The Strategic Role of Quality in Small Size Firms

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ABSTRACT. It is often claimed that, especially in mature industries, European firms can compete against low-cost NICs firms only if they are able to implement quality based strategies. The emphasis on the strategic role of quality, however, often leads to underestimate the extent of organizational and economic efforts, needed to turn quality from a potential opportunity into a real advantage. The lack of a thorough comprehension of the requirements of a quality based strategy can question the effectiveness of the investments some firms plan to improve their quality level. These firms can in fact remain "stuck in the middle", if they do not have enough resources to turn quality into a source of sustainable competitive advantage.

This paper is aimed at a better comprehension of both benefits and costs of a quality based strategy, with regard to a specific class of firms, Small Size Firms (SSFs), where a strategic use of quality is more difficult. The paper is articulated into two parts. Part one discusses the main obstacles facing the adoption of a quality based strategy by SSFs. A dynamic model for the adoption of this strategy over time, aimed at minimizing the risks for SSFs, is also presented.

Part two describes the results of an empirical research, aimed at verifying the viability of quality based strategies in an industry composed only by SSFs, the shoe-machinery industry. The empirical research supports the viability of the model presented in the first part of the paper.

1. Introduction

It is often claimed that, especially in mature industries, European firms can compete against low-cost NIC's firms only if they are able to implement quality based strategies. This statement, apparently unquestionable, is at the same time confusing and misleading.

It is confusing, as different authors denote as quality based strategies a number of policies, varying from the improvement of the internal efficiency of a firm — as the *total quality management* (Crosby, 1979; Deming, 1982; Juran, 1988) — to the improvement of the performances of products — as in Porter's generic "differentiation strategy" (Porter, 1980, 1985). However, the "internal" and the "external" dimension of quality, while related, involve different skills and different strategic actions.

It is misleading, as it assumes that quality is a source of competitive advantage for firms, independently of their own characteristics and of the features of the context where they compete.

This paper is aimed at discussing if, and under which conditions, the different dimensions of quality can be a source of competitive advantage for a specific class of firms, Small Size Firms (SSFs).

The paper is articulated into two parts.

Part one discusses the main obstacles facing the adoption of a quality based strategy by SSFs. A dynamic model for the adoption of this strategy over time, aimed at minimizing the risks for SSFs, is also presented.

Part two describes the results of an empirical research, aimed at verifying the viability of quality based strategies in an industry composed only by SSFs, the shoe-machinery industry. The empirical research supports the model presented in the first part of the paper.

2. Quality and competition

2.1. *The concept of quality*

The term quality, apparently perfectly comprehensible, is often used with different meanings. Before discussing the competitive role of quality, we should better precise that the term "quality" is used in this paper with reference to two different aspects:

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(i) *the production process* of a firm; the concept of process quality (defined below as *internal quality*) is the ability to reduce or eliminate waste and sources of defective products. The improvement of internal quality requires the adoption of techniques like *total quality control* or *continuous improvement manufacturing* (O'Neill, 1988; Plunkett and Dale, 1988);
(ii) the *products* of a firm; product quality (defined below as *external quality*) summarizes *quality of conformance* and *grade. Quality of conformance* measures the respondence of a product to design specifications. *Grade* is the capacity of a product to satisfy customers' requirements, in terms of safety and *performances* (Morse and Poston, 1986)

Internal and external quality are not unrelated; the improvement of internal quality can also lead to an improvement of product quality. They must not however be considered as synonymous, as a company can act on the external quality of its products through changes in design or in appraisal, without affecting its internal quality.

The distinction between internal and external quality is necessary when we analyse their competitive role, as they act on shareholder value in a different way (Azzone and Bertelé, 1991a). Internal quality, in particular, reduces cash outflows, by eliminating, as it was pointed out above, reworking and wastes. External quality, on the other hand, increases cash inflows, as the acknowledgement, by customers, of improved product quality, results in a price or market share increase.

2.2. *Internal quality and SSFs*

The improvement of internal quality, *ceteris paribus*, increases the efficiency of a company. Internal quality can be improved by reducing *non value added activities* (Berliner and Brimson, 1988), i.e., activities that do not add value to productions (waiting times, queues, scraps, reworking, etc.).

Non value added activities exist in each firm, independently of its size; undoubtedly, some of these inefficiencies can be eliminated through limited efforts, in terms of rationalization and quality control (monitoring scraps and reworking, halting defective machines, increasing maintenance, and so on), whose economic effectiveness is clear. Based on these considerations, there is a wide acceptance that company "size" is not discriminatory with respect to the effectiveness of investments in internal quality.

But this is somehow incorrect. Once most evident wastes have been eliminated, a further improvement of internal efficiency requires the availability of high financial resources and managerial skills. Even without examining in detail the operating approaches normally employed in improving process quality (Crosby, 1979; Feigembaum, 1986; Juran, 1988; Taguchi, 1986; Dale, Lascelles and Plunkett, 1990), we can point out that they usually require the introduction of precision machinery, staff training, wide diffusion of statistical quality control techniques (Deming, 1982) whose adoption in SSFs would be prevented by easily foreseeable difficulties.

The emphasis we place on the obstacles that must be faced by SSFs is obviously not aimed at discouraging strategies based on *internal quality*, but rather at underscoring how this choice, in order to be effective, must start from a thorough analysis of the strengths and weaknesses of a firm. This should result in focusing investments in more promising activities, as regards to their cost/benefits ratio, especially in SSFs, where the most critical obstacle to innovation is the amount of capital required, and the simultaneous development of too many quality oriented projects is made impossible by limited financial resources.

The cost/benefit analysis of investments aimed at improving internal quality requires (Azzone and Bertelé, 1991b) two steps.

First, the current amount of quality costs — i.e., all cost items that are influenced by the quality level of a firm — must be measured (Plunkett and Dale, 1988). Quality costs include (Morse and Poston, 1986):

— prevention costs (costs for research and development, machinery and education programs, when aimed at improving quality by preventing defects from occurring);
— appraisal costs (costs aimed at controlling quality by reducing the number of defective items that are released to customers);

— internal failure costs (cost of reworking defective units);
— external failure costs (warranty repairs).

Then, the expected benefits of programs aimed at improving quality, i.e., their planned amount of reduction in each cost item, must be determined.

The problem, hence, is to clarify whether SSFs are able (a) to monitor their quality costs and (b) to appraise the expected impact of different programs aimed at improving internal quality. Unfortunately:

(a) quality costs are usually not accounted for by the typical cost system of a SSF; hence, the information system of the SSF should be modified. Moreover, the introduction of quality costs in the information system is difficult, as they are based on a terminology that is not familiar to manufacturing managers (Eldridge and Dale, 1989). Hence, also when quality costs are determined, they often receive a limited attention; and
(b) the shift, from actual quality costs to their expected value after the introduction of quality improvement, imposes the utilization of complex and not standard statistical models (Azzone and Rizzardi, 1989), which are of difficult use by SSF.

But, unless both an information system devoted to quality data and perspective statistical models are introduced, the strategic role of internal quality is reduced to slogans like *zero defects*, whose validity is at least questionable (Godfrey and Pasework, 1988).

2.3. *External quality and SSFs*

The improvement of external quality, *coeteris paribus*, increases the value of the products of a company for the customers. However, an improvement in the performances of the product can actually become a source of competitive advantage only when:

(a) a company is able to make a product that responds to customer needs better than the products of its competitors;
(b) the improved performance of the product are acknowledged by the customers; and
(c) customers are willing to pay a *premium price* for improved performances.

When it is claimed that a strategy based on the improvement of external quality offers same opportunities to both small and large firms, usually only step (a) is considered. And indeed, often SSFs companies are more flexible and more close to the customer than large companies, hence they are able to recognize more easily a single customer's needs and to modify more quickly the features of their products.

However, small and large firms differs as regards steps (b) and (c). Assuming no differences between firms operating in industrial markets and those operating in end-user market, we can examine separately two typical situations for SSFs: (i) firms facing customers with considerable bargaining power, as large firms in oligopolistic markets (see also Blois, 1972; Williamson, 1983; Mariotti and Cainarca, 1986) and (ii) firms operating in markets where customers have a limited bargaining power.

In case (i), the quality level of the supplier is usually acknowledged and, sometimes, certified, through direct inspections from the customers, that impose their requirements to the suppliers. Here, the improvement of quality level is usually a response to the requirements of the customers, and represents more an obligation than an advantage for small suppliers. They have (limited) guarantees of demand stability, but must sustain *quality costs* formerly due to the customer. The case of Texas Instruments, since a long time involved in the use of *total quality control* techniques (Azzone, Buzzacchi and Cainarca, 1989) is emblematic. The company classifies its suppliers into three classes, A, B and C. To remain in best classes, suppliers must improve every year their quality standards. In other words, the advantages of improved quality of the suppliers are internalized by the US multinational, that externalizes part of its quality system, imposing its cost to the suppliers. The competitive use of quality for SSFs is hence limited, as customers, while acknowledging a "plus" in the product, usually do not accept to give a corresponding "premium price" to small suppliers.

In case (ii), there is usually not a direct link

between the firm and each customer. Hence, it is critical (step (b)) to be able to persuade customers to recognize the "plus" of the products of a firm.

While large firms find it relatively easy (see also Teece, 1986), as their "*brand*" is implicitly considered as a statement of the quality of their products, this appears more critical for small firms. More precisely, we believe that it is difficult for small firms that based in the past their strategy on cost advantages, to acquire a new image, promoting their products as "quality products".

It is claimed that the acknowledgement of external quality for SSFs could be supported by a certification process, that is a process of "attestation of quality" (Cainarca and Chiesa, 1989), either regarding the performance and safety of each product (product certification) or the quality of the firm as a whole (firm certification).

Product certification requires the identification of quantifiable, hence measurable, features. This problem appears particularly critical for SSFs, when related to "performance" issues. Safety standards appear instead more promising, as in this case the identification of quantifiable features can be obtained more easily. Besides, product certification is economically justifiable when product volume is high or, at least, when product mix is substantially stable over the long run. The first characteristic is, by definition, lacking in SSFs; the second can be seldom found, due to the increasing turbulence of the environment in most industries (Ansoff and Mc Donnell, 1990). This is especially true in Italy, where the success of SSFs is mainly due to their flexibility.

Firm certification certifies that all products are realized by a "quality firm", i.e., that they are produced according to processes and procedures able to guarantee the required quality. So, the frequency and cost of the certification process are disjoint by the frequency of introduction of new products and by the width of product mix, and this kind of certification is more consistent with the need of flexibility of SSFs.

However, also firm certification can prove counterproductive for SSFs. Particularly critical to this aim is the need of people specifically devoted to prepare, verify, and update the procedures of the quality system of a firm, that represents a fixed cost that can hardly be justified in a number of SSFs. Besides, a firm, in order to be certified, must buy all its direct materials by certified suppliers. This is at present impossible in countries like Italy, where SSFs have usually a network of very small suppliers, often with no more than 5 workers each, whose certification appears unrealistic.

2.4. *Which quality for SSFs?*

Previous sections pointed out that SSFs can find it more difficult to follow a strategy based on quality than large firms, as such strategy requires skills and resources that often lack in SSFs. This implies that the choice to follow a quality based strategy should be based, in each firm but especially in SSFs, on a thorough cost/benefits analysis.

Due to the characteristics and the amount of resources needed by internal quality — that, as we noticed, does not require only a cultural and organizational change, as it is often claimed, but also high investment — the most promising strategy — at least for a set of SSFs — is based on an improvement of external quality.

More specifically, external quality can be a viable policy also for SSFs if (i) they operate in markets where safety regulations exist and the bargaining power of customers is limited; and (ii) they are able to use, in a dynamic way, the two different, and somehow complementary, features of product quality, *performance* and *safety*, as it will be clarified below.

The improvements of performances of a product (in terms of productivity, availability, precision or conformance) is not compulsory; it can create advantages sustainable over the long run, but it is of difficult measure.

The product safety is a dimension of quality that can be more easily certified according to quantifiable measures, but can also be easily imitated by competitors and then can represent a competitive advantage only for a limited period of time. Moreover, while an improvement in performances represents a tangible advantage for the customer, an improvement in safety is balanced "only" by an indirect benefit for workers and customers.

On the other hand, the certification of safety is becoming compulsory in a growing number of industries. Hence, safety, being a requirement to access industrialized markets can play a substan-

tial role in starting an effective differentiation strategy.

In our view, the sustainability of quality as a competitive advantage derives from the complementarity of the two dimensions of product external quality. SSFs must, in other words, use, in a dynamic way, the strengths of each dimension of quality (measurability of safety and sustainability of performance), avoiding, at the same time, the corresponding weaknesses. In this way, the dynamic competition approach (Nelson and Winter, 1982; Dosi, 1988) is extended to encompass product quality, as a specific kind of innovation, and the role of government regulation, as an active actor in addressing firms towards a process of "competitive upgrading" (Porter, 1990).

In Figure 1, it is showed how this approach can result in a virtuous circle, referring to SSFs operating in a delimited market, threatened by foreigner competitors able to sell products at a lower cost. The situation is typical of many industries in many western countries, where the threat is represented by competitors from the Far East.

We have divided firms in two groups, denoted as "quality firms", following a quality based strategy as far as the necessary financial means, production conditions and technologies are available, and "cost firms", following a cost leadership strategy.

According to Porter (1990), the regulation of product and process standards, throughout the

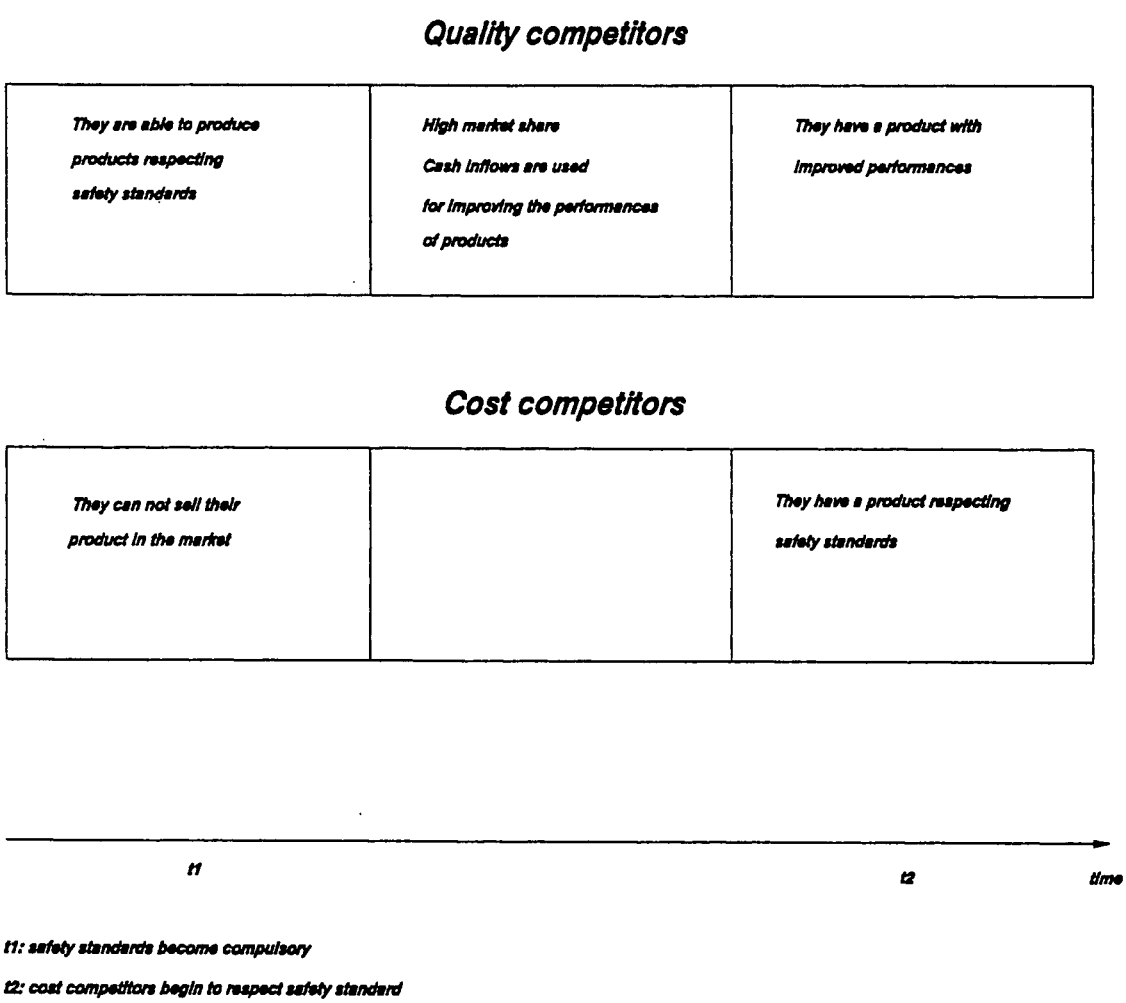

Fig. 1. The dynamic model for a strategic use of quality.

introduction of more limiting performance, safety and environmental standards can pressure on firms, for improving quality, upgrading technology and providing superior product features. In this context, quality firms are able to react more quickly and with lower costs than "cost firms".

If t_1 denotes the moment when quality firms are able to realize a product respecting requirements, and t_2 the moment when also low cost competitors respond to requirements, in the period $t_1 - t_2$ there is in practice an entry barrier, as only "quality" firms can operate in the market.

Quality firms are hence able to increase, temporarily, their market share with respect to other firms. Besides, if, as usually should be, the adaptation cost to new standards for quality firms is lower than that of "low cost" competitors, the price difference between the products of the two kinds of firms is reduced; this results, indirectly, in an increase in market share of quality firms, too.

Financial resources deriving from increased market share can be used for further improving product performances, through process and product innovation, and to develop a policy of quality certification.

At time t_2, quality firms have a product with better performances; besides, their products have also a wider diffusion than competitors', thus increasing the possibility of an acknowledgement of improved performances.

At this time, the process becomes self-feeding; increasing revenues, due to improved performances, provide financial resources that, together with the know-how developed by quality firms, can maintain them on technology border.

3. The Impact of Certification on the shoe-machinery industry

3.1. *Introduction*

The competitive use of "external quality" depends directly on the possibility to start a virtuous circle between its complementary features. A critical premise of this process is the development of compulsory safety standards and their acceptance within the market considered. The perspective of the Common European Market, in 1992, offered the opportunity to verify the consistency of the proposed model, at least with regard to its first stage. To this aim, we analysed — through an extended survey based on direct interviews to Italian producers — the impact of the introduction of European safety standards in the shoe-machinery industry. This is an emblematic case study, due to the characteristics of competition in the industry. The traditional higher level of safety, technology and reliability of shoe-machines produced by the European, and more specifically by the Italian firms (the "quality firms" in our model), is in fact faced by Far East producers that follow a low- price strategy (the "cost firms").

This section of the paper, after clarifying the characteristics of the industry, discusses the opportunities offered by the normalisation/certification process.

3.2. *The context of the industry*

According to available data, in 1990 the world production of shoe- machinery — grouped in 14 large product families — is valued 687 million dollars. The role of European and, above all, Italian firms is preeminent. In particular, as it is shown in Table I, in most segments the market share of Italian producers exceeds 50% of world market. It must be underscored that the Italian

TABLE I
Italian and world production of shoe machinery (1990)

Segments	World production (Million $)	Italian production (Million $)	Share (%)
Plastic moulding	267	125	47
Assembling	125	52	42
Cutting	67	38	57
Conveyors	46	12	26
Milling	30	17	57
Performing	21	10	48
Pressing	20	13	65
Steamers and dryers	20	11	55
Splitting	17	10	59
Nailing	17	13	76
Roughing	13	8	62
Folding	10	8	80
Sewing	9	7	78
Total	662	324	49

Source: derived from Azzone and Cainarca (1990)

production is due to about 120 firms, employing less than 3,000 people.

While the synthetic data discussed above justify the use of the shoe machinery as an emblematic case study for discussing risks and opportunities of quality based strategies for SSFs, some other elements must be emphasized for a better characterization of the industry:

(i) *characteristics of the product*; the production of the industry is mostly composed by dedicated machines, i.e., machines able to perform single phases or operations of the work cycle of a shoe. Within the 14 market segments, there are hundreds of different types of machines, mostly characterised, so far, by a limited technology content;
(ii) *characteristics of the industry*; the wide fragmentation of the work cycle of a shoe, and the limited entity of resources, tangible and intangible, required for the production of shoe-machines, have emphasised the specialization of machines, in terms of both usage and production. As a consequence, the industry is almost exclusively composed by small and very small firms;
(iii) *customers*; the low degree of concentration of shoe industry limits the bargaining power of customers (Porter, 1980). The relevance of Italian production of shoes — Italy is the first country for value of the export — makes its industrial organization emblematic. According to the data of the National Association of Footwear Producers (ANCI), in 1989 8,827 firms, employing 114,123 people were operating in Italy in the production of shoes; 98.7% of these firms employed less than 100 people each.
(iv) *competition within the industry*; European and, in particular, Italian firms are at present dominating the world market of shoe machinery, but new firms are emerging, especially in Brazil and in the *Far East*. The availability of low cost labour, the high imitability of shoe-machinery, the lack of entry barriers, allows to new industrialized countries very effective cost based strategies.

3.3. *Viability of external quality*

The external quality of shoe machines can be modelled as the set of three features:

(i) structural characteristics;
(ii) performances;
(iii) safety for the user.

With regards to structural characteristics, quality should be certified through the use of "certified" components. However, if we exclude a limited number of components — like microprocessors or PLC — made by large firms, potentially able to certify their production, most inputs are produced by very small mechanical firms, whose certification is at present unrealistic.

The certification of performances is also questionable in the industry, at least in the short term. As the technological level is at present low, imitation of innovations, with lower cost components and materials, can not be prevented. Besides, users are unable, at present, to distinguish between machines with different performances, as the measurement of performances like productivity or precision have not been standardized yet, in the shoe machine industry, so that performance levels declared by each firm can not be used to compare different products.

The certification of safety for user, on the other hand, presents some opportunities also in the short term.

First of all, the respect of safety standards is compulsory in the EEC. In other words, the respect of these norms, and its demonstrability, is a condition for the circulation of the product in all the European market.

Second, the existence in each European country of given safety requirements, that often act in practice as "national" entry barriers, is a natural incentive to the definition of common norms. These common norms offer benefits not only to the supply side, through the possibility of a standardization of products, but also to the demand side, as the investments of shoe producers are preserved by the discretionality of each national institutional subject.

Third, actions aimed at respecting safety standards can impact also on the quality of conformance of the products. We can remind the case of

electrical protection, that involves specific care in the design and production of electric circuits.

Finally, the respect of safety standards can be easily verified.

Another way to make quality "tangible", is the certification of a firm as an indirect way to validate the quality of products. This involves the introduction, in firms in the shoe machinery industry, of managerial innovations. All the firms interviewed affirm that firm certification is "unrealistic" for them, because it requires a formal quality system, that is too expensive and introduces organizational bureaucracy, as the role and responsibility of each people in a firm must be strictly defined with regard to quality.

This feeling is further confirmed by the decision of the UNI, the Italian normalisation board, to prepare a revised version of European norms, better responding to the requirements of small and medium size firms.

The analysis of the various kinds of certification supports a first statement of the model, and more precisely that "the certification of the respect of safety standards" is the only realistic way to proceed in the short term. A second question concerns the effectiveness of this kind of certification, that is its capacity to reduce the cost difference between quality competitors and cost competitors, in order to start the virtuous circle that represents the basis of the model.

This specific analysis was realized asking Italian producers to evaluate the cost for adapting their production to some factors that will possibly constitute the basis of the requirements of the EEC for the products of the industry. Moreover, Italian producers have been asked to discuss the difference in their adaptation costs, with respect to other producers in Western Europe and in NICs.

3.4. *Safety as a competitive weapon*

Table II synthesizes the results of the analysis of the shoe-machine industry. They have been obtained by engineeristic appraisals of the cost of materials and the loss of productivity needed to adapt different products to a set of norms, that have been suggested by a working group made by representatives of different European Associations of producers of shoe machinery.

We must point out that the total costs needed for adapting Italian machines to more limiting safety requirements are in the average low. Only for four possible requirements (protection of dangerous areas, electrical equipment, safety stops, noise protection), the average adaptation cost exceeds 5% of the cost of the machine.

TABLE II

The impact of safety standards on the Italian shoe-machines in terms of adaptation costs and productivity reduction

Safety requirements	Adaptation cost (%)	Productivity reduction (%)
Guard of dangerous areas	> 5	5—10
Electric equipment	> 5	—
Emergency stop devices	> 5	< 5
Two hand control devices	< 5	> 10
Unintentional operation	< 5	—
Noise protection	> 5	< 5
Muting of safety devices	< 5	—
Guard of hot surfaces	< 5	< 5
Guard from dusts and harmful fumes	< 5	—
Photoelectric guarding system	< 5	< 5
Acustic signal devices	< 5	—
Guard from harmful substances	—	—

Source: Azzone and Cainarca (1990)

The protection of dangerous areas results also in an indirect cost increase, as it obstacles workers in their operations and reduces productivity, in the average, by 10%. Even worse is the impact of disposals requiring the simultaneous use of both hands for commanding the machine, where productivity reduction often exceeds 10%. The effect of other kinds of safety requirements on productivity is instead minimal.

Table III compares the forecasted increase in the cost of European and non European firms for adapting their products to more limiting safety requirements, with respect to Italian firms.

We can point out that there are not cost difference, in practice, between Italian firms and the other European firms, thus encouraging a joint action towards the introduction of safety standards in the industry, as it is happening in practice.

On the other hand, firms interviewed believe that machines produced by NICs (the cost competitors) require, in the average, higher adaptation costs than those produced in the European countries for some specific requirements.

TABLE III
Costs that the European and Extra-European firms have to sustain in respect to the Italian firms to adapt shoe-machines safety standards

Safety requirements	Relevant costs for	
	European firms	Extra-european firms
Guard of dangerous areas	=	+
Electric equipment	=	+
Emergency stop devices	=	+
Two hnad control devices	=	+
Unintentional operation	=	=
Noise protection	=	+
Muting of safety devices	=	=
Guard of hot surfaces	=	=
Guard from dusts and harmful fumes	=	+
Photoelectric guarding system	=	=
Acustic signal devices	=	=
Guard from harmful substances	=	+

Legend: = same costs as Italian firms
+ higher costs than for Italian firms

These conclusions support the possibility of introducing a cost advantage for quality based competitors by means of more limiting safety standards.

4. Conclusions

The analysis of the expectations of Italian shoe-machine producers has evidenced that the introduction of common requirements in the European Market can result in a double advantage. On one hand, products realized in European countries can be distributed within the European Market without "non economic" obstacles. On the other hand, compulsory safety requirements can become a technical entry barrier to non-European producers. The introduction of quality bounds, aimed at protecting European consumers, can be a barrier against cost competitors, whose low price derives from the use of components and materials that are not certified or, anyway, that are characterised by a lower level of reliability and safety.

The low cost policy, that characterises far eastern competitors, must therefore face extra-costs deriving from a minimum quality level, in the wide meaning used in this paper. In this way, European producers obtain the result of addressing demand towards certified production and the virtuous circle of quality based strategy begins.

The model suggests that institutional policies for supporting quality based strategies should hence be mostly directed towards the development of the premises of this virtuous circle.

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