

AGRICULTURE, AGROINDUSTRY AND THE QUALITY SYSTEM

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QUALITY IS CONFORMANCE TO REQUIREMENTS

Usually a product is said of *quality* if it has high level characteristics. The modern theories of the *Quality Control* define of *quality* the product with the characteristics required by the market. Products conforming the requirements deduced from customers' exigencies are products of quality in any sense, independently from its intrinsic characteristics (Juran 1988).

Hence, it can be stated that the *cost of quality* is the sum of the expenses sustained in producing goods nonconforming market requirements and that it comprises – apart the costs of design and manufacturing – the costs of verifications, scraps, product recalls and contractual and image losses (Shroeder 1991).

In middle size firms, costs retrievable by an efficient quality management are estimated to be about 10%-20% of the turnover (Deming, 1982).

Competition between producers is fast growing and final purchaser can see his way, on the basis of his exigencies, among a number of similar goods, or choose to satisfy his other interests, without being obliged to buy the few products available, as once happened.

Fidelity to a product disappears fast, as new investors enter the market looking for greater profit rates or larger market shares.

CEE chose the *internal market liberalization* strategy to reach the united market and to stimulate the European firms efficiency.

This new deal, inspired by the *deregulation*, has the goal to limitate the legal bonds only to problems concerning public health and personal and environmental safety protection, leaving to the market the task to establish standards, each product must keep to, for all other aspects (ISO/TC 176, 1993).

QUALITY SYSTEMS AND THE ISO 9 000 NORMS FAMILY

The *quality policy* of a company is made of its overall inten-

ABSTRACT

Continuous innovation management imposes the full participation of the enterprise in the several steps of the products life cycle and the strong collaboration among the different elements of the agrofood chain. Agroindustry is providing customers every day more strict who are looking for standardized products, and it has to comply with legal, sanitary and environmental norms protecting consumers and enforcing producers to preview and to prevent market requests.

Several *Quality Control* doctrines can be adopted to reach such goals: among them the International Organization for Standardization approach (ISO 9 000 norms family) has been preferred by the European Union to speed Common Market integration, because of its simplicity and flexibility.

RÉSUMÉ

Le management de l'innovation continuée impose la participation de l'entreprise, dans son intégrité, à tout phase du cycle de vie de ses produits et à une intense collaboration entre les composantes de la filière agroalimentaire.

L'agroindustrie vend à des consommateurs chaque jour plus exigeants qui l'obligent à prévoir et à prévenir les changes de ses goûts et qui cherchent des produits standardisés; elle doit aussi respecter des normes légales, sanitaires et environnementales très complexes.

Entre les doctrines sur la Maîtrise de la Qualité qui peuvent être employées à ce propos, une des plus promissantes est celle de l'Organisation Internationale de Normalisation (famille des normes ISO 9 000) qui, dû à sa simplicité et flexibilité, a été choisie par l'Union Européenne afin d'accélérer l'intégration du Marché Commun.

tions and direction with regard to the satisfaction of all the requirements expressed by the market; it forms one element of the corporate policy.

In this context *Quality Control* (QC) means *control – or mastery – of the productive process* as a whole; it includes the operational techniques and activities that are used to fulfil the requirements for quality.

The *Quality System* (QS) is the organizational structure, procedures, processes and resources needed to implement the quality management.

Procedures formalize the criteria and the way of choice and management of the operations – both independent and linked together –, these are the specific processes, that make the productive cycle of the firm.

Procedures may range over from the detection of the exigencies of the market to the after-sale assistance to customer, design, manufacturing and servicing.

All this understates that the company quality responsibility flows from the general manager, whom the goals definition, the resources assignment and the specific initiatives launching pertain to.

The norms of the ISO 9 000 family are the guidelines (a) for the implementation of Qs ensuring the firm reliability and (b) for their auditing (ISO/TC 176, 1994).

Customers of a good or service demand to their counterparts the satisfaction of two kind of requirements:

(a) supply of goods or services conforming their exigencies, (b) reliability of the organization, that is the demonstration that it has the control of the productive process.

The satisfaction of (a) is appraised by product inspection and test, carried out by the customer or an independent organizations, as stated in the contractual clauses.

The satisfaction of (b), that is the demonstration of the productive reliability of the company, is testified by the certification of its QS, executed in accordance with the criteria established by the ISO 10 011 Norms series.

The *certificate of conformity of the QS* of a firm testify that it operates in accordance with the principles of the ISO 9 000 Norms family.

This certificate ensures all the components of the customer-chain that the producer is able to satisfy the market technical

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and legal requirements, also if they can not personally verify it or are not acquainted with the producer.

DISTINCTIVENESS OF THE AGRICULTURAL AND AGROINDUSTRIAL SECTORS

In the agricultural and agroindustrial field, the firm is characterized by high specificity, so that the implementation of its QS is done with a tight adaptation to its peculiarities.

The main specificity of the agricultural productions is due to the field practices, little schedulable because the environmental factors involved (climate, land, living organisms) greatly vary their expression from time to time (Asses. Agr. R.E.R., 1992).

Every other activity (processing, storing, marketing, accounting, etc.) has no major difference from the other forms of production (industry, commerce, services, etc.).

The interest of the community and individuals – or of specific kinds of people unable to opportunely take precautions by themselves – to prevent damages caused by products prejudicial to their health and to the environment, has originated norms – national and international – that regulate the characteristics of the goods on sale, with regard to these matters.

In such situations, verifications of the conformance of the products and productive processes to established standard and norms are requested before their immission in the market.

Food is subject to a lot of meticulous provisions for its perishableness and for the damages that the ingestion of toxic substances may cause to the human body; moreover a lot of productive practices (agrochemical distribution, hardware, equipment or vehicles utilization) are the source of accidents for the operators and of damages to the environment.

At last, it must be added the *civil liability for the damage cau-*

sed by defective product which the CEE Directive n° 374/85 ascribes to the producer.

This means that the entrepreneur, with respect to a part of its agricultural activities and to the other ones linked to its work, is exposed to big hazards in case that he is unable to control the productive events so that the technical and legal requirements are fully satisfied.

It is also clear that the food not in order may be declassified or rejected by final consumers; besides, the community applies sanctions more and more stern for the damaging of the environment.

The principles of the QC give a conceptual framework suitable to coherently face these problems, detect the risk factors, manage the non conformances and supply the company management with tools and informations adequate to enable it to exercise its leadership (Taylor, 1989).

The customers exigencies above mentioned induce more and more distributors to ask to their suppliers product and system assurances to prevent the commercial risks dues to the supply of defective products; the leading companies of the agro-food sector have already implemented and made certify their QS in accordance to ISO 9 000.

The areas more interested to the introduction of the QC methodologies are:

(A) typical foods based on particular characteristics of the product or of the production technique that, thanks to their peculiarities, can enlarge their diffusion in the internal and foreign market or, in any case, maintain their actual market share with high returns,

(B) wide consumption foods, to which more and more requirements of fitness to the exigencies of the industrial processing and to the health preservation must be ensured,

(C) first rank foods with a limited capability of expansion in the market, but with strong image requirements.

When chain subsuppliers are linked up with a leading firm,

Table 1 The cost of quality.

The cost of quality is the cost of products nonconforming to specifications; it includes the costs sustained for the reduction of non conformance probabilities – prevention costs –, the costs of non conformance detection and analysis and the costs – internal and external – dues to the nonconforming products.

❶ Prevention costs

- ① quality planning costs: plans, programs, manuals and procedures for quality management;
- ② costs of product design: market inquiries, experiments, definition and review of quality specifications;
- ③ training costs of the personnel devoted to product manufacturing and technical assistance;
- ④ analysis and review of the processes of research, design and manufacturing to enhance their contribution to quality.

❷ Deviations detection costs

- ① costs of purchased materials and equipments inspection and test;
- ② costs of in-process inspection and test;
- ③ costs of product final inspection and test;
- ④ costs of laboratories used for quality verifications.

❸ Internal costs of non conformance

- ① scrap-related losses;
- ② costs of rework;
- ③ price reduction of products sold as second-rate;
- ④ costs of post-rework inspection and test;
- ⑤ losses for use of equipments for process stops and the slowdowns dues to quality problems.

❹ External costs of non conformance

- ① costs of warranty: refund, repair, replacement;
- ② product recall management costs;
- ③ complaint management costs;
- ④ discounts and allowances dues to complaint acceptance.

Adapted from R.G. Schroeder - Operations Management, Mc Graw-Hill, 1981.

but also in the case of companies strictly linked altogether in the line of the product processing, the implementation of the QS can be coordinated or even integrated by the different companies in an associated program.

Specificly, if the reciprocal relations between the firms are very strong and the activities of QC of the specific organizations can be coordinated, these can proportionally contribute to the costs of implementation, management – e.g., suppliers qualification, new products design, marketing, etc. –, certification and monitoring of their QS.

HOW TO IMPLEMENT A QS IN THE AGRICULTURAL AND AGROINDUSTRIAL SECTOR

The key of the success of a QS is pragmatism, both in the elaboration of procedures and in their implementation.

In other words, the documentation backing the quality management must be implemented to improve the productive efficiency of the company, not as an issue aimed to its own accomplishment.

The organization of a QS requires a deep company analysis, the clearing up of the technical and normative restraints and the careful definition of tasks and responsibilities.

In the productions which involve field practices, the existence of uncontrollable environmental factors must be taken into consideration and the limits of every responsibility must be clearly defined, so that a wide decisional freedom can be left to the field technicians and operators, for the resolution on special or unexpected matters.

Operational activities, interfaces, responsibility assignment and choice criteria must be formalized in specific technical papers and registers of rules.

The plan of implementation of a QS involves directly the general manager; however the task of organizing and introducing the QS in the company is assigned to a quality expert –

usually in collaboration with a QC consulting firm – who, anyway, operates at the highest level of the organization and directly reports to the general manager.

First, the general manager, in collaboration with the firm management, defines the *quality policy* of the company and the ISO 9000 norm to use as the reference model for the certification of the QS.

The implementation of the QS is done step by step, to allow the estimation of the effectiveness of every factor involved in the realization of the quality policy.

At the beginning, the limits, actual activities, available resources and market perspectives of the firm are analysed, then the basic criteria are established and an outline of the organization which stresses the inputs, outputs and interfaces between the operating units is traced.

Afterwards, the overall procedures are outlined and the single processes – both operational and of verification of the product characteristics and processes – are defined.

These procedures – which formalize the actual practices of the firm and the assignment of the single responsibilities – are approved or fitted to the QC standards; the criteria for the *management of the non conformances* are also established.

All stages of the production are reviewed: design, manufacturing and, if necessary, also accounting, marketing, etc.

To ensure a fine field production – the stage of the whole process which supplies the raw materials to the agroindustry – technical papers, describing the requirements and verifications the producer must comply with, if he wants that the stock centre accepts its products, are elaborated.

Afterwards, methods for the farmers qualification and the updating of the technical papers following the future innovations are elaborated, to ensure the success of the technical papers; so, the commitment of the farmers to implement the contents of the technical papers and the technical/economical feasibility of the processes admitted are ensured.

The stock centre perform or entrust to external experts the verifications specified in the technical papers; the post-harvest processes are obviously subject to verifications tighter than the field practices.

At last, activities of customers' after-sale assistance – to control the effects in the market of product non conformances and to anticipate consumers' future requests (continuous adaptation to market requirements) – are planned.

During the implementation of the QS, a *Quality Manual* – the true and practical description of the QS of the company – is draft.

In the Quality Manual, are emphasized (1) the human, technical and instrumental resources of the company, as well as (2) the procedures and processes used to accomplish the quality management and (3) the consequent specific responsibilities.

At the end of the program, the company can ask to a certifying organization – independent from the consulting firm which has advised it in the implementation of the QS – the *certification of conformity* of its QS to the ISO 9 000 norm choised as a model at the beginning of the program. ●

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