the standard then there does not seem to be a valid problem resulting from firms using the standards in private trading arrangements. Such arrangements are voluntary actions taken by the firms as a normal part of their business activities. Obviously, the firms that do require their suppliers to adopt ISO 9000 must perceive some benefit to this action, just as they perceive benefits to accrue from having goods sold to them meeting industry-specific or firm-specific standards.

### **3. Costs and Benefits**

The final area of contention concerning ISO 9000 is about the explicit costs and benefits of its adoption. The focus of the debate is not so much on the ability or inability of ISO 9000 to lower system-wide transaction costs associated with informational incompleteness and asymmetries, but whether or not the costs outweigh the immediate benefits for those firms that adopt it.

Many supporters of ISO 9000, including its developers, argue that firms that adopt it will benefit from lower costs of buyers assessing their quality. In addition, these lower costs will lower barriers to international trade and will therefore increase the amount of trade. Others, as we have seen already, argue that adopters of ISO 9000 will benefit from higher quality products or lower production costs. Critics argue that formal adoption of ISO 9000 is a very costly process, and that this aspect more than dominates the benefits, if indeed there are any benefits. The critics also tend to argue that the registration process is poorly organised because the registrars appear to have a conflict of interest between their own concerns and those of their clients. We will look at the costs first, since data about them are more readily available, then we will look at benefits. Finally, we will look at qualifying factors that need to be kept in mind when weighing up the private costs and benefits relating to the adoption of ISO 9000.

#### **3.1 Costs**

The private costs of adopting ISO 9000 fall into two main categories. The initial once-off adoption costs, and the continuing costs of adhering to the standard. The initial costs include training staff to be familiar with ISO 9000 and its operation, and creating the documentation systems and the documentation itself. The continuing costs

include updating the documentation, training new staff, and undergoing the periodic audits necessary to check adherence to whatever particular standard is adopted. The exact magnitude of these costs will not be known with full certainty for any given organisation since it is not certain that an organisation will obtain registration to a standard on its first audit. An organisation may incur additional costs if it fails its initial audit.

A 1993 survey of companies in the United States and Canada found that the average cost of obtaining initial ISO 9000 registration for the surveyed companies was \$245,200.<sup>59</sup> The costs ranged from an average of \$62,300 for companies whose sales were \$11 million or less to an average of \$607,600 for companies whose sales were greater than \$1 billion. Roughly one third of the average cost of a company obtaining initial registration was from the fees associated with auditing, consulting, and registrar services. The other two thirds was from the costs associated with training staff, creating documentation systems, and preparing documentation.

It is important to realise that these costs are not necessarily fixed over time. There seem to be increasing returns (external to each adopter, but accruing to all adopters as a whole) from the benefits of specialisation and increased competition to adopting ISO 9000 as the number of adopters increases. These Marshallian externalities play a part in decreasing the costs of adopting ISO 9000 as the number of adopters increase. The reason being that more knowledge has been generated about how to adopt it the more adopters there are. This is evident in the case of ISO 9000 where increases in the number of adopters of the standard have given rise to large increases in the number of books, trade journal articles, and conferences about ISO 9000 and how to adopt it.<sup>60</sup> In addition, increases in the adoption of ISO 9000 have led to large increases in the number of software programs to help organisations set up ISO 9000 compliant documentation systems, and in the number of consultants specialising in helping organisations adopt the standard.<sup>61</sup> Marshallian externalities will lower costs through two routes. First, the internal cost of adopting ISO 9000 will fall as more products and services helping firms adopt it become available, and more knowledge is generated about the standard. Second, the probability of successfully obtaining certification on the first audit typically increases as the number of adopters increases. This seems to have occurred with ISO 9000. A survey of ISO 9000 registrars found that forty percent of first time applicants were successful in adopting the standard up to January 1993. By October 1994 over

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<sup>59</sup> CEEM Information Services (1993, p. 6).

<sup>60</sup> Gunby (1996, Chapter 5).

<sup>61</sup> Gunby (1996, Chapter 5).

seventy percent of first time applicants were successful.<sup>62</sup> Note that between 1993 and 1994, the number of firms who had adopted ISO 9000 in the United States had more than doubled from 2,705 to 5,535.<sup>63</sup>

Finally, the cost (or price) of being audited may also decline as more auditors become available, which increases competition in the market for auditing services. That is, at the beginning of the industry's life cycle there are few auditors and there is little resulting competition to lower prices. But as the industry matures more auditors are attracted to enter the industry which increases competition and leads to lower prices.<sup>64</sup> The available evidence suggests that such a theory captures what has happened with the provision of auditing services for ISO 9000. For instance, the average registration fee in the United States for an automotive supplier located at a single site with 250 employees was estimated to be \$13,128 in January 1993, but only \$11,300 by October 1994. And this does not allow for inflation which would imply that the real price of an initial audit fell by even more than the figures suggest.<sup>65</sup> That this could be due to increased competition in the market for auditing services seems to be supported by the available data. In 1991 there were only three registrars accredited to the RAB, but by 1994 there were twenty-five.<sup>66</sup> While such data is not conclusive by any means, it does suggest that Marshallian externalities are a feature of the adoption process.

### 3.2 Benefits

As has been mentioned, there is less information about the benefits of adopting ISO 9000 than there is about the associated costs. The major benefit we would expect to see, given that ISO 9000 is a generic standard, is lower costs associated with transactions in which informational incompleteness and asymmetries are present. We would expect this to occur through the benefits of standardisation. That is, the redundancy involved in buyers using many different standards would be reduced or even eliminated. This is in fact what the developers of ISO 9000 anticipated would be the main benefit from its widespread adoption.

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<sup>62</sup> *Quality Progress*, (1995), 28 (1), p. 24.

<sup>63</sup> These figures are from CEEM Information Services, Fairfax, Virginia.

<sup>64</sup> For a more detailed discussion and evidence about the life cycle of industries see Jovanovic and MacDonald (1994).

<sup>65</sup> *Quality Progress*, (1994), 28 (1), p. 24; and Hilary (1996, p. 35).

<sup>66</sup> The figures were provided by the RAB.

To see why the widespread adoption of ISO 9000 may lower transaction costs it is helpful to think about a concrete example. Consider the European aerospace industry. There are about forty European aerospace manufacturers, each of which has somewhere between 500 and 10,000 suppliers.<sup>67</sup> Assume for the moment for simplicity that each manufacturer has the same 500 suppliers and that manufacturers audit each of the suppliers annually. A common quality assurance standard could lower transaction costs in this industry in one of two ways. First, suppliers will have to conform to only one standard instead of forty different informal or formal ones used by each manufacturer. Second, a possible 20,000 second-party audits may be reduced to 500 third-party audits if a certification or registration system is organised in conjunction with the standard. That the possibility of such savings is more than just a theoretical exercise is evident in the fact that it is common for firms in the United States to adhere to over a dozen different quality assurance standards, and some even have up to thirty audits a month.<sup>68</sup>

As is evident, the motivation for the development of the ISO 9000 standards was to get rid of the apparent redundancy associated with the existence of the many firm-specific quality assurance standards. The ISO thus believed that ISO 9000 would rationalise the seemingly “chaotic” situation where firms were commonly expected to conform to many different quality assurance standards.<sup>69</sup> In such circumstances, a common standard would lower transaction costs between sellers and buyers while still being a mechanism that gives buyers meaningful information about the quality of goods produced by sellers. As is evident, the motivation behind the development of ISO 9000 has to do with the benefits of standardisation, which makes sense since we are after all talking about “standards”.<sup>70</sup> If everyone talks the same language then the costs of people communicating and interacting with each other are much lower than if several languages are spoken. Equally, if one system of assuring quality is used by organisations, then the costs of assuring quality to buyers are likely to be lower than if several different systems are used. A firm just has to have one set of documents, just has to incur one set of audits, and just has to train its employees to understand only one system, compared to the situation where several quality assurance systems are followed. One important assumption underlying the ability of ISO 9000 to lead to benefits from

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<sup>67</sup> Hutchins (1993, p. 61).

<sup>68</sup> Johnson (1996, p. 28).

<sup>69</sup> The experience of one of the members of committee ISO/TC 176, the committee that developed the ISO 9000 standards, is discussed in Jacques (1990). The motivation behind the development of the ISO 9000 standards is discussed in Randall (1994) and Price Waterhouse (1988).

<sup>70</sup> For more detail about the economics of standards see David (1987), David and Greenstein (1990), and Farrell and Saloner (1985).

standardisation is that using only one generic standard is roughly as informative as using one or more specific standards.

The specific benefits of having a generic international standard were thought to be twofold. First, many different organisations, such as firms and national standards bodies, would stop needlessly developing and using their own standards. For instance, it cost an estimated \$6.5 million for the Institute of Electrical and Electronics Engineers (IEEE) to develop their twenty-three software engineering standards.<sup>71</sup> There are 227 other standards (admittedly not all of them are quality assurance standards) that also apply to the software industry. If we assume that the cost of developing the IEEE standards is representative of development costs in general, then these 227 standards may have cost as much as \$64 million to develop. And this is for only one industry. Second, there would be substantial cost savings if firms had to adhere to only a single generic quality assurance standard, rather than many firm-specific or industry-specific standards. Thus, it was argued that a common standard would save resources and lower production and transaction costs by exploiting the benefits of standardisation.

It is worth noting that at least some industry observers also expected that general standards, such as ISO 9000, would lower transactions costs associated with informational incompleteness and asymmetries. A general manager of supplier development and quality assurance for General Motors of Canada had this to say about the QS 9000 series of auto industry process standards, “But most of the standards will be common, Mr Pearson says, which means that they will save time and money for suppliers — and for their Big Three Customers.”<sup>72</sup>

There is evidence that some of the benefits of standardisation have indeed occurred. As has been discussed in an earlier section, some firms have indeed experienced a reduction in the number of audits undertaken by their customers. Furthermore, many firms have experienced an opening up of markets after adopting ISO 9000. On the other hand a survey of 160 small and medium-sized firms that adopted ISO 9000 in Western Australia found that “reduction in customer audits” did not feature as a benefit for most of the firms surveyed.<sup>73</sup> One problem with the results of this survey concerns the fact that the Australian Federal Government had previously required that firms from which it purchased goods and services had to have adopted ISO 9000. Many of

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<sup>71</sup> Tice (1988).

<sup>72</sup> *The Globe and Mail*, (1994), 28 March, sec. B, p. 3. This view is independently repeated in Hilary (1996).

<sup>73</sup> See Van Der Wiele and Brown (1997).

these firms may not have otherwise adopted it because there were no obvious benefits to doing so. For example, if the correlation between the information produced from adopting ISO 9000 and the quality of the firms' products is low, then ISO 9000 would only be useful as a signalling mechanism. But compulsory adoption of ISO 9000 would destroy the ability of the adoption status of it to as a signal of quality. Thus the affected firms would all adopt ISO 9000, and since this would not act as an informative signal of their quality they would still have to employ other mechanisms at their pre-adoption levels to assure buyers of their level of quality. As a result, the findings concerning the benefits from adopting ISO 9000 may be "contaminated" by the regulation, and result in an underestimation of the benefits from adopting it (benefits other than those from being able to sell to the government). This interpretation seems to be supported by other findings in the survey. Another issue may be that the adoption of ISO 9000 had little impact on the number of audits by local buyers, but reduced transactions costs with buyers further away. The findings in the survey do not support this possibility, since new sales opportunities was ranked as one of the bottom placed benefits from adopting ISO 9000.

It is also possible that benefits from adopting ISO 9000 could arise from increases in product quality or decreases in production costs. But, there is very little documented evidence supporting these types of benefits and as was argued previously it is unlikely that many adopters will experience such benefits.

Finally, a 1993 survey found that companies in the United States and Canada who obtained ISO 9000 registration experienced average annual savings of \$170,000.<sup>74</sup> The annual savings ranged from an average of \$25,000 for companies whose sales were \$11 million or less to an average of \$532,000 for companies whose sales were greater than \$1 billion. Unfortunately the survey did not report a breakdown of the savings by their source and such a breakdown is necessary for us to gauge how well the ISO 9000 series of standards meets their intended function. In addition, the accuracy of the findings are subject to the same caveats mentioned previously about making inferences in complex systems, and hence they may be picking up the effects of factors other than just from the adoption of ISO 9000. Even still, and regardless of their source, the reported annual benefits are large relative to the reported once-off costs incurred in obtaining ISO 9000 registration. Of course such evidence does not imply that all organisations will experience such benefits from adopting ISO 9000, nor even that adopting ISO 9000 was the best thing for these firms to have done, as will be explained in the following sections.

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<sup>74</sup> CEEM Information Services (1993, p. 1).

### 3.3 Bargaining

While the average reported private benefits from those who adopt ISO 9000 may be large, even they certainly underestimate the total social benefits accruing from the use of it since these measures only look at one side of an inherently bilateral transaction. This occurs because some of the benefits accrue to the firms that are the buyers and not just to the firms that are the sellers. To see this it is important to realise that firms and their suppliers typically bargain over the terms of any trades they enter into — for example over the price, quality, and installation and maintenance details associated with the selling of a firm’s good. The motivation for a seller to adopt a quality assurance standard is to increase its profitability. In the bargaining that occurs between the buyer and seller, the buyer is likely to attempt to capture some of the net benefit associated with adopting the standard. The greater the number of alternative suppliers that a buyer has access to that have adopted the standard, other things being equal, the larger the share of the benefit the buyer can capture in the bargaining process.<sup>75</sup> This effect would tend to decrease the net benefit accruing to the adopter from their adoption of ISO 9000 as more firms adopt it.

That such an effect is expected with respect to ISO 9000 is evident in the comment of Bruce Dodd, from the Canadian General Standard’s Board, who wrote that “Obviously as a standard becomes universally used, the edge gained by the early users fades and disappears”.<sup>76</sup> There is some evidence that suggests such an effect has indeed occurred with respect to ISO 9000. Managers of twenty-two companies in Colorado that have adopted ISO 9000 expected that ISO 9000 registration would confer no advantage vis-a-vis their competitors because they expect adoption of it to become the norm.<sup>77</sup> A recent survey of 160 small and medium-sized enterprises in Western Australia found that while many firms experienced some benefits from adopting ISO 9000, it did not increase their ability to compete with other firms. This is consistent with the possibility that the marginal net benefit associated with its adoption had been captured almost fully by the buyers because a sufficiently large number of firms had adopted ISO 9000.<sup>78</sup> It may also simply reflect that ISO 9000 is only a signalling device (that is, the information generated by its adoption is not correlated with the quality of the producer) and that its value in such a role is negated if it is widely adopted. This would occur if the cost of adopting it was not onerous and the quality of the products

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<sup>75</sup> See Shaked and Sutton (1984) and Osborne and Rubenstein (1990, pp. 54-63). This point is discussed in more detail with regard to the software industry in Gunby (1996, Chapter 5).

<sup>76</sup> See Dodd (1996, p. 22).

<sup>77</sup> Weston (1995).

<sup>78</sup> See Van Der Wiele and Brown (1997).

in question could not be readily ascertained by inspecting them or using them. It could also occur if governments or their agencies made ISO 9000 adoption compulsory. In effect, all firms adopt ISO 9000 and so are pooled together by quality level and thus buyers cannot use ISO 9000 adoption status to distinguish between them by quality.

### 3.4 The Registration Process

One issue that has arisen relates to the registration process and has implications for the costs and benefits of adopting ISO 9000. The first concern is that the registrars appear to have an apparent conflict of interest. For example, over 47.5 percent of 81 respondents in a 1995 survey agreed with the statement that ISO 9000 was primarily an income source for consultants, certification agencies, and training services.<sup>79</sup> The second concern, ironically, given the intended function of ISO 9000, is that buyers of the services of registrars do not have as much information about the quality of the services offered by each registrar as the registrars have themselves.

The potential conflict of interest relates to the fact that the demand for the services of the registrars is derived from organisations that wish to adopt ISO 9000. Obviously registrars would like to have as large a demand for their services as possible. Given that the registrars themselves decide if firms have, or have not, obtained registration, they do seem to have an interest in failing the relevant firms to increase the number of audits that they perform. In addition, the registrars would obviously prefer more frequent audits with as small a period between them as is possible. In both cases demand for their services would increase. Offsetting these effects is the tradeoff between failing a firm to get another audit later and a potential reduction in the total number of firms wanting to adopt ISO 9000. The fact that firms are free to adopt ISO 9000 constrains the registrars from failing firms in excessive numbers, at least to some extent. In a similar vein it would also benefit registrars to have adoption of ISO 9000 made compulsory, again to increase the demand for their services.

The current evidence suggests that registrars may not be actively preventing organisations from adopting ISO 9000 to increase demand for their services. Instead of increases in the failure rates of first-time adopters of ISO 9000, there have, in fact, been large increases in the success rates of these firms. At this stage there does not appear to be enough information available which details the average period between audits, so

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<sup>79</sup> Black (1993). This would be predicted by the theory of bureaucracies. See Cullis and Jones (1992, Chapter 14).

no comment can be made about this aspect. As for supporting compulsory adoption of ISO 9000, there is evidence suggesting that registrars do act in this manner. The move by the Australian Federal Government to remove ISO 9000 registration as a requirement for selling to it resulted in howls of protest from Australian based registrars. Similarly, European based registrars protested at the move to de-emphasise adoption of ISO 9000 in Europe. Both of these examples suggest that the conflict of interest between the registrars and the buyers of their services is real. Unfortunately, there is insufficient data to determine the exact magnitude of this problem at this stage, but economic theories of public finance would suggest that it is a non-trivial problem.

When an organisation decides to adopt ISO 9000 it has to choose a registrar. But which registrar? The most important factor used in choosing a registrar mentioned in a survey of 620 adopters of ISO 9000 in the United States was the reputation of the registrar. This was the case for 155 of the firms. Then came country affiliation of the registrar, prior experience with the registrar, and industry expertise of the registrar. What this suggests is that buyers of the services do not have as much information about the quality of the registrars as the registrars themselves. In such circumstances it is possible for the sellers to trick the buyers by offering services of a quality not commensurate with their price. Some complaints have indeed been made concerning this very point, including, tellingly, that there is a “lack of regulation of registrars”.<sup>80</sup>

While there are serious informational problems with the provision of registrars’ services, and there is some evidence to suggest that some problems do indeed incur, the extent of such problems may not be as wide as is first indicated. All official registrars for ISO 9000 have to conform to the ISO 10000 series of quality assurance standards as previously mentioned. The registrars are audited by the national accrediting body — the RAB in the United States. The accreditation lasts for two to four years and follow-up audits are also conducted. This by itself provides information to potential buyers of their services. An additional element in the accreditation of registrars is that registrars are authorised to conduct audits for specific industry sectors. This helps to ensure that accredited registrars are only auditing firms that they have some competence in auditing.<sup>81</sup> The fact that other mechanisms exist will also alleviate the problems to some extent. For instance, we would expect reputations to be an important mechanism since the adopters of ISO 9000 have repeated bilateral transactions with the registrars, there are many firms adopting ISO 9000, and because buyers using information generated from firms adopting ISO 9000 have an incentive to monitor

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<sup>80</sup> See Zuckerman (1995) and Avery (1994b).

<sup>81</sup> Spizizen (1992).

the performance of the registrars. As was previously reported, the available evidence supports the importance of reputations as a mechanism with which to judge the quality of the registrars. It is likely that there will always exist some complaints about the registrars, as the world is not a perfect place, but the key issues are the extent and severity of any “bad” practices by registrars. At this stage there does not seem much in the way of concrete evidence to suggest major problems with the registration process.

### 3.5 Idiosyncratic Circumstances

An important point to understand about ISO 9000, which may help explain some of the conflicting assessments about it, is that the costs and benefits experienced by a firm from adopting it depends upon the firm’s own idiosyncratic circumstances. In many cases a firm’s product is different from that produced by others, even compared to those in the same industry. In addition, some firms may be better known than other firms, and buyers may use the fact that they have a favourable reputation in judging the quality of what they produce. In these situations it seems likely that the benefit of using ISO 9000 to assure the quality of a good will be less attractive than in other situations where the quality of the good is difficult to ascertain even after using it because it is complex in nature, or the firm producing it is a new entrant to the relevant industry.

Evidence supporting the idiosyncratic nature of the costs and benefits of adopting ISO 9000 takes a couple of forms. First, there has been a proliferation of sector specific guidelines relating to ISO 9000. Well known examples are the QS 9000 and TickIT schemes. The first relating to the automotive industry and the second to the software industry. Another example is the separate guidelines for the use of ISO 9000 in the chemical industry which have been produced by the United Kingdom’s Chemical Industries Association, the American Society for Quality Control, and the European Chemical Industry Council.<sup>82</sup> The driving force behind these developments is the fact that a general standard such as ISO 9000 may not generate enough information for buyers when the good in question is complex. Complex goods may require complicated design and production processes and a generic standard may simply not convey much useful information about the likely quality of a firm’s products to prospective buyers, hence the need for industry-specific guidelines in some situations. The presence of these guidelines simply reflects the fact that firms produce different things and that a generic standard may not be able to cope with this in some situations. Second, some firms, because of their size or lifespan, have some form of reputation capital which they use to

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<sup>82</sup> Lamprecht (1993, p. 176).

assure buyers of their quality. This has been recognised by Jacques McMillan, Chief of the Standards Policy Group for Directorate-General III for Industry in the European Community, who says that "... he has realized that corporate giants with name-brand products have no marketplace need for ISO 9000 certificates."<sup>83</sup> Again this simply reflects the fact that firms are in different situations, and some firms will find adopting ISO 9000 profitable, while others will not.

Finally, the available evidence shows large variation in the costs and benefits reported by companies adopting ISO 9000, even adjusting for factors such as total sales of the companies.<sup>84</sup> We should not be surprised that such variation occurs in practice. This variation simply reflects the fact that firms face idiosyncratic circumstances.

An important final point to realise is that not all firms have adopted ISO 9000, quite the contrary. Presumably the companies that have adopted ISO 9000 are the ones for whom adopting a quality assurance standard is most likely to be profitable. But many companies have not sought ISO 9000 registration, because they must find it unprofitable relative to their other options. This implies that the companies in this group must find one or more of their other options more profitable than adopting a quality assurance standard such as ISO 9000. Again this just reflects the fact that firms face idiosyncratic circumstances. It is worth noting that an implication of this aspect of the adoption of ISO 9000 is that there is self-selection going on concerning which organisations actually adopt ISO 9000. This is an important issue that must be kept in mind when interpreting the available evidence. For instance, virtually all of the surveys mentioned (see Table 2) only survey firms that have become registered to ISO 9000 and do not survey firms that have not adopted ISO 9000. We would thus expect the survey results to paint a positive picture of the likely net benefits obtainable from adopting one of the ISO 9000 standards, which we do seem to find. But it must be kept in mind that surveying firms that did not adopt ISO 9000 would likely paint a negative picture.

### **3.6 Alternatives to ISO 9000**

There is yet another reason why some firms may find adopting ISO 9000 unprofitable compared to other firms. This is related to the fact that not only are firms different, but that firms have options other than ISO 9000 from which to choose. In

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<sup>83</sup> See Zuckerman, (1995, p. 38).

<sup>84</sup> CEEM Information Services (1993) and Yates and Aniftos (1997).

**Table 2: A Summary of the Features of the Surveys  
Investigating the Adoption of ISO 9000**

<b>Study</b>	<b>Number of Responses</b>	<b>Response Rate</b>	<b>Location of those Surveyed</b>	<b>Activity of those Surveyed</b>	<b>ISO 9000 Registration Status</b>
Quality Systems Update (1993)	620	37%	– US – Canada	– general	– 100% registered
Black (1995)	81	44.5%	– US	– individuals who wanted to learn more about ISO 9000	– 15% registered – 22.3% seeking registration – 33% considering registration
Guerin & Rice (1996)	27	100%	– UK (9) – Germany (10) – Netherlands (8)	– importers of forest products	– 22.2% registered (all from the UK)
Vloeberghs & Brown (1996)	290	42%	– Belgium	– general	– 100% registered
Van Der Weile & Brown (1997)	160	32%	– Western Australia	– firms with fewer than 500 employees	– 100% registered
Yates & Aniftos (1997)	138	25%	– US	– construction standards organisations	– 52% registered – 29% intend to register
Weston (1995)	40	100%	– Colorado	– general	– 100% registered

Notes:

1. Where possible, the number of respondents from each country are reported in the fourth column for those surveys involving more than one country.
2. The registration status concerns respondents of the respective surveys. The surveys for which the registration status of respondents is reported as 100% only sent surveys to ISO 9000 registered organisations.
3. The figures in the last column may not add up to 100%. The difference captures those respondents who were not registered to ISO 9000, were not seeking ISO 9000 registration, or were not considering ISO 9000 registration.

fact, firms can choose from many different mechanisms (some examples of these other mechanisms are provided in Table 3) and the particular one chosen is a function of the characteristics of the transaction between the buyers and the seller. For instance, consider what happens when buyers and sellers have transactions that are repeated regularly. A good example of such transactions are between Japanese firms and their suppliers.<sup>85</sup> Japanese firms, at least in the past, tended to enter into ongoing relationships with small numbers of suppliers. This allowed the firms to use mechanisms

<sup>85</sup> Dyer and Ouchi (1993) and McMillan (1990).

**Table 3: Mechanisms Commonly Used to Alleviate the Effects of Asymmetric Information**

Individuals	Developers of Mechanisms	
	Industries	Governments
Reputation formation	Grading	Subsidising information
Warranties	Licensing	production
Guarantees	Standards	Labelling requirements
Conspicuous initial expenditures		Right to sue
Second-party audits		Standards
Product testing		Licensing
Specifications		
Transaction specific investments		

other than audits in coping with informational incompleteness and asymmetries in their transactions, because the transactions were regularly repeated. Such mechanisms included firms and suppliers making investments specific to their transactions, the sharing of personnel between firms and suppliers, establishing processes in negotiating quantities and prices, and so on. It is also worth noting that this example highlights that some of the characteristics of the transactions are also determined by the choices of the buyers and sellers. The Japanese firms and their suppliers chose to enter into ongoing relationships, but they could have equally chosen not to.

Even when we are focusing solely on quality assurance standards it is worth emphasising that generic standards such as ISO 9000 are not the only ones that are available, and that firms can use more than one type of quality assurance standard at a time. For instance, a firm may want to adopt ISO 9000 as well as an industry-specific quality assurance standard. In addition, firms may develop quality assurance standards specific to their needs rather than use a generic standard such as ISO 9000 or an industry-specific standard.

The choices available to firms tend to fall into two types, either signalling the quality of the seller or screening low quality sellers from the market. Examples of signalling mechanisms are warranties and guarantees, conspicuous initial expenditures, and investment in reputation capital. Examples of screening mechanisms include conducting second-party audits of sellers, and using specifications in contracts. Quality assurance standards may be of either type, or even a bit of both.

Consider a couple of mechanisms developed by individual firms: advertising and warranties. Recently evidence has been found showing that the amount of advertising undertaken by producers of compact players signals, to some extent, the quality of their goods.<sup>86</sup> Now assume that communication and verification costs are prohibitively large, but that there are many sellers and they can each issue a warranty in case of product failure. In this case full warranties are likely to be issued by the sellers, which is the best possible outcome. Sellers not offering a full warranty would be treated by buyers as being of low quality. For obvious reasons, less than full warranties are issued when moral hazard is present on the part of the buyers.

Of course quality assurance standards can also be developed by an individual firm. One example of such a standard is the 1979 quality assurance certification program instituted by Caterpillar.<sup>87</sup> Caterpillar uses the standard it has developed to audit the processes employed by its 5,000 suppliers to ensure that each supplier can manufacture products that will conform to the required specifications, that each supplier can deliver products on time, and that each supplier can meet cost agreements. The standard is also being used to audit the processes of internal divisions of Caterpillar.

In some cases it is optimal for producers in an industry to impose a mechanism on themselves, or on producers in other industries.<sup>88</sup> Two such mechanisms are grading and standards. Industry mechanisms may be used when externalities are present. For instance, the American Gas Association developed a series of standards for gas appliance manufacturers in the 1920s.<sup>89</sup> The quality of the appliances directly affected the demand for a complementary good, in this case gas. Another example involved zinc and brick manufacturers, again in the 1920s, who in each case developed minimum industry quality standards.<sup>90</sup> Individual sellers in both industries were adulterating their products, adversely affecting the reputations of all sellers. As a result, demand had decreased for these products and increased for close substitutes, such as tin and copper, and cement. In this case buyers were forming and using beliefs about weighted industry quality in their purchasing decisions. Thus, individual sellers could increase profits by free-riding on the efforts of other sellers. A seller obtained the price commensurate with

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<sup>86</sup> Horstmann and MacDonald (1995).

<sup>87</sup> Black (1993).

<sup>88</sup> These mechanisms may also be used for anti-competitive reasons. Safety standards, for instance, may reduce international trade by increasing entry costs or reducing potential benefits from economies of scale.

<sup>89</sup> Hemenway (1975, p. 75).

<sup>90</sup> Hemenway (1975, pp. 70-71).

the average quality in the industry, but enjoyed a reduction in expenses by lowering its own quality.

An example of an industry quality assurance standard is the previously mentioned American Softwood Lumber Standard PS 20-70.<sup>91</sup> The standard involves much more than other quality assurance standards as it encompasses not only how the goods are produced, but also characteristics of the goods. It specifies the grades assigned to different types and qualities of wood. The standard also specifies how inspection agencies (such as the Western Woods Products Association in the North-Western United States) are to grade wood, and how the ALSC is to inspect the inspection agencies. There is no specific law requiring a mill to adopt the standard, but for many purposes adoption is mandatory by default because the wood from a mill requires the ALSC stamp to be used under United States building codes. The standard was developed to promote uniformity among producers, so that users of wood could buy standardised grades. It was also developed to assure buyers that they were getting a quality consistent with the claims of the sellers. Without grades and an effective enforcement mechanism, sellers have an incentive to adulterate their product. For example, United States lumber producers during the 1920s reduced the size of a two-inch board by three-eighths of an inch, and raised the moisture content of lumber in general.<sup>92</sup> An individual producer had an incentive to adulterate its product in order to save on transportation costs, to free-ride on the superior quality efforts of other producers, or both.

Parts of the lumber standard are referred to as minimum industry quality standards.<sup>93</sup> These types of standards specify a minimum level of quality that a good must meet and are therefore specific to the good in question. This is in contrast to standards like ISO 9000 which are general in nature and focus on the production processes of organisations. Minimum quality standards can be a useful mechanism to overcome the problems associated with asymmetric information. This occurs if buyers are very sensitive to quality variations, demand for a good is not overly sensitive to price changes, there is a low marginal cost to producing extra quality, and buyers place a significant premium on high quality goods. The standard increases the market price for the good by keeping out low quality sellers. This induces higher quality sellers to enter the market. Both effects increase average industry quality. Aggregate welfare increases when the benefits to increased quality outweigh the effects of the price increase.

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<sup>91</sup> Epley (1982).

<sup>92</sup> Hemenway, (1975, p. 72).

<sup>93</sup> Empirical examples are given in Hemenway (1975). The circumstances under which minimum quality standards are likely to cause overall welfare to increase are investigated in Leland (1979).

Oddly enough, at least at a first glance, the quality level of the standard may be set too high when the industry can choose it. In this case the industry uses the standard to collectively act as a monopoly.

Governments, at best, have no more information about the quality of sellers than buyers, however they have a range of policies unavailable to individuals and organisations in the private sector. These usually take the form of legislated controls on the actions of producers. These policies are normally implemented when there is a co-ordination failure in the market provision of other mechanisms. This commonly occurs when any information produced has a high public good content, externalities are present in the effects of individuals actions, and excessive transaction costs hinder the formation of contracts. Policies include subsidising the production of information about goods and services (such as funding consumer watchdog agencies), developing labelling requirements (such as “best-by” dates and listings of ingredients in food), developing standards and licensing requirements (such as toy safety standards), and establishing means of legal recourse from sellers who misrepresent their products (funding the legal system and permitting civil trials).

A well documented example of the effects of government policies which are designed to alleviate the effects of asymmetric information involves the television repair industry in the United States. One study looked at the details and effects of licensing schemes for television repair persons that were implemented by three municipal governments.<sup>94</sup> The examples clearly demonstrate how government intervention can be effective in alleviating the effects of asymmetric information, and also the sensitivity of the effects of the schemes on their design. New Orleans implemented a strict licensing scheme where the repair persons had to pass a strict examination. The municipal government of San Francisco randomly tested repaired televisions to check on the quality of the repairs. Washington D.C. had no government intervention in the television repair industry. Both New Orleans and Washington D.C. experienced very low quality repairs, whereas San Francisco experienced substantially higher quality repairs. Prices in San Francisco were not significantly higher than in Washington D.C. The licensing scheme in New Orleans decreased competitive pressures by acting as a barrier to entry. This allowed existing repair persons to lower their quality, but maintain the same price for their services.

Examples of government mandated quality assurance standards are those developed and enforced by Transport Canada since 1969 for air carriers that use large air-

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<sup>94</sup> Carol and Gaston (1983).

planes.<sup>95</sup> These standards provide requirements and guidelines that air carriers have to follow, including: what to do in an emergency; how air carriers should train air and cabin crews, and minimum training requirements; the maximum amount of air time allowed for air crew; and what actions air carriers should take for different weather conditions.

There are obviously many mechanisms other than quality assurance standards which are available to prevent opportunistic behaviour by sellers. In some situations, however, quality assurance standards work better than these other mechanisms. In particular, there is a general weakness in many of the previously mentioned mechanisms in that they typically assume that buyers somehow know a great deal about the structure of the relevant market, including the average quality of sellers. This seems inconsistent with the assumption of asymmetric information and the fact that prices cannot convey all of the relevant information. Even if buyers could in principle deduce average qualities from prices, it seems unlikely to happen in practice. There are a myriad of other events going on in an economy, such as movements in the prices of factors of production, and therefore also of household income, and movements in the prices of substitutes and complements. These movements in the relevant demand and supply curves are likely to create a signal extraction problem in determining quantity and quality effects from market prices. In addition, technological innovation causes changes in the very nature of the goods and services being traded, as well as in the structure of the relevant industry. That quality assurance standards such as ISO 9000 do not rely on buyers knowing an average industry quality is a major advantage they have over other mechanisms. The standards are only concerned with the good or service of the seller conforming to the specifications set by the buyer. This explains why in the past many firms have resorted to second-party audits based on firm-specific quality assurance standards such as the Targets for Excellence Programme of General Motors and Motorola's use of its internal Quality System Review approach to evaluate the processes of its suppliers.<sup>96</sup>

In conclusion, we are likely to observe that some firms will find a generic standard such as ISO 9000 to be the preferred option in providing information about the quality of their products to buyers. This is why Edgcomb Metals has adopted ISO 9000. Other firms, however, will find other options more profitable. This is precisely what we observe. For example, some organisations have developed industry-specific standards based on ISO 9000 rather than use the generic standard and other firms such as Motorola prefer to rely on their positive and well-known reputations. The wide variation in

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<sup>95</sup> Transport Canada (1995).

<sup>96</sup> *The Globe and Mail*, (1994), 28 March, sec. B, p. 3; and Bobbit (1993).

the characteristics of transactions undertaken in an economy means that each of the available mechanisms, including ISO 9000, is unlikely to work well in alleviating the effects of asymmetric information in all situations. We should thus expect to see a variety of mechanisms being used in practice which we do indeed observe.

## 4. Conclusion

It is clear that ISO 9000 was not developed to alter the quality of what firm's produce. The sole reason for the development of ISO 9000 was to lower the costs of assuring quality. What is more, some organisations seem to be genuinely mistaken in believing that ISO 9000 is a product quality standard rather than a quality assurance standard. The critics are thus correct in suggesting that "the eye's of firms may be taken off the ball". This is unlikely to a problem though as the firms that misperceive the function of ISO 9000 will either learn soon enough of their mistake, or go out of business. This is the normal process by which markets work. In addition, initiatives by the ISO itself appear aimed at minimising such mistakes by firms which will increase the speed at which learning about the ISO 9000 standards occurs. Obviously though, while some organisations misperceive the role of ISO 9000, they will judge it with an inappropriate yardstick. They are thus likely to find the adoption of ISO 9000 to perform poorly when using this yardstick.

Is ISO 9000 likely to be used as trade barrier? It seems not. Yes there are problems in getting a smooth registration process whereby certificates issued in any given country are recognised internationally. But, this does not appear to be causing governments to invoke mandatory adoption of ISO 9000 as a form of non-tariff trade barrier. Most governments or government agencies that have required ISO 9000 be adopted by their suppliers have done so only after it gained prominence and are attempts to reduce the costs that their suppliers face. In any event, governments in such an instance are not differentiating between domestic and foreign firms that have adopted between ISO 9000, but between firms that have or have not adopted ISO 9000, whether they are foreign or not. Thus it is not a form of trade barrier because the ability to sell to the governments concerned is not based on where the firms are domiciled. Finally, the claim that ISO 9000 adoption is necessary to sell goods in the European Community is grossly exaggerated. This situation holds for only a very few types of products. Furthermore, this is done with a view to lowering trade barriers, not increasing them.

The other issue concerning ISO 9000 that sheds light on why some perceive it to be a saviour and others a demon relates to the costs and benefits from its adoption. As has been argued it is surely the case that where ISO 9000 adoption is not mandated by governments or buyers that some firms will find ISO 9000 to be an inferior choice. Not all firms are created equal and thus some firms will find ISO 9000 is better suited to their circumstances than other firms. The former firms will experience a higher return from adopting ISO 9000 than the latter firms. In addition, there are many choices available to organisations other than adopting ISO 9000. Even if adopting ISO 9000 confers a positive private benefit, the benefit may not be as high as the benefit from choosing some other action. Again some firms will find adoption of ISO 9000 to be a better choice than others. Neither situation means that ISO 9000 is “good” or “bad”, but simply reflects the fact that firms find themselves in different situations and therefore rank the available choices differently. It is also worth recalling that the original developers of ISO 9000 intended it to be used in two-party contractual situations, and envisaged that it would be only one of many other tools available for sellers to assure buyers of the quality of what they were making. That is, ISO 9000 was not designed to serve the needs of everyone; some firms would use ISO 9000 as well as using other mechanisms, and some firms would not use ISO 9000 at all.

Has ISO 9000 achieve the goal for which it was designed? This is the goal of lowering that costs of sellers assuring the quality of their products to buyers through the benefits of standardisation. At this stage it is difficult to draw a firm conclusion. There is some evidence that firms experience a lower number of audits after adopting ISO 9000. It also seems likely that the proliferation of firm specific standards has been eliminated or avoided in some industries, for example in the automotive industry in the United States. On the other hand, there is no longer a single “definitive” ISO 9000 standard. A plethora of industry guidelines with which to interpret ISO 9000, as well as industry specific standards based on ISO 9000 plus additional elements, have arisen. These obviously lower the potential standardisation benefits of ISO 9000. This highlights two tensions between the purpose of ISO 9000 and the main source of its benefits. First, the benefits come about because it is a generic standard, but its purpose is to alleviate a problem which likely differs in cause, but not in nature, in specific situations. That this has itself been recognised by the ISO is evident in the fact that there are guidelines for different broad types of products, and that industry-specific guidelines are being considered. Essentially, the assumption that the general production processes used by firms may be related to the quality of the goods or service produced may be a good one for some products and industries, but not for others. Second, if ISO 9000 acts as a signalling mechanism then we would expect that the level of its adoption

will not be as widespread as initially envisaged. That is, the standardisation benefits from its existence are inherently constrained, since widespread adoption of ISO 9000 would destroy its ability to signal the quality of the adopters. On balance, it is likely that there have been some standardisation benefits from the advent of ISO 9000, but not as much as originally hoped for, particularly in industries with complex products that have uncertain product characteristics, such as software and pharmaceuticals, and in industries where ISO 9000 is used to signal the quality of firms' products.

Finally, this article demonstrates that the ISO 9000 series of quality assurance standards are not worthless, nor a silver bullet that will solve all of the problems that organisations face. They are simply one tool available to organisations which they can choose to employ or ignore in the pursuit of their goals.

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# Demon or Saviour?

## An Assessment of the ISO 9000 Quality Assurance Standards.

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### Abstract

There exist conflicting assessments about the merits of the ISO 9000 series of quality assurance standards. In some cases this conflict arises because of a misperception that ISO 9000 is a product quality standard rather than a quality assurance standard. In addition, there is some uncertainty as to whether ISO 9000 acts to signal the quality of sellers or to screen sellers by their level of quality. The available evidence suggests that it is used in both modes with the exact mode used in a given situation depending on the nature of the good and transaction being considered. There is also a misperception that ISO 9000 is a European standard being used as a non-tariff trade barrier. It is argued that this is not the case and that ISO 9000 actually has a United States rather than a European pedigree. It is also argued that some of the conflicting assessments about the merits of ISO 9000 can be shown to occur because some firms will find adopting it profitable, while other firms will not. Finally, it is argued that the development of ISO 9000 has likely led to some benefits from the standardisation of quality assurance standards, but not at a level originally envisaged when it was developed.

**Keywords:** asymmetric information; quality assurance standards; ISO 9000; adoption patterns; suppliers; quality.

**JEL Classification:** D82; L15; M20.

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