



Quality

A. Illy

The term ‘quality’ has been abused since the later 1980s, when Western industries realized that lack of quality accounted for their diminished competitiveness with respect to those of Japan. This tendency to speak, at times inappropriately, about quality seldom reflects the true meaning of the word itself, although this is perhaps understandable and justifiable if one considers that ‘quality’ can convey just as many meanings as the ‘ability’ an object has of producing effects, as will be seen below.

Quality is highly pervasive, and this prevents anyone who decides to ‘create quality’ from clearly defining a field of action. In companies recognized on the market for their quality, it is obvious this involves the entire staff, with no limits in time or space. In other words, quality is culture.

The following paragraphs will try to sketch at least an outline of this fascinating concept ‘quality’.

1.1 ORIGINS AND MEANINGS OF QUALITY

The concept of quality is vast and cannot, therefore, be singled down to one meaning. Aristotle distinguished four different families of qualities, which were subsequently adopted by scholars:

- 1 Tendencies and aptitudes (examples of tendencies are temperance, science and virtue, while health, illness, heat, cold, etc. are examples of aptitudes).
- 2 Natural abilities and faculties, or active qualities.
- 3 Sentiments and passions, or passive qualities (sounds, colours, taste, etc.).

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- 4 Shapes or geometric determination (square, circle, straight line, etc.).

These families can be classified as:

- attitudinal qualities, which include aptitudes, habits, abilities, virtues and tendencies, or all the ‘possibilities’ of the object;
- sensorial qualities, which can be perceived by our sense organs and include sounds, colours, smells, etc.;
- measurable qualities, which can be measured objectively, such as speed, length, intensity, mass, etc.

The attitudinal qualities refer to the identity attributes of an object, or what distinguishes it from another, without value hierarchies, whereas the sensorial and measurable qualities refer to all the value attributes, which make one thing better than another.

Identity and value are the two poles of meaning of the word ‘quality’. In a critical analysis, the two poles must be compared with the episteme – the cognitive dimension of the certain knowledge – and with the taste – the subjective orientation of individual knowledge. This is of particular importance for the understanding of quality as innate excellence.

In the modern industrial application, measurable quality prevails: ‘You can’t have quality if you can’t measure it’ wrote Juran (1951), based on the scientific method. Alternative and complementary approaches can be applied based on the product, the user or the production, and the prevailing dimensions are performance, reliability, conformity, life and functional efficiency, each with its own units of measurement.

Two ways of considering quality will therefore be compared: the first is philosophical, where aesthetics concerns itself with sensorial qualities, and the second is scientific, where everything is related to the characterization and quantification of measurable qualities.

1.2 DEFINITION OF QUALITY

The range of the term ‘quality’, with all its applications and facets, makes an exact and concise definition difficult. This explains why there are so many.

The ‘official’ definition is provided by the International Organization for Standardization (ISO):

The extent to which a group of intrinsic features (physical, sensorial, behavioural, temporal, ergonomic, functional, etc.) satisfies the

requirements, where requirement means need or expectation which may be explicit, generally implicit or binding. (ISO, 2000)

There is, moreover, a series of definitions provided by specialists on the subject. Among the best known are:

- Conformance to requirements (Crosby, 1979)
- Fitness for use (Juran, 1951)
- The efficient production of the quality that the market expects (Deming, 1982)
- The total composite product and service characteristics of marketing, engineering, manufacturing, and maintenance through which the product and service in use will meet the expectations of the customer (Feigenbaum, 1964)
- Meeting or exceeding customer expectations at a cost that represents value to them (Harrington, 1990)
- Anything that can be improved (Imai, 1986)
- Does not impart loss to society (Taguchi, 1987)
- Degree of excellence (Webster's, 1984)

Although the official definition provides a desirable fusion of the most important meanings of the original definitions, it must be noted how the interpretations of these authors make a more or less marked reference to the various families of qualities described above. Focusing on a few of these definitions reveals the degree of subjectivity or objectivity of the qualitative characteristics they take into consideration.

1.3 COMMERCIAL QUALITY

Quality has always been of substantial importance in trade relations and this is understandable as the value of an exchanged good is the relationship between its quality and its price. Until a few years ago, commercial quality was product quality. Nowadays the term total quality is used to broaden the concept of quality to the service involved in the exchange.

1.3.1 Historic evolution

In the eighteenth and early nineteenth centuries when production was limited exclusively to cottage industries, quality, as we know it today, did not exist. The formal quality audits became necessary only with the

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arrival of mass production, mostly in the military field, to such an extent that, in 1941, the American War Department formed a committee aimed at enabling the army to procure arms and ammunition in large quantities without incurring problems of quality. In 1950, only one-third of the electronic military installations worked properly, and so a working group of the US Department of Defense was formed to deal specifically with reliability. This is how reliability came to be one of the 'chapters' of quality.

In the post-war period, with the publication in 1951 of the *Quality Control Handbook* by Juran, the concept of 'the economy of quality' took root and is the basis of all industrial quality management today.

In 1956, Feigenbaum introduced the concept of 'total quality control', saying that it must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied. So quality control was extended to research and development of methods and equipment, purchases, production, audit and acceptance testing, despatch, installation and service.

At the beginning of the 1960s the Japanese quality revolution marked the end of the previous era of 'quality control' and the beginning of the new era of 'quality management'. The 1980s saw the birth of a new concept, that of 'total quality'. Attention which had till then been focused on the product alone was shifted to the customer.

Today quality is read as total quality. The concept of 'fungibility to use' is replaced by 'suitability to needs' and the focal point is no longer merely the customer, but man, with all his (and her) physical, social and economical needs, be they explicit or otherwise.

1.3.2 Total quality

From the producer's point of view it can be said that total quality is offering products and services in conformity with customers' needs.

From a consumer's point of view it is, however, necessary to distinguish various types of quality:

- 1 Expected quality is the customer's expectations from a particular category of products.
- 2 Promised quality is the customer's expectations from a product of one particular brand. With respect to expected quality, promised quality is at a higher level, as the customer, who is initially unaware, gains awareness during his or her analysis of the offer. With the same product, the factors that differentiate the quality promised by one

- producer from the other are the elements of communication such as design, appeal and brand image, price, sales point, advertising, etc.
- 3 Effective quality is the quality of the product in question, in other words, the measurable quality. If the promised quality is with regard to the form of the product, then here we are talking about pure substance. Effective quality is, in turn, made up of two components: The first, which is subjective, refers to the excellence of the characteristics of products and services. Juran's definition of 'fungibility to use' mainly refers to this component. Examples of product features relating to subjective quality are robustness, reliability, flexibility, precision, performance, beauty, goodness, respect for the environment, lifespan, service content, economy of use and so on. The second component, which is objective, refers, according to Crosby's definition (1979), to how the product conforms to the requirements specified of it in order to respect the above characteristics, and therefore to the absence of defects.
 - 4 Perceived quality is the sum of the promised and effective qualities, and therefore both product and communication contribute to this. This is the most important quality, as the relationship between this and expected quality determines customer satisfaction.

$$\text{Satisfaction} = \text{Perceived quality} / \text{Expected quality}$$

- 5 Potential quality is how the product can be further improved.

Consumers assess all these qualities one by one. When they decide to approach a product, they have, or they create, depending on the information gathered, a 'map' corresponding to the expected quality for that particular category of products. When they must choose between one brand or another, they will choose the one they perceive as having the promised quality which is most in keeping with their needs for use and/or for price. Finally, once the product has been chosen and purchased, they will be faced with its effective quality, which is not always in line with the promised quality.

Psychological mechanisms also intervene in this increase in qualitative appraisal. For instance, it is more difficult for a consumer to realize that the effective quality of a product is poor if it has a high promised quality. This is due to the difference between form and substance, which is not something man is used to measure, as even in nature beauty represents good. On the other hand, man finds it difficult to recognize even an existing high effective quality in a product with a poor image, and, indeed, even more difficult if one needs to be an expert to assess the

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quality of a product. How many people would be able to recognize a fine Bordeaux wine served in a bottle without a label? And vice versa, how many could recognize that a fairly good wine poured from a bottle of *premier cru classé* is not excellent?

1.3.3 Quality certification

Total quality is part of a large movement begun at the end of the post-war period in the West, aimed at improving the quality of life. This involved the introduction of more and more restrictive technical regulations regarding consumer safety and environmental protection, which gradually reduced the freedom of the producers of industrial goods. In order to maintain the free circulation of goods in such a restrictive market, it became necessary to be able to certify the quality of traded goods objectively and impartially. Therefore, especially in Europe under the pressure of the European unification, international legislation changed and quality certification was introduced.

There are two different types of quality certification: conformity certification and quality system certification.

Conformity certification means the certification of the conformity of the product to its declared characteristics. This type of certification can either be binding, as in the case of potentially dangerous products, or consensual, where the producers wish to attract attention to the qualitative contents of their product. The certificate is issued by a third party, often on the basis of tests carried out on the product in question. *System certification* seeks to have an official body certifying the 'quality assurance system', which includes all the structural and organizational factors put in place to obtain and maintain a particular standard of quality. Reference is made to the International Organization for Standardization ISO 9000 regulations, which are recognized nearly all over the world. Its latest revision, 'Vision 2000', has increased senior management involvement and has also introduced the concept of ethics in socio-economical activities. Conformity certification is direct in that the object certified is the effective quality of the product. System certification, on the other hand, is indirect, as it implies that a producer who complies with ISO 9000 regulations is *capable* of respecting the stipulated qualitative standard. In both cases, in order to be able to issue certificates, the certifying body must in turn be accredited by an appointed national authority. These bodies should actually be delegated by the public authorities, in compliance with a specific legislation on quality, the so-called 'Country Quality System'.

1.4 QUALITY OF FOOD PRODUCTS

Food products are consumed both owing to man's need to feed, but also from the search for pleasure provided by certain foods or drinks. In the case of unfinished products, one further aspect looked for in food products is the service level, i.e. how easy it is to use or quick to prepare. These three components of the expected quality for food products are listed below.

1.4.1 Nutritional quality

The nutritional quality of a food product depends on the nutritional content of the food product and how safe it is for the consumer's health.

The nutritional value implies both a quantitative aspect, in terms of the number of calories provided by the product per unit weight, and a qualitative aspect given by the composition in nutritive classes, or the relative percentages of carbohydrates, proteins, lipids, vitamins and mineral salts, plus other substances, such as fibres. Each nutritive class can, in turn, be analysed from a qualitative point of view, by taking into consideration the content of essential substances (such as amino acids and fatty acids) and its digestibility.

Wholesomeness, or hygienic quality, corresponds, on the other hand, to the complete absence of toxicity in food products. Leaving aside cases of uncontaminated food products, which become toxic due to improper use by the consumer, it can be said that food products only become toxic by contamination. This contamination may be chemical or bacteriological and can take place at any time during the life cycle of the product due to endogenous or exogenous factors.

Generally speaking, nutritional quality is deemed the acceptable minimum, that is, an indispensable condition for trading a product. This means that the nutritional content of a particular product must be consistent with its category and absolute wholesomeness. As the acceptable minimum, nutritional quality is at a lower level than expected quality therefore the consumer tends to take it for granted. Or consumers only take it into consideration when deciding whether or not to try out products in that particular category. This is why nutritional quality is normally standardized by law, especially regarding the aspects affecting its wholesomeness.

In some cases, however, nutritional quality is a condition for excellence. This is the case of special products, either of registered origin or, more generally, the products that, within their category, distinguish themselves by offering advantages for the consumer.

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1.4.2 Sensorial quality

Sensorial quality is a secondary quality, in that it is the effect produced by certain primary qualities on our sense organs. The primary qualities in question (organoleptic attributes, according to ISO 5492) are to be tracked down to those chemical and/or physical properties of food – such as taste, aroma, texture, aspect (e.g. colour), maybe sound (e.g. crunchiness) – that impact on consumers' exteroception, namely on the senses of gustation, olfaction, haptic (tactile) sensitivity, vision and audition.

Sensorial quality can be defined as the ability of a product to satisfy the hedonic needs of consumers. It is, therefore, subjective as it is assessed through an interpretation by each consumer and cannot be measured in an absolute sense.

Despite this, products that most consumers like are considered quality products. As a consequence, the only means of defining the sensorial quality of a product is to bear in mind the tastes and views expressed by consumers. These opinions are influenced both by the individual characteristics of the sense organs of each person and each individual's ability to use them, and by the customs and traditions of the various regions in the world influenced by culture, ethnic groups, religion and social class.

Sensorial quality varies both in time and in space. Moreover, food products are very complex, which makes it difficult to attribute a particular sensorial quality to one or more easily analysed constituents. A way to solve this difficulty is to define accurately the ingredients used and the processes applied, as this is done with typical or registered products, and to proceed to the quality control of the finished product by means of sensorial analysis.

Consumers attach a great deal of importance to sensorial quality, indeed it can be said that this is what sells a product. This is due to the fact that, at least in the West, there is no longer a need to appease hunger; the Western diet is varied and 'complete' foods are no longer needed. Moreover, Western society, which takes care to guarantee consumer safety, ensures that only products of high nutritional quality are commercialized.

1.4.3 Service content

The lifespan of the packaged and/or opened product, the cooking time, the availability, how easy it is to transport, the quantity and quality of information that accompanies the product, the encumbrance of the

packaging to be thrown away, the environmental impact of the packaging material, packaging safety etc. are all examples of the service content a product may or may not have.

At times the service content contrasts with other qualities. Just think of long-life milk, which has an increased lifespan at the expense of a reduced nutritional and sensorial quality. At other times, however, the service content strengthens other qualities; one lucky example of this is, indeed, coffee, which, if pressurized in inert gas, not only lasts three times as long, but also undergoes a considerable strengthening of its aroma content.

1.4.4 Conformity certifications

The fact that our society is more mature regarding producer responsibility in guaranteeing product safety has led to the development of both horizontal and vertical regulations in the food sector:

- 1 European Directive 85/374, 25 July 1985 (EC Official Gazette n. L210 – 7 August 1985) is concerned with the liability for faulty products (which applies also to all non-food sectors).
- 2 The cornerstone of the European regulations on the hygiene of food products is European Directive 93/43/EEC, 14 June 1993 (EC Official Gazette n. L175 – 19 July 1993), which focuses on prevention by prescribing obligatory internal audits, assigning responsibility to manufacturers by imposing the analysis of critical control points – Hazard Analysis Critical Control Point (HACCP) – and requiring the drawing up of a manual of correct hygiene practices as a function of the type of products and processes and the characteristics of the manufacturer.
- 3 All the vertical regulations regarding disparate food products as a function of their critical state are coupled up with this horizontal set of regulations. Genetically Modified Organisms (GMOs), which so far do not include coffee product, are regulated by numerous directives and regulations; their presence in a food is among the situations most critically perceived by consumers.

1.4.5 Quality and the general food law

As a consequence of the recent European Regulation 178/2002/EC (General food law), 28 January 2002 (EC Official Gazette n. L31 – 1 February 2002), which states the principles and general requirements of

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the food law, provides the setting up of the European Authority for Food Safety (EFSA) and lays down procedures for food safety control, the European standardization organizations – which refer to the ISO – are drawing up guidelines on the systems of traceability in food companies. According to the new models of development based on the sustainability of the whole food chain, traceability is an instrument of health and hygiene guarantee, which, besides inspiring trust in the consumer, can help strengthen the identity and quality of the food product.

In addition to the safeguarding of fundamental health and hygiene requirements, protected by the regulations in force, more restrictive qualitative requirements, or requirements of typicality, are proposed through the guarantee of product certifications. These can refer to binding regulations (voluntary regulated product certifications), or to voluntary technical regulations defined by the producer companies with the control bodies. Organic farming production is an example.

Table 1.1 gives some examples of the validity of voluntary regulated product certifications laid down within the European Union.

The seal of quality is attributed to farm and food products for which a particular quality, reputation or other characteristics depend on their geographical origin, and whose production, transformation and/or processing take place in a certain area of production. At least one stage of the production process must therefore take place in a particular area.

As far as wines are concerned, they are regulated by national regulations in their respective production countries, which, in their turn, have been harmonized with the EC Council Regulation n. 823/87, 16 March 1987 (EC Official Gazette n. L084 – 27 March 1987 – Pg. 0059-0068 and subsequent amendments).

1.5 THE EXPERIENCE OF COFFEE CONSUMPTION

Ever since coffee was first consumed in the West, towards the middle of the seventeenth century, specific local habits and traditions have developed and overlapped, entailing great differences in coffee consumption. There is generally a remarkable ritual component, divided into two very distinct rites, preparation and tasting. Below is a cross-section of contemporary coffee cultures, which clearly shows the expected and perceived qualities in the various countries.

- **Amsterdam:** Essential times for drinking coffee in Holland are in the morning, at breakfast and around 10 or 11 o'clock, often with guests.

Table 1.1 Regulations related to quality in the European Union

Product	Definition	Regulation
Organic product	A food product for which, throughout the production cycle, the use of chemicals (pesticides and fertilizers) is excluded, and only the use of environmentally friendly techniques of cultivation and stock farming is foreseen. Land is made fertile by crop rotation and the use of organic manure and natural minerals, while environmentally friendly products and techniques are employed to defend the crops from parasites. Coffee can be certified as organic	EC Regulation n. 2092/91 – Official Gazette n. L198 – 22 July 1991 and subsequent amendments
Protected designation of origin (PDO)	Seal of quality attributed to food products whose particular characteristics essentially depend on the territory in which they are produced. The geographical environment includes natural and human factors, which make it possible to obtain a product, which cannot be imitated outside its defined area of production. All stages of production, transformation and processing must take place in a delimited geographical area	EC Regulation n. 2081/92 – Official Gazette n. L208 – 24 July 1992 – pp. 1–8 and subsequent amendments
Protected geographical indication (PGI)		EC Regulation n. 2081/92 – Official Gazette n. L208–24 July 1992 – pp. 1–8 and subsequent amendments

It is mostly prepared with a filter machine, even though a growing number of people now have an espresso machine in their homes. Much care is taken in the preparation, the presentation and how the coffee is served. The '*koffie verkeerd*' is their typical coffee, drunk with plenty of milk in mugs and often served with sweets, such as apple pie. Socializing and comfort are two aspects particularly associated with coffee consumption in Holland and, in public, young people want to drink coffee 'in the right way'. Espresso has become the ideal

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after-dinner coffee beverage, and possession of an espresso machine with all its accessories has become a status symbol.

- **Hamburg:** Coffee in Germany is associated, first of all, to well being and euphoria, relaxation and fun, and, despite the fact that it is consumed throughout the day, it is seldom drunk after a meal. The day starts off with a steaming cup of coffee and a large breakfast. The careful preparation of the brew takes place in a relaxed atmosphere, in which the coffee is served on a perfectly laid table, every day of the year, and drunk in quantity, followed by fresh bread rolls. Throughout the rest of the day, plenty of coffee is drunk, both at work and out and about, in the 'EisKaffe', places where beverages are served with cakes, or in the 'Steh-kaffe', bars with high counters looking out onto the street, where one can drink coffee standing up. The traditional coffee is mostly prepared with a filter, but for a more modern consumer espresso coffee consumption is growing. Milk is gradually replacing cream, which traditionally used to be served with coffee. Germans pay particular attention to coffee being at the right temperature, and so they tend to keep it handy in a thermos. In the afternoon, around 5 o'clock, it is time for 'Kaffeeklatsch', an important moment for socializing at home, which is the ideal formula for inviting someone to the home.
- **London:** The main reason British people decide to drink a cup of coffee on a weekday is for its stimulating effect to improve their performances. Taste and aroma are of secondary importance, so much so that some take a thermos of coffee with them from home. Lack of time and space have contributed to the spread of extremely functional methods of preparing coffee, such as instant coffee prepared with the kettle that is also used for tea, which still has a strong hold in British homes. At weekends, when people have more time, habits change and coffee is then drunk with real pleasure, because it no longer means only 'getting on with something quickly'. Some bars have become popular because they offer coffee in real settings consumers can relate to. Coffee consumption in the UK is therefore a modern and cosmopolitan experience, most certainly not a substitute for the traditional rite of tea.
- **Naples:** Naples probably represents the city with the richest daily idiosyncratic coffee culture in the world, having elaborated both a philosophy and a theory on its use and consumption. It is no accident if all expressive activities that distinguish this city, from the theatre of de Filippo to the songs of Pino Daniele, have dealt with coffee by creating and offering particularly original visions and interpretations of the experience. At home, coffee is prepared with the Neapolitan

coffeemaker and served in the '*tazzulella*'. At the coffee bar – an authentic omnipresent coffee temple (approximately one for every 450 people) – a very concentrated espresso of no more than 20 ml (called *ristretto*) is served, prepared by the expert hand of a Neapolitan barman, operating on an old-fashioned lever-espresso machine, with sugar mixed with coffee during percolation.

- **New York:** The first coffee of the morning, generally prepared with a filter machine or by the infusion system, is drunk in a hurry in the traditional mugs accompanied by the traditional muffins or bagels, and seen as a habit, with no special rite. A common scene in New York is that of coffee drunk in the street in a paper cup, 'in transit', like street fuel, very basic and always available on every street corner. There is an enormously wide supply of blends for the home – besides the various brands, you can find pure origin, flavoured coffee, organic coffee, etc. Coffee is less commonly taken after the main meals, whereas, especially on holidays, people often take a break during the day to prepare a coffee for themselves or for friends. There are no fixed rules about occasions for drinking coffee as there are in other countries. Espresso, stronger tasting than the traditional American coffee, and the beverages associated with it, the so-called ESBAD (espresso-based), such as *latte* and *cappuccino*, are consumed more frequently in the coffee shop chains or in Italian restaurants and are therefore mainly considered 'special' beverages.
- **Oslo:** The basic Norwegian coffee is what is known as ordinary coffee, which is black, with no milk or sugar, mostly associated with home consumption. Preparation with a filter is gradually taking over from the use of a kettle. Consumption out of the home, which mainly takes place in coffee bars, is becoming more and more widespread and this has opened the way for new ways of drinking coffee, such as espresso and *cappuccino*. Sometimes these are even prepared at home, especially when people have guests for the weekend or in the evening. Consumption is very high – an average of five cups a day – which makes Norwegians, together with the rest of the Nordic people, the highest coffee consumers per head in the world.
- **Paris:** Coffee is the heart of breakfast; most French people have a real yearning for it. It is normally prepared using a filter and is drunk with other typically French products, such as croissants and baguettes. Another cup is drunk after lunch, without milk. Real coffee lovers still go to '*brûleries*', if they can find one, where one can enjoy coffee after choosing the desired strength and aroma. 'Café', in its two

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accepted meanings, as a beverage and as a place of encounter, represents an important social and collective rite that reached its climax, thanks to the likes of Voltaire, Balzac and all the way to Sartre. In bars and restaurants, especially in the north of the country, coffee is generally prepared with an espresso machine, although it is not served as concentrated as in Italy.

- **San Francisco:** Their first desire in this city is to start the day off with the rite of a good cup of coffee, that is, to begin the day with an experience of quality where its careful preparation is something to be proud of. There are roasted coffee dealers, shops and bars that serve coffee almost anywhere in town, and they are proud of roasting their own coffee. San Francisco is an important centre for coffee in the United States and played a leading role in the 1980s in the revolution of gourmet coffee. The wide availability of different types of coffee tempts people to try out all kinds of novelties. Milk and espresso-based beverages are like meals, so at lunch lighter drip coffee is preferred, while 'fun' coffees are consumed after lunch, as a dessert. The bars are like an extension of the sitting room at home where you can drink a coffee as you relax, reading the newspaper or surfing on the Internet.
- **Tel Aviv:** In the morning, instant coffee, quick and without much ceremony, is a necessary provision for the working day ahead; no great interest is taken in preparing the coffee and certainly no time is dedicated to this. At other times of the day drinking coffee is a way of spending time together. People in the city love sitting for hours in roomy, high-tech cafes, where they can go to see and be seen, especially on Friday, savouring coffee at length with little sips, often accompanied by dry cakes, biscuits or fruits.
- **Tokyo:** The pace of life is very fast and people do not have much time for themselves. For this reason, most people drink instant coffee, of which there is a wide choice. The most widespread coffee drunk, especially out-of-home, is American coffee. The coffee is consumed in bars or from vending machines, mostly as an energising drink. The vending machines, to be found everywhere, even in city streets and on country roads, sell various kinds of soft drinks, but above all, cans of liquid coffee, for which Japan is at the top of the world market. Coffee is on the menu in Western-style restaurants, which, together with the coffee shop chains, are the main places where coffee is drunk, especially among coffee lovers. At home, this beverage is indeed little used, people almost only drinking instant coffee once in the morning. Espresso coffee is very successful, even if it is thought by many to be too bitter.

1.6 THE QUALITY OF ESPRESSO COFFEE

Three coffee experiences can be lived throughout the day:

- 1 coffee for waking up is still preferred as a hot, dilute beverage;
- 2 espresso, as has been seen, takes the lion's share of coffees at breaks, especially in Latin countries and above all in Italy;
- 3 in Anglo-Saxon or northern European countries, espresso is considered a speciality suitable for relaxing, where feeling and care are involved in its preparation.

The most appreciated characteristics of espresso are its creaminess, body and the strength of its aroma, associated with stimulating properties, despite the fact that espresso contains less caffeine than the more dilute coffees do. Espresso therefore represents a benchmark universally recognized as being a great pleasure and a symbol of Italian culture, so much so that the highest expression of coffee is that served in bars in Italy, in restaurants in France, and restaurants and coffee shops in the rest of the world, precisely because it is coffee prepared with a professional machine.

As regards the nutritional content (see Chapter 10), the only expectations one can have from the consumption of an espresso are the intake of a moderate dose of caffeine, known above all as a stimulating pleasure, boosting intellectual activity, improving memory and concentration, quickening reflexes, making it easier to stay awake, improving one's mood, etc., and the fact of consuming a product devoid *per se* of calories.

The real consumer's expectations, however, are of a hedonistic nature, because drinking a good espresso is genuinely wonderful. Espresso is a true elixir, a concentrate of exquisite aromas lasting long after it has been drunk. Even sight and touch are satisfied, thanks to the striped hazelnut colour of the cream and to its full body. In moments of relaxation at home this tasting rite is preceded by the eagerly awaited rite of preparation, when it is enjoyable to play out the actions of the barman, enriching it with your own secrets, as you anticipate the pleasure of its taste.

As far as service is concerned, consumers require the roasted and ground coffee to retain the fragrance of the aromas developed during roasting until the time the package is opened, and they want to know the characteristics of the product they are consuming (see Chapter 6). It should also go a long way, in that only a small amount is needed to make a good cup of coffee and, once open, the aroma should last until the contents of the package run out.

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Grinding deserves a whole chapter (see Chapter 5). Connoisseurs believe that in order to be excellent, the beans should only be ground immediately prior to preparation; unfortunately, it is difficult to find and take care of top quality household grinders. This is why 90% of packaged coffee sold in retail shops is ground. The most promising solution for the future is servings – ground and pressed doses of coffee, sealed in a wrapper and ready for use. Servings offer the fastest, cleanest way of preparing espressos, and, most importantly, they guarantee a consistency of quality that neither coffee beans nor ground coffee can in any way guarantee due to the serious problems in keeping all the parameters involved in preparing a perfect espresso cup under control.

Espresso consumption is an aesthetic experience, like tasting a vintage wine or admiring a painting. It is a search for beauty and goodness for improving the quality of our life. As it offers such subjectively ineffable ‘goodness’, devoid of defects, the only adequate reaction to it is astonishment – astonishment that can give birth to enthusiasm, and therefore intellectual and spiritual enrichment.

The predominance of the experience aspect means that the official definition of quality may be limited for espresso. It may be more appropriate to speak of ‘degree of excellence’. The elements characterising effective quality are the subject of this book and will be revealed in detail as you read. From an organoleptic point of view, we have already seen the importance of the aroma and the full-body – to a certain extent represented by the visual component of the cream – while, as regards the taste, consumers look for a slight bitterness in southern countries or a slight acidity in northern countries, in both cases accompanied by the characteristic sweetness of the coffee. On the opposite side, the most common, serious defects penalising consumption are the extreme bitterness and foul flavour of poor quality beans.

1.7 DEFINITION OF ESPRESSO

Everyone in Italy has a clear mental picture of a cup of espresso: a small heavy china cup with a capacity just over 50 ml, half full with a dark brew topped by a thick layer of a reddish-brown foam of tiny bubbles. More than 50 million cups of espresso are consumed every day in the world: its fragrance and flavour are the first stimuli in the morning, they crown an excellent meal later in the day, and act as frequent revivers during lengthy working sessions.

1.7.1 Espresso as a lifestyle: brewed on the spur of the moment

One of the meanings of the word *espresso* (express) is that it is made for a special purpose, on the moment, on order (Marzullo, 1965; Hazon, 1981); therefore it is made for the occasion on express request, extemporaneously rather than fast. This concept is clarified by the saying 'the consumer not the espresso must wait'. As a direct consequence, once brewed, espresso cannot be kept, and must be drunk immediately, before the foam shrinks and collapses, breaking into patches on the surface. After a while, the surface of the liquid is completely free from foam, which has dried out on the walls of the cup above the liquid.

If an espresso is kept waiting, smoothness of taste is lost and perceived acidity increases with time regardless of cooling. Furthermore, if the cup cools down, an unbalanced saltiness becomes noticeable.

- Freshness of preparation must be an integral part of the definition of this very special brew.

1.7.2 Espresso as a brewing technique: it requires pressure

At the beginning of the twentieth century the need for preparing a cup of coffee within seconds of a customer's request led to an increase in the pressure of the extraction water. Water was heated up to its boiling point in a sealed kettle, so that the steam in equilibrium created pressure, accelerating extraction. A drawback of this technique was that brewing with boiling water provokes over-extraction of astringent and bitter, usually less soluble, substances, which give a *burnt* taste to the brew.

Brewing was first improved by separating the water used for brewing, best hot but not boiling, from the heating water. Pressures as high as 10 bars could be created by a lever, multiplying the force of the arm of the bartender, producing a thick layer of foam on the cup. The lever has now been replaced by an electric pump, simpler and more regular to operate.

A pressure field applied within a fluid produces potential energy – what is known as Bernoulli's piezometric energy – which can be easily transformed into kinetic energy, and further transformed into surface potential energy and heat.

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Pressure is important for the definition of espresso, making it different from other brews. During espresso percolation (see Chapter 7), a small amount of hot water under pressure is applied to a layer of ground roasted coffee, the *coffee cake*, and this very efficiently produces a concentrated brew, containing not only soluble solids, but also lipophilic substances, lacking in filter and instant coffees. The foam on the top and the opaque brew are unique to espresso, owing to the presence of a disperse phase formed by very small oil droplets in emulsion (Petraacco, 1989) (see 8.1.1), which are perceived in the mouth as a special creamy sensation, the *body*. Furthermore, the oil droplets preserve many volatile aromatic components, which would otherwise either escape into the atmosphere or be destroyed by contact with water as in other brewing techniques, so that the rich coffee taste lingers in the mouth for several minutes. If coffee were percolated under high static pressure only, the pressure would be lost downstream and no work could be performed on the cake; while, if kinetic energy from stirring propellers, choke nozzles, sprayers, etc., were applied downstream from the cake, a smooth layer of foam could be produced, but it would lack body.

The Latin etymology of the word espresso, literally meaning *pressed out* (Campanini and Carboni, 1993), clearly points out the importance of pressure in espresso brewing, making the technique an integral part of the definition:

- Espresso is a brew obtained by percolation of hot water under pressure through tamped/compacted roasted ground coffee, where the energy of the water pressure is spent within the cake.

1.7.3 Italian espresso: it must be rapidly brewed

Another important feature of espresso, especially as traditionally drunk in Italy, is the length of percolation (see 7.5.8). The diversified energy input in espresso pressure brewing efficiently brings into the cup both hydrophilic and lipophilic substances. A best mix is reached within 30 seconds; if the extraction is shorter than 15 seconds a weak and exceedingly acid unbalanced and under-extracted cup is obtained. Conversely, if extraction lasts longer than 30 seconds, over-extraction of substances with poor flavour will produce an ordinary harsh-tasting cup, as can be easily seen by separately tasting the liquid fraction percolated after the prescribed 30 seconds.

A quantitative definition can now be given:

Italian espresso is a small cup of concentrated brew prepared on request by extraction of ground roasted coffee beans, with hot water under pressure for a defined short time.

The range of the parameters is:

Ground coffee portion 6.5 ± 1.5 g

Water temperature 90 ± 5 °C

Inlet water pressure 9 ± 2 bar

The requisite conditions to make a good cup of espresso will be reviewed in detail in the following chapters.

1.8 CONCLUSIONS

We have seen how varied and complex the concept of quality is and how difficult it is to use it as an objective measure, particularly in the case of the espresso. We have, however, understood that the espresso lives almost solely on the pleasure it gives consumers. Therefore, if the number of lovers is to be maintained and increased, it is necessary to seek the means of continually improving its quality, meaning its degree of excellence. In the following chapters we will try to outline this road to improvement, setting out everything that is known so far about the quality of the espresso.

This becomes a stage on a the road to improving the quality of the world-wide production of coffee brewed worldwide, which, as the resounding success of gourmet coffee has shown in the Anglo-Saxon world, can lead to a significant increase in consumption. This may result in an important contribution to rebalancing re-equilibrating of the supply and demand of coffee, thus improving the precarious financial and social situation the producer countries find themselves in.

Wine has travelled a similar road very successfully and, besides providing pleasure to consumers, has achieved a significant rise in the value of overall production. This has resulted in a segmentation of the market where no one in the world is any longer surprised by the fact that the price of a bottle can range over several orders of magnitude. Consequently, there has been a general increase in the well-being and satisfaction of those along the whole chain. This road was not easy and involved an almost 'manic' search for excellence, the the specialization of the distribution networks and education of the consumers.

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Espresso can play the part of the leader role in a similar situation in the coffee field, thanks to the experience image it enjoys as a symbolic beverage and thanks to the commitment of the commitment of the whole industry to continuous improvement.

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