

Quality Management System maintenance in Small and Medium-Sized Enterprises

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Resumo (Resumen):

São encontradas na literatura menções das dificuldades percebidas por algumas empresas, principalmente nas de menor porte, para adotar e manter um sistema de gestão de qualidade implantado. O objetivo deste artigo é entender as dificuldades que Pequenas e Médias Empresas possuem para manter em vigor um Sistema de Gestão da Qualidade baseado na ISO9001. Para tal, as dificuldades foram levantadas a partir da literatura em três importantes blocos: CMMI, ISO9004 e FCS. O método de pesquisa aplicado foi Survey, em escala Likert de 6 pontos, delimitando-se a aplicação dos questionário às empresas certificadas no Estado de São Paulo - Brasil. O resultado obtido foi a confirmação da baixa percepção das dificuldades mencionadas na literatura e presentes nas empresas objetos de estudo. Essas dificuldades foram agrupadas em 6 dimensões, com as seguintes abordagens: estratégia, avaliação e resolução de problemas, satisfação dos stakeholders, gestão do conhecimento, gestão de recursos e desenvolvimento organizacional.

Se encuentran en la literatura menciones de las dificultades percibidas por algunas empresas, principalmente en las de menor porte, para adoptar y mantener un sistema de gestión de la calidad implantado. El objetivo de este artículo es entender las dificultades que las Pequeñas y Medianas Empresas poseen para mantener en vigor un Sistema de Gestión de la Calidad basado en la ISO9001. Para esto, las dificultades se plantearon a partir de la literatura en tres importantes bloques: CMMI, ISO9004 y FCS. El método de investigación aplicado fue el Survey, en una escala Likert de 6 puntos, delimitando la aplicación de los cuestionarios a las empresas certificadas en el Estado de São Paulo - Brasil. El resultado obtenido fue la confirmación de la baja percepción de las dificultades mencionadas en la literatura y presentes en las empresas objetos de estudio. Estas dificultades se agruparon en 6 dimensiones, con los siguientes enfoques: estrategia, evaluación y resolución de problemas, satisfacción de los stakeholders, gestión del conocimiento, gestión de recursos y desarrollo organizacional.

Palabras clave: ISO9001, Mantenimiento del SGC, Percepción de las dificultades, PME.

Abstract:

Literature mentions that there are difficulties felt by some companies, especially the smaller ones, to adopt and maintain quality management system. This paper aims to understand the difficulties that Small and Medium Sized Companies have in order to maintain a Quality Management System based on ISO9001. The difficulties were raised from the literature in three important blocks: CMMI, ISO9004 and CSF. The survey methodology was applied added to a 6-point Likert Scale, delimiting the questionnaire application to certified companies in State of São Paulo, Brazil. The result obtained confirmed the low perception of the difficulties mentioned in the literature and existent in the companies studied. These difficulties were grouped into 6 dimensions, and summarized in the following approaches: strategy, problem evaluation and resolution, stakeholder satisfaction, knowledge management, resource management and organizational development.

Keywords: Difficulties Perception, ISO9001, Maintenance of the QMS, SME.

1. Introduction

Literature mentions there are difficulties felt by some companies, especially the smaller ones, to adopt and maintain quality management system. These companies are considered in developing countries the major contributors to the economies. Some authors study these challenges, aiming to create frameworks that enable barrier confrontation (BASIR; DAVES, 2016; MUSTAPHA; JUSOH; NOR, 2015; MAJUMDAR; MANOHAR, 2016).

This work is justified because SMEs are the major employer companies in Brazil, including State of São Paulo. It can be observed different difficulties encountered by many companies in maintaining a Quality Management System, which according to Moreira (2016) are due to a poor implementation.

Therefore, this paper aims to study existing difficulties for QMS's effective maintenance in SMEs in Brazilian São Paulo State, according to the references: the QMS Maturity Level (CARNEGIE MELLON UNIVERSITY, 2004), the Sustainable Success of an Organization (ABNT ISO 9004, 2010) and the Critical Success and Problem Factors (WAHID; CORNER, 2009).

The question presented is: what are the main difficulties for the quality management system maintenance in SMEs?

2. Theoretical Review

The first emerging quality-oriented standard was British Standards (BS) 9000 in the electronics industry, followed by BS5179, which came as a pilot to quality assurance and finally the BS5750 published in 1979 (PARIS, 2011).

Based on these standards came the ISO9000, which proposed that the company instead of requiring a certification for each customer, it would have only one auditing by qualified independent auditors. This certification was accepted in all countries of the European Economic Community (EEC) and was a requirement to access these markets (ISO, 2018).

Despite the whole ISO9000 approach for improvement, according to companies participating in a research conducted in Italy, ISO9001 certification does not bring any improvement in performance, such as cost reduction (CHIARINI, 2016).

It means that the implementation of ISO9001, cannot be considered the solution of organizational problems. In this way, it can be asserted that improvement is not a norm consequence, but it comes from all the culture that it proposes and must be daily followed.

Small and Medium Enterprises (SMEs) contribute significantly to Brazilian Gross Domestic Product (GDP), besides, they play a fundamental role in the job generation. They mean about 30% of the Brazilian GDP and employ approximately 15 million people in the country (PwC, 2013; SEBRAE, 2014).

However, SMEs investment in certifications is prioritized by the detriment of worker qualification, which does not promote the expected quality and productivity improvement at the organization, since has been ignored the ISO9004 proposed for a sustained success model: Management, Strategy and Policy, Resources, Processes, Monitoring and Measurement and, Improvement, Innovation and Learning (CORREA, 2005; ABNT, 2010).

Karadag (2015) reinforces that the reason for failures in SMEs are financial problems. He states SMEs face several challenges, in addition the problems arising from "poor financial management" are mainly reported as the causes failures in SMEs.

According to Olander, Hurmelinna-Laukkanen & Mähönen (2009) all the difficulties faced by these businesses exist due to limited resources, which trigger a series of difficulties and barriers, which are faced by SMEs daily. It distances them strongly from the competitive advantage, when compared with big companies from the same sector.

2.1. Management System Maturity

CMM (Capability Maturity Model) emerged in the 1980s as a model for risk assessment during software companies hiring by the United States Department of Defense (CMMI, 2010).

From CMM derives the Capability Maturity Model Integration (CMMI ®), a maturity model used to improve organization process, product and service, aiming to develop the latter, so that development and maintenance practices could be applied throughout the entire process: from design to customer delivery and maintenance (CMMI, 2006).

In general, CMMI ® has as audience all those who are interested in process improvement, which is part of a development and maintenance environment. This model is also recommended for organizations that want to know their maturity level, for those who know what they want to improve and for others who want to get an overview of CMMI ® (CMMI, 2006).

Although PME's have eventually economic problems, their organizations structures have some advantages compared to larger ones. They have reduced organizational policies, smaller work teams, and clearer central control. The reduced number of employees can help communication and coordination employed in a new process. In addition, in smaller companies the motivations of employees are generally more easily aligned with the organization goals, which would facilitate a process improvement software adoption and implementation (STAPLES; NIAZI, 2010).

2.2. ISO9004

ISO9004 is named "Management for the sustained success of an organization: a quality management approach", as well as it is part of ISO9000 standard family and it provides guidelines for organization sustained success management, through orientations that aim to support an organization that is embedded in a complex, demanding, and rotating environment to achieve success on a sustained mode, based on a QMS (ABNT, 2010).

However, ISO9004 is not a certification standard. It only provides support for the implementation and maintenance of other standards. In addition, the standard can be applied in any organization, regardless of size, type or activity (ABNT, 2010).

As a tool for sustained success, the standard also presents a maturity evaluation model, in order to measure the maturity level reached by a QMS. One self-evaluative model is found in the appendix of ISO9004:2010 and consists of five levels of maturity, considering the following topics: management of the sustained success of an organization; strategy and policy; resource

management; management processes; monitoring, measurement analysis and review; and innovation and learning improvement (ABNT, 2010).

2.3. Critical Success Factors

The Critical Success Factors (CSFs) concept emerged in the 1960s with D. Ronald Daniel (GIL; IBARRA, 2014) and has been addressed and discussed for several organizations and academics that believe organization priorities can be precisely met through a strategic perspective.

Gil and Ibarra (2014) corroborate CSFs like a limited number of areas with satisfactory results, which will ensure a competitive and successful position in the market. By this concept, it proposes to establish the CSFs from interviews with the largest executives in a market and extract from them the essential points to be successful in this market. In order to reach these points, objectives, performance evaluations and targets are established.

CSF is a set of key performance areas, which are considered essential to fulfill the organization mission (CARALLI, 2004). According to Business Dictionary (2018), CSF is a limited number of characteristics, conditions, or variables that have a direct and serious impact on the effectiveness, efficiency, and feasibility of an organizational activity, program, or project, and all related activities to FCSs, should be carried out with the utmost excellence in order to achieve the pre-established objectives.

Wahid e Corner (2009) identify critical success factors and problems in maintaining ISO9000 requirements during the post-certification period. They see that much of the scientific work associated with ISO9000 certification addresses issues to how obtain certification and the impact it has on the organizations implementing. The authors developed, based on the literature, a relationship between the CSFs and the problems found in maintaining certification.

3. Methods

3.1. Data Collect

This research has an exploratory objective since it addresses a bibliographical survey and a questionnaire creation to obtain quantitative data.

The content of this research data collection is based on 3 QMS maintenance themes, in accordance with ISO9001: CMMI, ISO9004 and CSF, presented in the literature review.

The questionnaire was used for addressed research, in order to corroborate the perception of these difficulties by SMEs. This questionnaire had profile questions (I1 to I11) and affirmations (P1 to P49). Table 1 presents the relationship of each question to the respective research blocks.

Table 1 – Question in blocks

Dimensions	Questions	Nomenclature
Research participant identification	1 to 11	I1 to I11
CMMI	12 to 18	P1 to P7
ISO9004	19 to 48	P8 to P37
CSFs	49 to 60	P38 to 49

The survey questionnaire presents a quantitative characteristic, besides being able to obtain direct knowledge of reality, quickly and economically (PRODANOV; DE FREITAS, 2013; GERHARDT; SILVEIRA, 2009).

The questionnaire is based on Likert Scale, which is used to measure people agreement to certain construct-related statements that are of some interest to the user and that will measure the agreement degree from the participants with points at the researcher criteria (SILVA JÚNIOR; COSTA, 2014).

In the research, the scale used has 6 points, since it is considered that results obtained in a median degree of an odd scale do not present concise conclusions. The questionnaire affirmations are positive for maintenance, thus, the smaller results (disagreement) represent the greater difficulty and the greater results (agreement) greater ease.

The inclusion criteria of the research participants are:

- a) Being classified as small and medium-sized enterprises, according to Table 2, from Brazilian Service of Support to Micro and Small Enterprises (SEBRAE, 2006), with the proviso that there are great similarities between micro and small companies, so the study kept the latter included in the consideration of SMEs (CEZARINO; CAMPOMAR, 2005);
- b) Being established in São Paulo State;
- c) Being registered as a valid certificate or certificate granted, which may be in active, canceled or suspended status, currently;
- d) Being registered in the "Accreditation Type Certification Body" as "Quality Management Systems";
- e) Being registered with the standard ABNT NBR ISO 9001 2008 or 2015;

f) Being updated contact emails and activated for access at their websites.

Table 2 – Enterprise size classification from SEBRAE

Classification	Number of Employees
Micro Enterprize	Until 19 employees
Small Enterprize	From 20 to 99 employees
Medium Enterprize	From 100 to 499 employees

Source: Adapted from SEBRAE (2006)

3.2. Data Analysis

The data analysis used SAS (Statistical Analysis System) software at the 9.3 version, licensed for the State University of Campinas (UNICAMP), due to the capacity to process a large number of data, besides the possibility of developing and applying statistical tools because of its versatile interface (UFJF, 2017).

The questionnaires answers data were analyzed using Boxplot in order to eliminate possible atypical observations and obtain greater reliability (BUSSAB; MORETTIN, 2013).

The diagram construction was made by three quartiles of the sample (Q1, Q2, Q3), determining the upper limit (UL) and lower limit (LL) according to the relations presented in Equations 2 and 3 (MONTGOMERY; RUNGER, 2012).

$$UL=Q3+1,5(Q3-Q1) \quad (1)$$

$$LL=Q1-1,5(Q3-Q1) \quad (2)$$

Cronbach's Alpha calculation was used as a way to assure the reliability and robustness of the sample. To use this tool, the measuring instrument must be a fixed items scale as the Likert Scale (TAVAKOL; DENNICK, 2011).

To estimate alpha index, we consider a matrix X, m x n, corresponding to the quantified answers, whose lines represent the research answers and the columns the questions elaborated by the researcher (LEONTITSIS; PAGGE, 2007). Equation 3 shows calculation (ALMEIDA et al. 2010).

$$\alpha = \frac{k}{k-1} \left[\frac{\sigma_m^2 - \sum_{n=1}^k \sigma_n^2}{\sigma_m^2} \right] \quad (3)$$

Must be considered σ_n^2 as sum variance from each respondent answer, σ_n^2 as variance from each question, and k as a correction factor. Furthermore, α varies from 0 to 1, where minimum value is 0,7 (ALMEIDA et al, 2010).

The descriptive statistics is performed as a way of describing the data through position and dispersion measurements, such as mean, median, fashion and standard deviation, which are fundamental for sample behavior analysis and for subsequent calculations (BUSSAB; MORETTIN, 2013).

Exploratory Factor Analysis (EFA) is used as a grouping of a original variables set through common factors. The EFA is a statistical instrument with the purpose of facilitating data interpretation by grouping original variables through common factors. These factors describe the variables used in the research in a more succinct and less redundant way (FÁVERO et al, 2009). Scree plot test was used to select the number of factors. This test is given by the construction and analysis of the graph of eigenvalues of the sample versus the number of existing factors (FAVERO et al., 2005). This graph has the objective of finding the curve "elbow" (breaking of the graph), at which point the eigenvalues begin to present a more linear trend (REISE ET AL, 2000).

Data analysis also used the Promax method, which provides an oblique rotation, which assumes that there is some dependence between the variables, grouping them and making easy the interpretation. For the effective calculation of an EFA, the sample size must be larger than the number of original variables, so that the correlation between the variables is calculated (HAIR et al., 2006; SASS; SCHMITT, 2010).

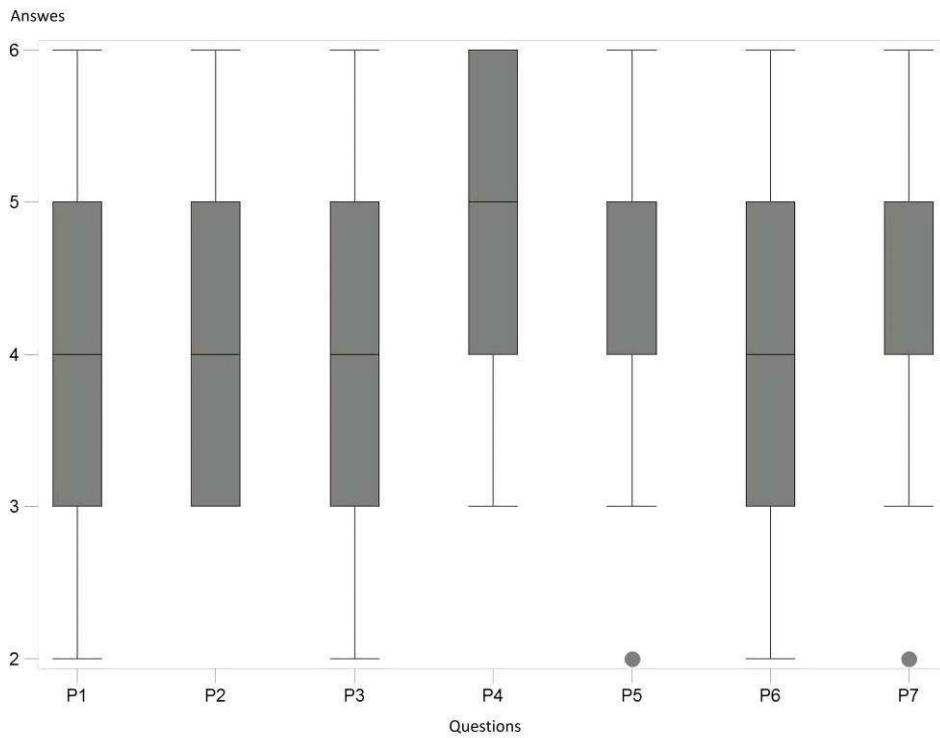
4. Result Analysis

4.1. Results

We analyzed responses from 23 questionnaires received, so that 69.6% were from the industrial sector and 30.4% from services. We also observed that 34.8% of the answers were from micro-enterprises, 39.1% from small and 26.1% from medium-sized organizations, which indicates a heterogeneous and little biased population.

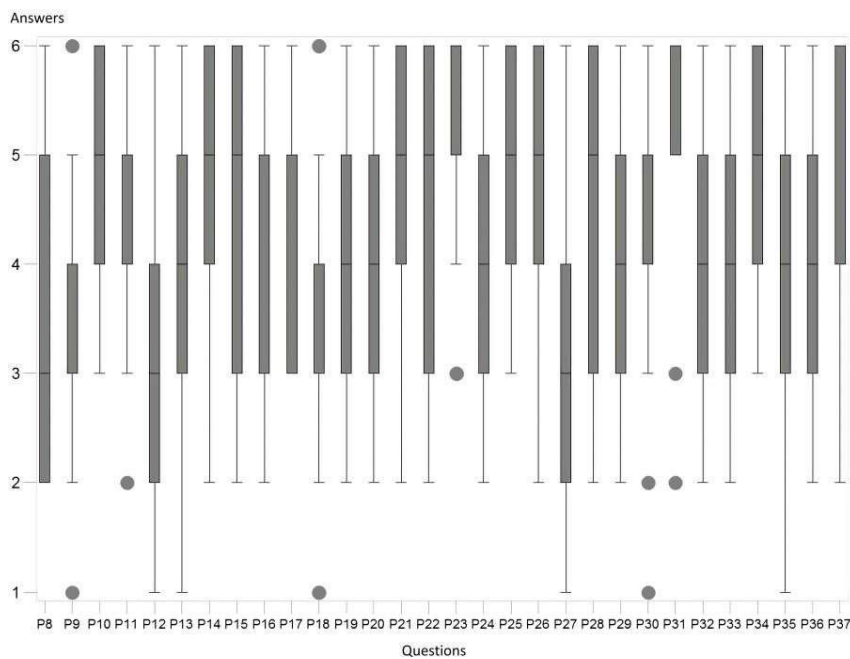
Figures 1, 2 and 3 present the outliers analysis of each block of questions. The outliers presented were removed from the database in order to give more robustness to sample. Thus, those answers that do not represent the sample were not taken into account for data analysis and, consequently, not used to inference the population behavior. Ending outlier's withdrawal resulted a sample of 13 respondents, for all 49 questions.

Figure 1 – CMMI Boxplot



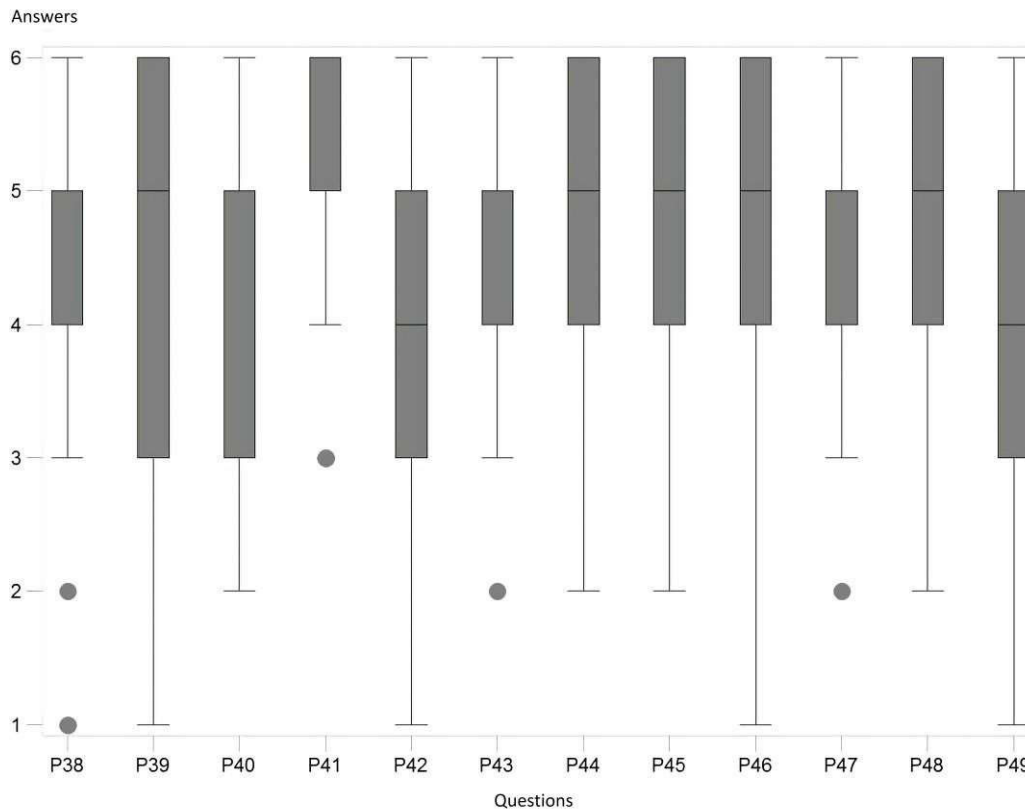
CMMI block presented two outliers (Figure 1). This shows consistency among the answers, since the disparity between them was small. Thus, the participating companies do not disagree on the level of difficulty or easiness in maintaining the QMS through attitudes that increase the degree of maturity.

Figure 2 – ISO9004 Boxplot



ISO 9004 block featured seven outliers (Figure 2). It demonstrates the inconsistency between some responses. The high disparity leads to affirm that the participating companies did not present an agreement level regarding the difficulty or easiness of maintaining the QMS through attitudes that lead to sustained success.

Figure 3 – CSF Boxplot



CSF block presented six outliers (Figure 3). This reveals a certain disparity and, consequently, some company's disagreement regarding the difficulty or easiness in maintaining the QMS by knowing and coping with the critical success factors. After segregating the outliers, the total sample changed to 13 respondents.

Cronbach's Alpha sample analyze for robustness and reliability presented values of 0.89 for the CMMI block, 0.95 for the block of ISO9004 and 0.91 for the block CSF.

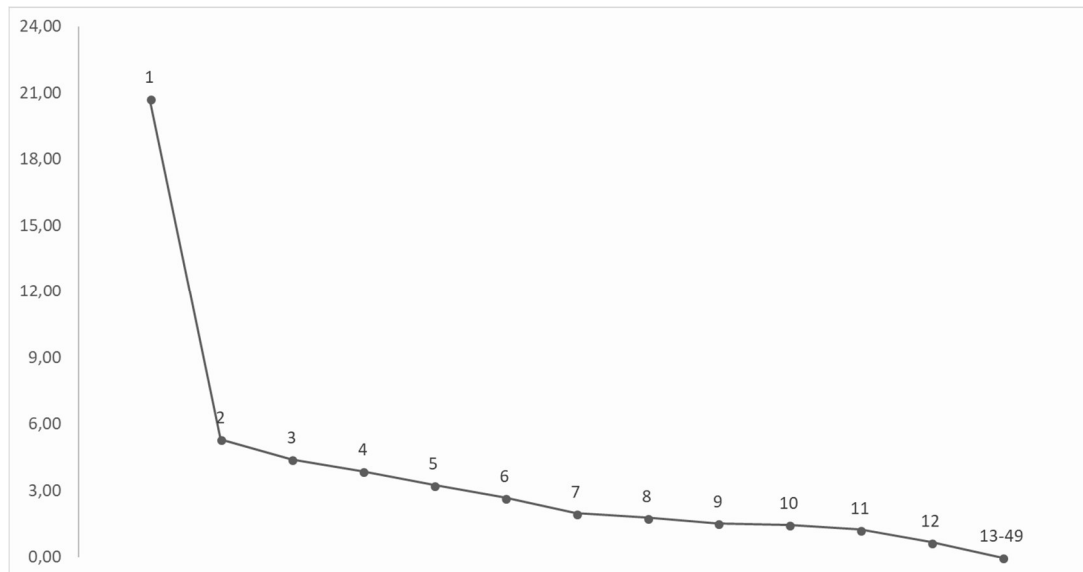
The descriptive statistics provided the arithmetic average, standard deviation, median and mode of each question. Table 3 presents all these values and highlights which block each question belongs to, also showing the quantity of valid samples in each one

Table 3 – Descriptive Statistics

	Questions	Average	Standard	Median	Mode		Questions	Average	Standard	Median	Mode
CMMI	P1	4.43	0.90	5.00	5.00	ISO9004	P26	4.94	1.14	5.00	5.00
	P2	4.43	1.00	5.00	5.00		P27	3.44	1.50	3.50	5.00
	P3	4.38	1.21	5.00	5.00		P28	4.69	1.31	5.00	6.00
	P4	4.86	0.94	5.00	5.00		P29	4.5	1.12	5.00	5.00
	P5	4.81	0.91	5.00	5.00		P30	4.94	0.83	5.00	5.00
	P6	4.24	1.06	5.00	5.00		P31	5.44	0.50	5.00	5.00
	P7	4.76	0.92	5.00	5.00		P32	4.25	1.35	4.50	3.00
ISO9004	P8	3.63	1.05	4.00	4.00	P33	4.56	1.12	5.00	5.00	
	P9	3.38	0.99	3.50	4.00	P34	4.94	0.90	5.00	5.00	
	P10	5.06	0.83	5.00	5.00	P35	4.13	1.05	4.00	4.00	
	P11	4.94	0.66	5.00	5.00	P36	4.75	0.97	5.00	5.00	
	P12	3.56	1.50	4.00	4.00	P37	5.38	0.99	6.00	6.00	
	P13	4.38	0.86	4.50	5.00	P38	5.06	0.64	5.00	5.00	
	P14	5.06	0.90	5.00	5.00	P39	5.35	0.84	6.00	6.00	
	P15	4.81	1.13	5.00	6.00	P40	4.76	1.11	5.00	5.00	
	P16	4.69	1.04	5.00	5.00	P41	5.29	0.57	5.00	5.00	
	P17	4.81	0.95	5.00	5.00	P42	4.53	1.24	5.00	6.00	
	P18	3.50	0.87	3.50	3.00	P43	4.88	0.76	5.00	5.00	
	P19	4.13	0.93	4.00	4.00	P44	5.24	0.73	5.00	5.00	
	P20	4.06	1.48	4.00	4.00	P45	5.29	0.75	5.00	6.00	
	P21	4.81	1.07	5.00	5.00	P46	5.12	0.76	5.00	5.00	
P22	4.69	1.10	5.00	6.00	P47	4.94	0.73	5.00	5.00		
P23	5.50	0.61	6.00	6.00	P48	5.35	0.90	6.00	6.00		
P24	4.44	0.93	4.50	5.00	P49	4.53	1.04	5.00	5.00		
P25	5.06	0.83	5.00	5.00							

Factorial analysis provides the relation and grouping of questions into 6 new factors groups.

These factors were chosen based on the eigenvalue scree plot, shown in Figure 4.

Figura 4 – Scree Plot

According to Graph 1, factor 7 as the second elbow and this point is chosen as the first exclusion. Thus, all 6 factors to the left of the elbow factor, form the set of factors that describe the research.

Table 4 presents the correlations (by Promax analysis) of each question with their respective factor (F1, F2, F3, F4, F5 and F6). The highlighted values are those that present the highest correlations with respect to the factors, considering only values greater than 0.60.

Table 4 – EFA

		F1	F2	F3	F4	F5	F6			F1	F2	F3	F4	F5	F6
CMMI	P 1	0.69	0.36	0.24	0.60	0.04	0.14	ISO9004	P 26	0.46	0.77	0.20	0.44	0.45	0.31
	P 2	0.32	0.53	0.24	0.73	0.22	-0.12		P 27	0.38	0.11	0.64	0.35	-0.13	-0.20
	P 3	0.54	0.68	0.57	0.40	0.16	0.43		P 28	0.52	0.33	0.64	0.38	0.04	0.38
	P 4	0.28	0.35	0.45	0.18	0.46	0.86		P 29	0.17	0.33	0.34	0.77	0.42	0.50
	P 5	0.73	0.36	0.56	0.11	0.25	0.63		P 30	0.23	0.81	0.38	0.32	0.23	0.66
	P 6	0.06	0.86	0.02	0.28	0.23	0.24		P 31	0.38	0.41	0.92	0.04	0.30	0.44
	P 7	-0.02	0.50	-0.41	0.25	-0.31	-0.05		P 32	0.30	0.46	0.59	0.35	0.78	0.52
ISO9004	P 8	0.76	0.23	0.47	-0.11	0.36	0.11	CSF	P 33	0.50	0.54	0.32	0.41	0.69	0.37
	P 9	0.80	0.32	0.64	-0.02	0.32	0.36		P 34	0.21	0.50	0.56	-0.27	0.69	0.58
	P 10	0.87	0.27	0.01	0.35	-0.16	0.32		P 35	-0.16	-0.03	0.07	0.19	0.77	0.18
	P 11	0.61	0.66	0.46	0.15	0.57	0.23		P 36	-0.09	0.33	0.24	0.80	0.40	0.21
	P 12	0.21	0.15	-0.16	0.25	0.65	0.02		P 37	0.15	0.80	0.45	0.49	0.41	0.24
	P 13	0.52	0.41	0.24	0.25	0.45	0.71		P 38	0.38	0.80	0.27	-0.03	0.55	0.50
	P 14	0.82	0.12	0.32	-0.07	0.38	0.53		P 39	0.23	0.84	0.29	0.23	0.02	0.15
	P 15	0.77	0.12	0.13	0.31	0.13	-0.07		P 40	0.36	0.58	0.02	0.71	0.14	0.21
	P 16	0.63	0.50	0.30	0.15	0.80	0.36		P 41	0.25	0.49	0.25	0.23	0.05	0.81
	P 17	0.48	0.36	0.23	0.23	0.57	0.84		P 42	0.47	0.77	0.47	-0.05	0.50	0.51
P 18	0.02	-0.08	0.49	0.36	0.48	0.57	P 43	0.59	0.57	0.53	0.36	0.51	0.52		
P 19	0.35	0.29	0.06	0.83	0.15	0.42	P 44	0.49	0.52	0.37	0.58	0.45	0.36		

P 2 0	0.84	0.57	0.41	0.00	0.31	0.29	P 4 5	0.46	0.85	0.52	0.35	0.41	0.38
P 2 1	0.57	0.55	-0.05	0.29	0.03	-0.08	P 4 6	0.13	0.60	0.84	0.19	0.28	0.46
P 2 2	0.76	0.13	0.03	0.04	0.13	0.59	P 4 7	0.37	-0.03	0.74	0.05	-0.06	0.10
P 2 3	0.76	0.38	0.35	0.23	0.28	0.43	P 4 8	0.18	0.70	0.60	0.55	0.36	0.11
P 2 4	0.61	0.30	0.09	0.26	0.58	0.45	P 4 9	0.35	0.47	0.62	-0.01	0.75	0.52
P 2 5	-0.14	0.23	0.77	-0.02	0.52	0.19							

CMMI block presents as factors most relevant to the questions grouping: factors 1 and 2, which means that this block can be summarized in two main difficulties, if considered individually. In addition, in this block the question P7 does not belong to any factor.

ISO 9004 block is the one that presents the largest number of statements. This is the block that consolidates the importance of summarizing the research in 6 main factors, because if

considered in isolation, it presents 6 relevant factors. In addition, in this block, questions P18 and P21 do not belong to any factor.

Finally, the CSF block presents a single main factor, being this the factor 2. Considering the factor two as a more relevant unusual factor of the 3 blocks, it is the one that best summarizes the difficulties of the group of research themes. In addition, in this block, questions P43 and P44 do not present any factor membership.

4.2. Discussion

Observing EFA results (Table 4) it is possible to state that there are six main subjects within which questions of the three blocks are related according to the answers of the research participants. Through the questions identification pertaining to each of the six subjects we could define six major themes that describe the difficulties cited in each question and related in each subject. It is interesting to note that the issues belonging to the theme group do not necessarily belong to the same block previously defined in the literary review.

In the first of the themes, 12 questions are related, and it is possible to identify that SMEs in the São Paulo State find difficulties in "Formulating effective strategy and planning through good relationships with stakeholders", even without the perception. From the 12 questions that participate from group 2 belong to the block of issues related to CMMI, 10 are part of the block that addresses the issues of ISO9004 and none represent the last block of questions. In this way the issues that relate to this subject are addressed:

- ↓ Developing (planning, execution and supervision) complex processes as well as dealing with them;
- ↓ Making identification of work products configuration;
- ↓ Developing long-term planning with well-established goals, deadlines and accountability;
- ↓ Making Identification of long-term risks and ownership of an ongoing strategy to mitigate them;
- ↓ Ensuring effective attendance to any and all legal and normative requirements to which the organization proposes;
- ↓ Establishing organization vision, mission and values as characteristics inherent in its activities and its political strategy;
- ↓ Maintaining good relationship with the organization's stakeholders, such as suppliers, employees, customers and partners;

- ↓ Ensuring provision of necessary resources to carry out the existing processes activities;
- ↓ Affording and possessing communication channel that is easily accessed by interested parties (suppliers, customers, employees and partners);
- ↓ Making easy and affordable process mapping for all your employees and partners;
- ↓ Developing and making available all documented work instructions processes to managers and agents;
- ↓ Engaging and motivating employees and partners through the sharing of values, strategy, knowledge, information, experience in the organization.

At the second theme were related 11 questions, identifying that there are difficulties in carrying out "Establishing effective activities evaluation and root problems resolution with the employees active participation ". Of these issues, 2 belong to the CMMI issues block, 3 are part of the block that addresses the issues of ISO9004 and 6 represent the block that refers to the FSC. The issues that relate to this second theme are:

- ↓ Ensuring organizational body's ability to deal with changes in a satisfactory way;
- ↓ Providing autonomy to its employees, in order to improve decision-making power;
- ↓ Maintaining employees life cycle, in order to stagnate their turnover;
- ↓ Keeping critical analysis of their processes performance;
- ↓ Ensuring ability of top management to provide financial resources and infrastructure to certification maintenance;
- ↓ Making identification of problem root cause and acts in a corrective and preventive way, in order to avoid its recurrence;
- ↓ Developing regular internal auditing program that takes into account the complexity and size of the organization, with seriousness and commitment;
- ↓ Establishing working groups, such as audit team, reviews management, etc.;
- ↓ Maintaining monitoring system of approved suppliers and partners of the organization;
- ↓ Maintaining efficient performance indicators;
- ↓ Ensuring ability to provide knowledge about the importance of Quality Management System (QMS) certification to employees.

The third theme received 5 questions, so that the existence of difficulty not perceived in the "Ensuring satisfaction of customers and employees" was identified. This questions group has the peculiarity of not having any question that belongs to the block of questions related to

CMMI, only 4, which are part of Block 2 and 1 that represents Block 3. Related to this theme are the questions concerning:

- ↓ Ensuring work environment with adequate infrastructure, including cleaning, organization, identification, ventilation, lighting, hygiene, equipment and systems of protection and safety, among other aspects necessary for carrying out the activities;
- ↓ Keeping measurement of reward and employees support, such as cash promotions, investments in training, among others;
- ↓ Ensuring customer satisfaction level evaluation, as well as the resources for loyalty actions and customer recovery promotion;
- ↓ Controlling quality products assured assertively;
- ↓ Ensuring ability of employees to follow new or revised procedures and instructions.

The fourth theme related 5 questions, identifying the existence of difficulty not perceived in the "Providing simple offering and knowledge management, with stakeholders' participation for continuous improvement". This topic brings together 1 issue of the CMMI block of issues, 3 of the ISO9004 block and 1 of the FCS. The six issues are related to:

- ↓ Developing internal teams ready to face challenges;
- ↓ Ensuring management and control of tacit and explicit organization knowledge;
- ↓ Establishing and maintaining innovation processes and continuous improvement, as well as the promotion of stakeholders' participation;
- ↓ Motivating promotion of good practices during the productive processes by employees;
- ↓ Proving amount of training that ensures the organization people development.

The issue number five brought together 7 questions, identifying a theme that corroborates the difficulty in conducting "Keeping Internal satisfaction surveys and delivering constant feedbacks, in addition to effectively managing objectives, goals, resources, and waste". This topic also does not present any question belonging to the first group of questions, but it groups 6 questions from the second block and 1 from the last one. The questions are:

- ↓ Monitoring and analyzing the organizational environment, such as internal climate research and internal satisfaction survey;
- ↓ Establishing deadlines, responsibilities and authorities so that their strategic objectives can be achieved;

- ↓ Ensuring costs reduction through a resource management policy, such as water, energy, financial and material resources;
- ↓ Ensure reduction of failures and wasting time and money through process optimization;
- ↓ Maintaining a policy that is responsible for monitoring all its productive stages, ensuring the product management;
- ↓ Maintaining a policy that provide resources to partners, such as shared information, processes, technology and training;
- ↓ Promoting constant feedback to people about process performance.

The last issue relates to 4 grouped questions, so that the difficulty in "Valuing stakeholder and organizational development through sharing and managing knowledge and information" was identified. Related to this topic are 1 question that participates in the Block related to CMMI, 2 issues from the block related to ISO9004 and 1 question related to the CSF. The questions are:

- ↓ Establishing alternative analysis and evaluation during a decision-making process;
- ↓ Ensuring engagement and promotion of information to organization stakeholders, such as suppliers, employees, customers and partners;
- ↓ Ensuring ability to acquire and share skills, knowledge and techniques;
- ↓ Keeping management of documents and records.

There were questions that are not framed in any group, because they have correlation values lower than 0.60 for all six factors. These issues can be classified as weaknesses in maintaining a QMS, since they are not related to each other or with other maintenance difficulties, demonstrating the inconsistency of the companies' responses. Therefore, these questions justify and corroborate the difficulties lack of perception by the companies, which exist and are mentioned in the literature.

The questions that do not belong to any group are 5, being 1 of the block of CMMI, 2 of block of ISO9004 and 2 of block of FCS. The approaches are as follows:

- ↓ Ensuring ability to senior management accept employee opinions about the process and product in question;
- ↓ Encouraging employees to draw a career plan;
- ↓ Establishing designation of an authority for each organization process;
- ↓ Ensuring ability to modify, simplify and improve the production process;
- ↓ Ensuring ability to modify, simplify and improve documents, records and work instructions.

5. Final Remarks

We diagnosed that these companies perceive little or no difficulty in maintaining the QMS, once the answers presented were very positive in relation of maintenance easiness, however, some issues were, not compatible with the literature that points critical factors to organizations success,

We performed an EFA that allowed the identification of six new themes, within which each question is related. These themes represent the main difficulties encountered by SMEs in São Paulo to maintain a QMS, such as ISO9001. Six themes found are:

- ↓ Formulating effective strategy and planning through good relationships with stakeholders;
- ↓ Establishing effective activities evaluation and root problems resolution with employees active participation;
- ↓ Ensuring satisfaction of customers and employees;
- ↓ Providing simple offering and knowledge management, with stakeholders' participation for continuous improvement;
- ↓ Keeping Internal satisfaction surveys and delivering constant feedbacks, in addition to effectively managing objectives, goals, resources, and waste;
- ↓ Valuing stakeholder and organizational development through sharing and managing knowledge and information.

Finally, we identified weaknesses contributing to the affirmation of the difficulties existence and non-perception of them.

We think that this research contributes to define the focal attention points during QMS maintenance. These points should be considered as factors that need continuous improvement and constant action on the SMEs part, because if ignored they can lead to the system maintenance failure and, consequently, to certification loss.

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