

Quality in Relation to Models and Management Systems in the Automotive Sector. A Bibliographic Review

Calidad en relación con los Modelos y Sistemas de Gestión en el sector de la automoción. Una revisión bibliográfica

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ABSTRACT:

In the current business environment, quality is an important management practice for the proper development of economic activity and the proper functioning of companies. This paper presents the process of evolution of quality, concept and changes of focus, touching associated issues such as control and warranty. The objective of the article is to expose the relationship between the application of quality management systems and their effect on the performance of the company in the automotive sector. The type of research is qualitative, seeking to delve into the literature of some of the numerous published research articles and similar studies on the subject. The findings serve to demonstrate the importance of an organizational phenomenon such as quality and how companies apply ISO quality systems with a positive effect on the productivity of the same.

Keywords: Quality; Quality Management Systems; ISO 9000; Performance; Productivity

RESUMEN:

En el entorno empresarial actual, la calidad es una práctica de gestión importante para el correcto desarrollo de la actividad económica y el buen funcionamiento de las empresas. Este artículo presenta el proceso de evolución de la calidad, el concepto y los cambios de enfoque, tocando cuestiones asociadas como el control y la garantía. El objetivo del artículo es exponer la relación entre la aplicación de los sistemas de gestión de calidad y su efecto en el desempeño de la empresa en el sector automotriz. El tipo de investigación es cualitativo, buscando profundizar en la literatura de algunos de los numerosos artículos de investigación publicados y estudios similares sobre el tema. Los resultados sirven para demostrar la importancia de un fenómeno organizacional como la calidad y cómo las empresas aplican los sistemas de calidad ISO con un efecto positivo en la productividad de los mismos.

Palabras clave: Calidad; Sistemas de gestión de la calidad; ISO 9000; actuación; productividad

1. Introduction

As a concept, Quality has evolved, which results in successive theories and approaches to quality assurance, including, not only compliance with specifications, but also customer

satisfaction [1]. In the first place it is appropriate to make an adequate analysis of the concept of quality from a general approach to the particular. In this sense, an attribute, a distinctive element, character or peculiarity refers to the English noun quality, a term that comes from the Latin word *qualitas atis*, which in turn derives from the Latin adjective *qualis* meaning equal, that is of which genre, of what kind, of what quality, of what species [2].

The American Quality Society and ANSI have defined quality as the condition of satisfying or exceeding customer needs, while the ISO organization, supported by the British Standards BS 4778 as in ANSI A3 (1978), defines Quality as the entire characteristics of a product or service that have the capacity to satisfy the explicit or implicit needs (ISO 8402, 1994).

Quality allows the organizations to improve the development of their goods and services according to the requirements of the market [3] and [4] considers that quality is associated with suitability for use, which means that if the set of characteristics of a product satisfies the customers, it also makes the product acceptable, therefore, quality consists in not having deficiencies. Under this perspective, quality is understood as the need to enhance products and services to take advantage of competitors, which implies having to reduce mistakes and do things right from the first time [5]. Quality is to imagine an excellent product or service

that meets or exceeds our expectations; [6]. Quality is related to excellence [7] and is associated with a conformity with the requirements [8]; is defined by the client, while it is the issuance of their judgment on a specific product or service, which usually leads to approval or rejection [9].

Quality is then to exceed customer expectations [10] being one of the critical success factors important for achieving business productivity. [11] define quality as the investment of the best skills and materials in the performance of a task, to achieve the best possible result. [12] and [13] argue that quality should be understood as the satisfaction of customer expectations and needs, linking quality not only with the inside of the organizations but with the rationale of manufacturing of the product, as is the customer [14,10] and in this way, customers are judges of quality by fulfilling their needs and meeting their expectations.

Table 1

Comparative table of the Quality definitions

Authors/year	Quality Definitions
Crosby, 1979	Accordance with the requirements.
Parasuram, 1985	Surpass client's expectations
Peters and Waterman, 1998	Excellence.
Parasuram & Zeitham am, Parasura	The clients are the real quality judges, because they measure the satisfaction and fulfillment of their needs and expectations
Tenner & De Toro, 1992	Is a subproduct, result of the emergence of the massive production systems, which led to the growth of the production scale and volume.
Juran, 1992	Usefulness aptitude.
Reeves & Bednar, 1994	The inversion of the best materials and abilities on the accomplishment of a task for gaining the best result as possible.
Powell, 1995	Is a remarkable source of competitive advantage.
Badri & Davis, 1995	A high direction's priority since the arrival of the globalization.
Cortés, 1999	Not only includes the accomplishment of the product's specifications, but also the strategical value and the client's satisfaction
Juran, 1999	Usefulness aptitude.
Juran, Godfrey, 1999	Is the group of characteristics of a satisfying product for the clients, and because of that, they make the product acceptable; the main thing about quality is the lack of the deficiencies.
Jam es, 2000	Flexibility and efficiency improvement system of an organism, which emphasizes the importance of the measurement and the diagnosis, as well as the client's role and the commitment of the employees.
Thiagaragan, 2001	In lot of enterprises, quality is understood as a priority, because of the globalization of the international trade and the rivalry's pressure caused by the growing consumer's demand.
Hoyer & Hoyer, 2001	Reputation's synonym; Also it should be understood as a rivalry's factor.
Ayuso, 2004	Is the fulfillment of the required specifications of the client as long as this have at least a minimum of stability over time.
Juran, Gryna, 2005	It's known what quality is, but it's as well ignored. If no one recognizes what it is then, for some practical effects, it doesn't exist. But for other practical effects it does exist.
Dean & Bower, Drucker, 1994-2007	The client's needs and wills satisfaction linking up the quality, not only within the inner incorporation, but also with the reason of making a product, which is, the client itself.
Icontec, 2008	The agroupation of inherent characteristics that meet the requirements.
Ismah, 2009	The business world depends on the production of high quality products and services.
Besterfield, 2009	Quality is to imagine an excellent product or service, that meets or exceeds our expectations.
Demuner Florez, 2009	Guides an enterprise's tasks in one proactive labour, understood as a continuous improvement, turning them into a quality management.
Besterfield, 2014	Expectations based on the expected use and the sell price.
Gutiérrez, 2014	Quality is defined by the client.
Evans & Lindsay, 2015	It's a group of properties and characteristics
Ruiz - Torres, 2015	The systems, the methodologies and tools of quality management have turned to a fundamental factor in the organizations for keeping their competitive advantages.

Therefore, a product or service present quality when it meets customer expectations and according to ICONTEC (2008) quality is defined as well, as the degree to which a set of inherent characteristics meets the requirements set out in the ISO 9000 standard compendium. As a result, there is no definition of quality that is considered to be the most appropriate because, depending on the situation, each definition has strengths and weaknesses in relation to the criteria of measurement, generalization and utility in management. In addition, the more modern definitions have not replaced the older ones, but rather have complemented them [17, 18].

1.1. Evolution Of Quality

The search for doing things better, faster and at a lower cost, through the three components of a quality strategy: innovation, control and improvement, also caused a continuous change in concepts and methods of quality. From 1920 until today, the quality approach has evolved both chronologically and conceptually, and has been extensively analyzed by different authors, including [19, 20, 21].

According to [22], a classification of four progressive stages has been reached, both from the historical point of view and the conception of this management [23, 24, 25, 26]. These stages are usually referred to as quality inspection, quality control, and quality assurance (evaluation, control and follow-up) [27]. The decade of the 80's marked the beginning of the quality management as a discipline era, becoming one of the indisputable pillars of business management. Therefore, companies must meet the requirements stipulated in the standards for certification, which, if well formulated and in the interest of organizations, help organizations to establish a documented system, which does not lead to interpretations [28].

1.2. Quality Management Systems

Quality management (QM) is a complex concept, difficult to observe and measure, so there is no commonly accepted definition, mainly due to the incomplete perception that the organizations' managers have of the principles, techniques and measurement tools that make that each approach to quality management, forget important parts such as dimensions [29]. While a management system is perceived as nothing more than a map or guide that explains how the company's day-to-day business is run, in fact it defines how the company is organized or structured, what are the interrelated processes and key business processes (Quality, environment, prevention of labor risks, innovation, among others) and who is responsible for these processes and procedures [25]. Quality management systems (QMS) is the interrelated set of elements (methods, procedures, instructions, etc.), that the organization uses for planning, executing and controlling certain activities related to the objectives it wishes to achieve [30]. It is a group of resources and rules appropriately implemented with the objective of guiding each part of the company to normatively accomplish its tasks in harmony with the others, and where the purpose is to reach a good level of quality and productivity [31, 32] that is based on standards that look for common elements, such as continuous improvement, alignment between goals and customer goals [33], so they are the basis of quality models [25].

For the purposes of this research, QMS's are defined as the tools that allow any organization control, evaluate and monitor the necessary activities for optimizing its processes and the development of the mission, in order to achieve the quality of the products or services, which are influenced by the fulfillment of the client's requirements and the satisfaction [34].

1.2.1. Implementation Of QMS

A growing number of organizations have developed and adopted QMS for improving efficiency, productivity and customer's satisfaction [35, 36] and its success is not related to the selection of a particular standard or model, but to the way in which they are implemented [32], being this a strategic decision that seeks to standardize the

organizational processes and their better management [36]. The performance leading to the company's success depends on the implementation and subsequent appropriate use of certain management models which allow to handle those critical or strategic activities [37]. This is why there are different quality models and tools ranging from client-oriented or process-oriented, to those centered on the human or systemic dimension, and those involving cultural and learning changes [38]. When choosing between them, managers find a wide range of possibilities to implement QMS within their organizations, valuing the effects that each one may have on the organization's capabilities and, ultimately, its profitability [39].

1.2.2. Quality Assurance

With current technological and economic development, industries should not choose to have quality flaws, and it is preferred (and more cost-effective) to prevent them than to correct or regret them. It was necessary for the QMS to assimilate prevention as a way of life and, in any case, serve to anticipate errors before they happen, which becomes a critical point of any activity that seeks to achieve quality [40]. To ensure quality, it is necessary to carry out systematic checks at each stage and also to take a critical examination of the company's efforts and achievements with regard to product quality. This is how the concept of quality assurance (QA) emerges, as a natural evolution of quality control, which adds prevention to the appearance of defects in industrial companies helping to maintain / improve the quality of products and therefore contributing to enhance the company's reputation and customer relationships. Ensuring quality means doing things in the best possible way, through systematic measurement, comparison with standards, and monitoring processes, which help avoid mistakes. In this research, QA is defined as the set of planned and systematic activities applied in a QMS to ensure that a product or service's quality requirements are met.

1.3. Standardisation

Quality necessarily begins with standards, so standardization is the activity focused on the creation of standards [40]. QMS make it essential for industries to maintain uniform quality standards by making them common to manufacturing and service enterprises. In the current globalized world, these norms are increasingly used and widely valid both for national and international organizations [41] which support activities with the instructions of what an element must contain to correspond to the needs it intends satisfy. Standards are not only specific to products or services, but also they are generic and apply to all processes [42].

1.3.1. International Organization for Standardization

By developing standards and guidelines from different geographies, terms such as quality management, quality control, QMS and QA acquired different meanings in countries and industries, making it difficult to understand. As a solution, a sort of global federation of national standardization bodies from more than 100 countries was created in Geneva in 1947 to standardize economic activities, calling itself the International Organization for Standardization (ISO) [43], established as an international non-governmental entity and was made up of representatives of national standardization bodies, with the objective of designing norms applicable to any type of organization [44]. Under the premise of seeking to become a benchmark of international standards for documenting QMS that could be applied in different cultures, ISO was consolidated [45].

1.3.2. ISO 9000 Standards

By 1987, the ISO organization established a series of international standards (ISO 9000) published in order to establish QMS not adjusted for the product's quality but to the practice of quality assurance methods of a company [46]. Also active in organizations [41] and with the aim of promoting the development of the standardization of related activities in the world, facilitating the exchange of goods and services at the international level. Compliance with ISO 9001 implies to have implemented a QMS that collects standardized procedures and documents the basic processes to manufacture the product or service that the customer

acquires [30, 47]. ISO 9001 is neither a mandatory QMS, nor a government regulation, but a voluntary regulatory process supported by each organization's own motivations, objectives and policies, which guarantees the organization's quality control methods and practices QMS.

ISO 9001 became widely available in Europe when companies pressured their suppliers around the world to be certified in ISO 9001 [48], formally adopting with their suppliers the requirements they had to comply under this standard in order to do business and Promoting the adoption of this standard by European companies [30]. In the United States, its earliest origin (1960's-MIL-Q-9858A and MIL-I 45208A) based on the British Standards Follow-up (BS 5750) developed in 1979 by the UK Standardization Agency Institution - BSI) [49]. At present the most implemented QMS initiatives correspond to the ISO Standards; without them, it is virtually impossible to compete in international markets [50, 51].

1.3.3. Series of ISO 9000 standard

ISO 9000 was originally issued in 1994 as a series of six internationally agreed standards (ISO 9000: 1994) to guide and audit the practices of a company's QMSs and under the headings of ISO 9001, ISO 9002 and ISO 9003 [52]. Each standard header contained specific guidelines associated to a particular segment of the activities related to quality: ISO 9000 (advices companies determine which standard of ISO 9001, 9002 and 9003 applies); ISO 9001 (Draft guidelines for companies engaged in the design, development, production, installation and service of products or services); ISO 9002 (Similar to ISO 9001, but excludes companies involved in design and development); ISO 9003 (covers companies engaged in inspection and final testing), ISO 9004 (guidelines for the implementation of the elements of the QMS) These standards are the minimum acceptable level of requirement that the quality management practices of a supplier must satisfy in order to receive ISO 9001 accreditation or certification. Several important modifications to the additional standards have subsequently been issued by ISO to eliminate application gaps [41], including a first thorough review of the original series made ISO 9001: 2000 (definitions), ISO 9001: 2000 (requirements) and ISO 9004: 2000 (continuous improvement) [43].

In Latin America and since the 1980s, the number of companies that use ISO 9000 standards has increased as a guide to manage the quality of their products and / or services, obtaining the certification of their QMS. This QMS certification based on ISO 9001: 2008 has have in recent years, a sustained dynamic of growth worldwide, and specifically in Colombia, being today the second country in the Latin American context with the highest number of ISO certificates 9001:2008.

The ISO 9001:2008 specifies the requirements for a QMS that can be used for internal application, certification or for contractual purposes [53], ensuring that customers have a consistent quality management process [54]. This was an important first step for the organizations on their way to QA [55], but another vision argues that when implementing ISO 9001, companies seek to obtain a certification that allows them to achieve a commercial benefit, without actually committing themselves with the QMSs [56, 57]. In September 2015, the latest version of the requirements of the standard, called ISO 9001:2015 was published.

1.4. Other Quality Models in Automotive Industry

QMS have evolved in parallel with the quality concept itself (5802). The standardization of requirements beyond the ISO 9001:2008/2015 standard makes it easier for suppliers to comply with and relationships with key customers. To do this, other criteria and / or standards were developed in the evaluation of the efficiency of the QMS in an organization, referring to the documents published by the national or international standardization bodies. New models of analysis emerged which, based on the principles of quality [59], and are used to summon prizes among aspiring companies to be recognized as a benchmark for excellence in management [5]. In order for suppliers of automotive companies to meet quality requirements, QMSs were implemented, which set out requirements for quality management systems [60] and analyze the results of the use of different tools related to

QMS, and their impact on business performance [61, 62, 63, 64, 22].

This research explores the situation of the main models and standards that are used in the automotive industry. For this case the most commonly used models are the European Foundation for Quality Award (EFQM) in Europe; Malcolm Baldrige National Quality Award (MBNQA) in the USA; Deming Prize in Japan and Asia; among others, which are summarized below:

1.4.1. Total Quality Management (TQM)

TQM originated independent of the ISO 9001 QMS emerging after World War II, during the total quality movement gestated in Japan [65], with the aim of getting things right every time, from the first time [66], improving the quality of an organization to meet customer satisfaction [67]. It is a concept based on the continuous improvement in the performance of the processes in an organization and the quality of the products and services that are the results of those processes [68] and also a general philosophy of management which goes far beyond commercialization, strongly introducing the concept of quality by including all the key requirements that contribute not only to the quality perceived by the customer, but also to the satisfaction of the customer [69]. In its implementation, top management acts as the main transmitter creating values, goals and systems to meet customer expectations and improve organizational performance [70]. TQM has been considered as the strategic, tactical and operational tool of QMS [71], and it is one of the approaches for the excellence of the most applied and accepted businesses [72] and defines [73].

In this paper, we present the results of the study [74] examined the application of factors, the results of adopting them and their relationships, identifying factors of TQM that have already been detected in other similar studies [75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 63, 85, 86, 87, 88]: Leadership, strategic planning, employee management and participation, supplier management, customer service, continuous improvement, information and analysis and knowledge and education are the commonly identified factors; Quality assurance is not mentioned. In that sense, [87] explored the relationships among factors such as leadership, strategic planning, customer orientation, evaluation and control, human resources management, supplier management and results from the adoption of such practices such as human resources results, customer outcomes, organizational effectiveness, and financial and market outcomes, identifying leadership and evaluation as the factors that serve as a foundation for achieving favorable business results. The effective application of practices in relation to these factors is likely to result in better performance [74].

1.4.2. QS 9000

The SGC QS 9000 was developed in September 1994 by Chrysler Corporation, Ford Motor Company and General Motors Corporation, in order to express the fundamentals of quality, which are to satisfy the production suppliers and the service industries of parts and materials that adopt QSM seeking to unify criteria. The aim of the automobile manufacturers was to develop QSMs that would further enhance continuous improvement, with emphasis on defect prevention as well as reduction of variation and waste in the supply chain. This certification aims to eliminate costs in the automotive industry.

QS 9000 not only establishes what should be done, but how to do it. The registration planned in QS 9000 will also achieve ISO 9001 certification; However, ISO certified companies must meet the requirements of QS 9000. Many of the concepts in the award criteria of the Malcolm Baldrige National Quality Award are reflected in QS 9000, although QS 9000 established customer requirements for several of the major manufacturers, not being a specification of international reach [89].

1.4.3. ISO/TS 16949

In 1999, in order to avoid the dual requirements between VDA 6.1 (Germany), EAFQ (France), AVQS (Italy) and QS-9000 (USA), the ISO / TS 16949 standard defines the standards of the automotive industry worldwide And is considered favorable to previous management schemes, as a unified specification that replaces existing North American, German, French and Italian automotive QMS standards, including QS-9000, VDA6.1, EAQF

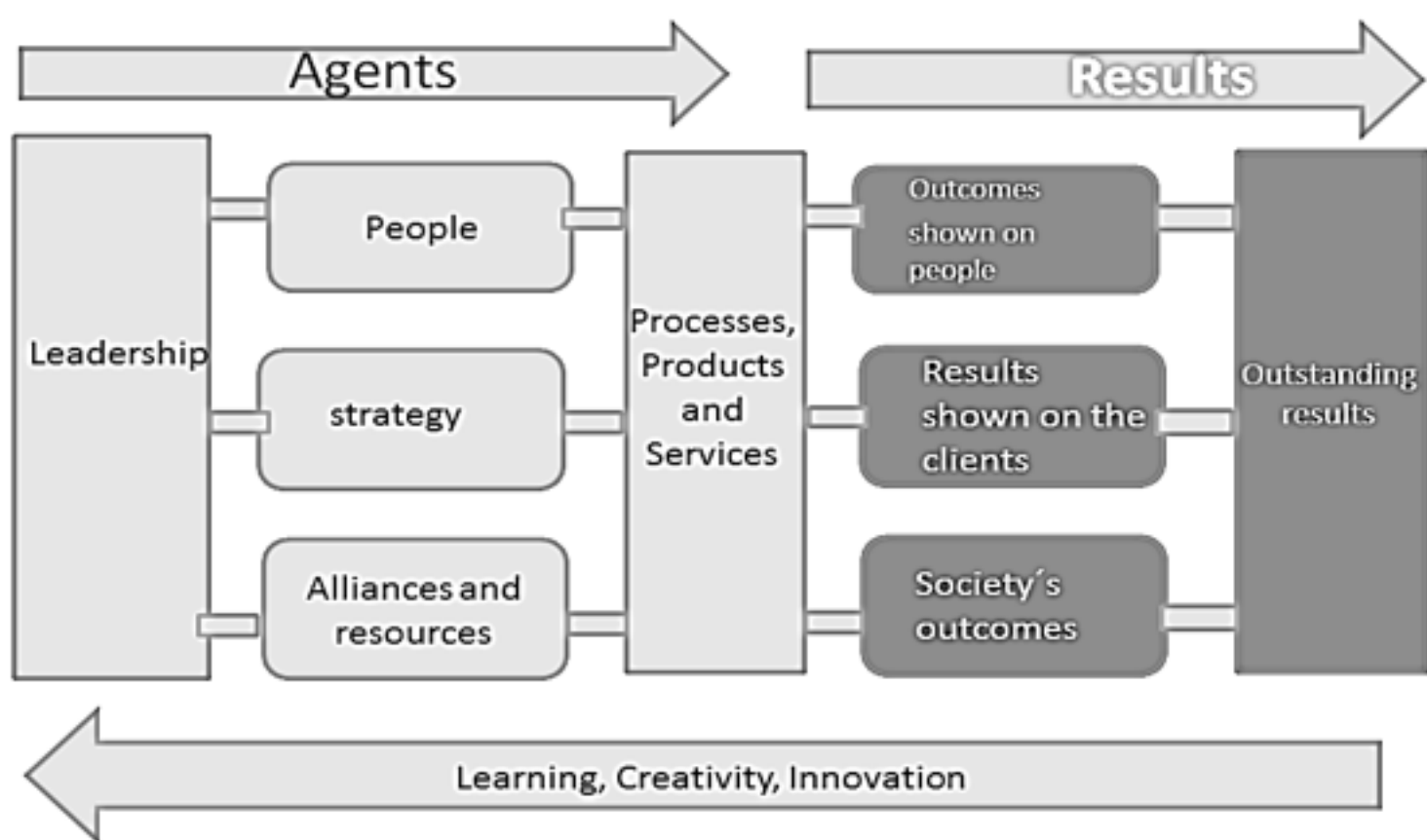
and ASQ standards. This standard, based on the standards of the ISO 9000 series, is applied in the design / development phases of a new product, and when relevant, in the installation and service of products related to the automotive sector. As a larger model than QS 9000, it allows automotive companies to maintain individual control over more specific requirements [89] and specifies the requirements of the QMS for the design / development, production, installation and service of automotive related products [41] [42], achieving the harmonization of quality requirements for US suppliers (Ford, Chrysler and General Motors) according to QS 9000, with French, German and Italian automakers. The standard has also been approved by Asian automakers.

1.4.4. EFQM

The European Foundation for Quality Management (EFQM) was created in 1988 in Brussels by Bosch, BT, Bull, Ciba-Geigy, Dassault, Electrolux, Fiat, KLM, Nestlé, Olivetti, Philips, Renault, Sulzer and Volkswagen) as a non-profit organization with a European scope [39] and with the aim of helping to improve the competitiveness of European companies through excellence [44]. The current number of EFQM members is more than 700. In 1991 the first European Model of Excellence, known as the European Model for Business Excellence, is the base for the European Quality Award, Current one that emphasizes the importance of the aspects related to the business excellence, being called Model EFQM of business excellence. EFQM Model of Excellence is based on nine Criteria that try to evaluate the evolution of the company on its way to excellence. The model is divided into facilitating agents, which represent the way in which the company implements each of the sub-criteria and, in the results, show what the company is getting in different fields. These two essential parts, agents and results, are related through a cycle of improvement:

- Leadership*. Organizations with a high level of excellence have leaders who build a great future and achieve their goals; Act as models of ethics and inspire confidence.
- Strategy*. Organizations with a high level of excellence apply the mission and vision through the development and implementation of a stakeholder-based strategy.
- People*. Organizations with a high level of excellence have a strong interest in their people, continuously looking to improve their skills and promote justice and equity.
- Alliances and resources*. Organizations with a high level of excellence are planning and managing very well the relationship with suppliers and internal resources to support the strategy and make processes more efficient.
- Processes, products and services*. Organizations with a high level of excellence are trying to improve their processes to add more value to their clients and other stakeholders [90].

Figure 1
EFQM Improvement Cycle



Source: EFQM (2016)

1.4.5. Deming Model

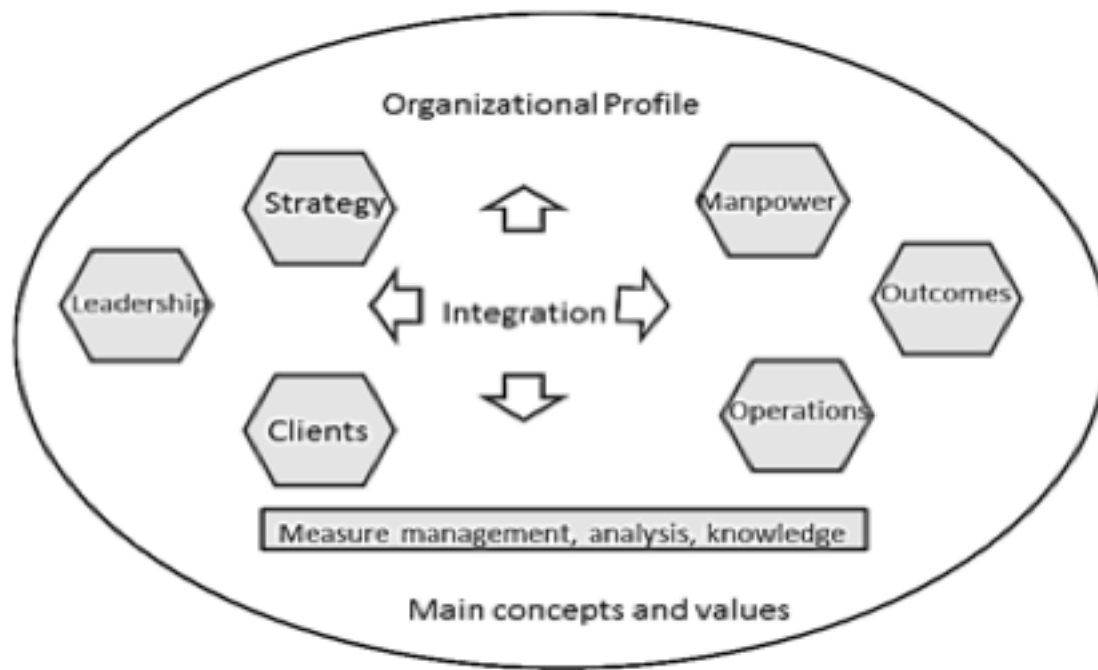
In 1951, Japan developed a model of characteristics similar to TQM called the Deming Application Award. The basic criteria are company policy and planning, organization and management, education and dissemination of quality control, collection, transmission and use of information on quality, analysis, standardization, control, Quality, results, and future plans. At the suggestion of the union of Japanese scientists and engineers (JUSE) was delivered for the first time to stimulate the development of quality control. Companies like Matsushita, Sony and Toyota have used these practices to improve their processes and increase market success.

1.4.6. Malcolm Baldrige Model

Due to the importance of the Japanese Deming Prize and worried about the loss of productivity and competitiveness of the economy, US leaders, in the early 1980s, strive to plan and execute programs that relaunch their companies to levels High quality; One of the results was the Malcolm Baldrige National Quality (MBNQA) or Malcolm Baldrige National Quality Award, created in 1978 by the US Department of Commerce to foster efficient quality control of products and services at North American business and Organizations. This model was created to provide a standard of excellence in quality [91] and also to help companies achieve a high level of performance [92].

Its leadership and management approach is based on a set of concepts and values that include criteria for excellence in performance, values and concepts, and guidelines for evaluation in its processes and results. The criteria used in the ISO 9001 QMS can be compared with MBNQA [93]. The prize cannot be presented neither the companies established outside the US; the public companies either. The last modification of the model was in 1997 and the 2015-2016 version has a renewed focus on managing and directing all the components of its organization as a unified whole; change management; And data analysis, data integrity and cyber security. There are seven categories of MBNQA assessment that are: Leadership, strategic planning, customer focus, measurement, knowledge analysis and control, focus on workforce, operations and results [92].

Figure 2
Malcolm Baldrige's Model



Source: Model Baldrige Adaptation.

1.4.7. Ibero-American Model of Excellence in Management

It is a supranational model convened for the first time in 1999 to be applied to any public and private organization and any sector of activity or size, to try to create a unique reference point in which the different national models of excellence are reflected the Ibero-American countries. Its objective is to evaluate the management of organizations, identifying their strengths and areas of improvement that serve to establish plans of progress and as information for development and strategic planning. This model is the reference document for the awarding of the Ibero-American Quality Award and includes the evaluation method, the REDER sheet and an Ibero-American glossary of terms of quality and excellence. The Ibero-American Foundation for Quality Management, owner of the model, develops updates and disseminates for free. It has almost the same criteria as the EFQM model. To date, 95 organizations have been awarded by more than 1,000 evaluators from 17 Ibero-American countries.

1.5. Comparative analysis of models of excellence

In general, all models are methods that define the results for clients, employees, society and those that constitute potential financial risk in companies.

Malcolm Baldrige model is based on three assumptions: leadership, strategic planning and customer and market driven approach, while EFQM is based on leadership, strategic planning and policy, alliances and resources, and the processes, achieving the results of excellence with respect to performance, customers, personnel and society.

Table 2
Summary of the main Models and actual SGC

	Deming Prize	Malcolm Baldrige Prize	SGC ISO 9001:2015	EFQM	Ibero-american Prize
Start year	1951	1987	2015	1992	1999
Estructure	Long -Term Price	Annual Challenge	International Certificate	Annual Championship	Annual Competition
Geographic Application	Japan	EEUU	Worldwide	Europe	Ibero-american

The Ibero-American Model has a premise very similar to EFQM, because the results of excellence are achieved, in addition to having the support of adequate leadership, a style of management and appropriate processes. In terms of its structure, the Ibero-American model bases its approach on the so-called facilitators of the company and its results, and does not present any apparent differences with respect to the EFQM model (both have nine criteria).

Table 3
Basic comparison between EFQM and Ibero-american Models

Facilitating Agents		Results	
EFQM	Ibero-american Models	EFQM	Ibero-american Model
1. Leadership	1. Leadership and directive style.	6. Results of the clients	6. Outcomes of the clients
2. People	2. People`s development	7. People`s outcome	7. People`s outcome
3. Politics and Economy	3. Polítics and Strategy	8. Society's result	8. Society's result
4. Alliance y Resources	4. Associated and Resources	9. Main outcomes	9. Global outcomes
5. Processes	5. Clients		

Source: Own elaboration

Malcolm Baldrige and EFQM models have the same objective, in terms of establishing a set of criteria used to evaluate quality and organizational excellence. Both drive the application of the criteria, as if it were a self-assessment tool, to identify the strengths and areas that need improvement. In sum, both models are integrated within a social policy to create a competitive advantage. The Baldrige, EFQM and Ibero-American models focus on systems of organizational level and leadership development, and were motivated by the quality movements of each era, as well as the evolution of the industry.

Table 4
Comparison between models according to the approach

	Deming Prize	M. Baldrige Price	SGC ISO 9001:2015	EFQM	Ibero-american Prize
	Statistic control. Problem resolution. Regular improvement.	Leadership, Evaluation, control and tracing; benchmarking	Minimum standards of global equal quality; Documentation of the Quality Insurance System (evaluation control	Organization facilitators and results; leadership, processes and outcomes.	Organization facilitators and results; leadership, clients and outcomes.

Focus		and tracing) of the support activities and processes.		
Focus				

Source: Own elaboration

2. Conclusions

Models in general conceive the organization as a set of connected and connected subsystems, having for them much importance the excellence and continuous improvement. All contribute to the self-evaluation process, seeking to incorporate continuous improvement and growth of companies.

QMS ISO 9001:2015 is a prescriptive standard, unlike the other models, which does not award prizes but certifications to companies that comply with the standards set in the standard, and whose purpose is to certify the individual companies, Organizations to market goods and services around the world, ensuring a level of conformity and quality matched in all latitudes. It refers to a set of standards (ISO 9000 series) designed to promote international trade by creating an area where producers from all over the world compete on equal terms [94].

The Malcolm Baldrige model is one of the most complete, since it incorporates the criteria of the EFQM and Ibero-American models. However, the most specific is the EFQM model, which has thirty-two subcriteria.

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