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Outcomes from an exploratory study of quality improvement approaches utilisation in Brazilian companies

Abstract: Markets are becoming more fierce and globalised, increasing the continue search for competitive advantage among organisations. As an attempt to respond to this global competition, companies are deploying innovative methods and tools, which in many cases tend to emphasise quality and customer orientation. This paper investigates the degree of adoption of quality improvement approaches in Brazil. In order to do this, the research was based on an exploratory survey validated and distributed among a number of Brazilian organisations operating in a wide range of industries. In general terms, the study shows that many Brazilian companies are now adopting quality improvement approaches as a strategy to be globally competitive, with ISO standards being their first choice. The study also presents evidence of which quality improvement methods have been more widely implemented by Brazilian companies, the importance of these methods and results obtained, the barriers faced during their implementation and, in case of not using them, the main reasons for this. Based on the research findings, the paper also identifies some key factors to successfully deploy quality improvement approaches in Brazil.

Keywords: Brazil, Brazilian companies, quality improvement approaches, ISO standards, TQM, Six Sigma, SPC, BEMs.

Reference:

Biographical notes:

1. Introduction

Global competition is challenging organisations from different parts of the world and from all sectors (Ovanessoff and Purdy, 2011). **Similarly, customers are rapidly changing their needs, challenging manufactures to develop new business strategies (Mishra et al., 2012).** As an attempt to respond to the pressure created by these challenges, companies are adopting innovative competitive methods and tools, which in most cases tend to emphasise quality and customer orientation (Yasin et al., 2011). In this scenario, the utilisation of quality improvement approaches is increasing. Besides their focus on quality, most of these approaches also focus on satisfying customers. Methods such as Statistical Process Control (SPC), ISO standards, Total Quality Management (TQM), Six Sigma and Business Excellence Models (BEMs) have been widely used by organisations, in different countries and industrial sectors, to improve the quality of their products, services and processes (Resende and Fonseca, 2002; Oliveira et al., 2011; FNQ 2008; **Salah et al.,2010; Singh and Ahuja, 2012).**

Currently Brazil is one of the countries that have been affected by global competition. **The shifting of growth zones to developing countries, like Brazil, challenged those countries to manage new global chain operations (Breja et al., 2010; Golffnett et al., 2011).** **Despite this situation,** Brazil today occupies the sixth place on the ranking of the world's biggest economies (World Bank, 2012), being a large producer and exporter of several kinds of products, mainly mineral commodities, agricultural and manufactured products (Desidério, 2012). However, the concept of quality improvement and use of quality approaches and tools in Brazil is relatively new. **Portioli-Staudacher and Tantardini (2012) suggested that this is mostly present in the manufacturing sector and large organisations, such as those found in the automotive industry, and as evidenced by Desidério (2012), in Brazil is not different.** As an example, Brazil today has around 6 million companies (IBGE, 2010), of which less than thirty-four thousand have been ISO certified (ABNT, 2011).

'Quality' has been considered an important subject for researchers and academics in Brazil. For example, Resende and Fonseca (2002) carried out a study that aimed at helping Brazilian organisations to identify and select the most appropriate quality approaches or tools based on their specific market needs and internal

capabilities. On the other hand, Oliveira et al. (2011) investigated the implementation status of ISO 9000 within companies in São Paulo, whereas the project led by Falcão (2011) focused on the application of quality control tools in the construction of residential buildings. Similarly, a study performed by Andrietta and Miguel (2007) investigated the implementation of Six Sigma in the 1000 largest companies of Brazil, and identified the critical factors needed for its effective deployment. Based on their study, Andrietta and Miguel (2007) provided suggestions and guidelines to effectively implement Six Sigma in Brazil. Similarly, Boarin Pinto et al. (2008) investigated the main characteristics of quality programmes in large size Brazilian companies. However, although these studies were conducted to investigate different aspects of the implementation and use of quality improvement approaches in Brazil, they were either restricted to large organisations or some specific approaches. Thus, the study presented in this paper also considered small and medium size enterprises (SMEs), as they represent more than 86 percent of the total number of companies in Brazil and these are those with the fastest growing rate in this country (SEBRAE, 2010). In addition, this study was not restricted to investigate a specific quality improvement approach but considered all the most widely known and popular methods (i.e. SPC, ISO standards, TQM, Six Sigma and BEMs).

Considering the positive results that approaches such as SPC, ISO standards, TQM, Six Sigma and BEMs have provided to organisations in other countries, there is no reason for not adopting those in Brazil to support its organisations' competitiveness and thus its economic development. Therefore, the objective of this research was to investigate whether Brazilian organisations are using quality improvement approaches and what types of tools they are using. As well as verifying whether they are satisfied with the results obtained. In addition, the study also aimed at analysing the data obtained in order to identify some key implementation factors to successfully deploy quality improvement methods in this country. In light of these goals, the working methodology of this project was based on an empirical investigation that used a survey questionnaire as its data collection method and descriptive statistics for the analysis of such data.

2. A brief review of Brazil's economic development and quality maturity

The concept of open market in Brazilian companies is relatively new. Until the 1990s all the exports were controlled by the government, causing a lack of competition for Brazilian companies. For this reason, quality became a main priority just after the opening of the Brazilian market, which is when Brazilian companies started to face real international competition. At that time, private organisations in Brazil had to search for effective strategies to be in good condition to compete in this new global market. Thus, a lot of concepts regarding Quality Control (QC) and TQM were introduced and adopted by Brazilian organisations. It was during this period that the Brazilian government started a new initiative, called Brazilian Programme of Quality and Productivity (i.e. PBQP – Programa Brasileiro de Qualidade e Produtividade), to support the modernisation of its industries and individual organisations. This programme spread the concept of quality and ISO standards. Later, Brazilian organisations voluntarily created the National Foundation of Quality (i.e. FNQ – Fundação Nacional da Qualidade), which regulates the National Quality Prize (i.e. PNQ – Prêmio Nacional da Qualidade) and aims to encourage and recognise the best quality management models (Fernandes, 2011). Nowadays, PNQ still exists and is stronger than ever.

In the past few years, innovative social policies and economic stability have led Brazil to become one of the major economies on the planet in the 21st century (BRASIL, 2012). In 2011, Brazil was the sixth largest economy in the planet, losing this position to the United Kingdom in 2012, due to the European crisis and deceleration of Chinese economy. Despite this, in the same year the Brazilian Gross National Product (GNP) totalled 4.4 trillion dollars (IBGE, 2013). Brazil is a developing country that in the past few years has experienced a combination of economic advancement and social progress. Also, since 2008 it has the grade of 'safe investment' (BNDS, 2008) and in 2009 it became part of the creditor group of the International Monetary Fund (IMF) (IMF, 2010). In addition, Brazil, together with Russia, India, China and South Africa, is part of a group called BRICS. These countries together represent 25 percent of the IMF due to their fast economic development and large populations (Itamaraty, 2012). However, despite the positive economic growth, in the last few years the Brazilian industry has been affected by the world's economic crisis, mainly because the industry of this country is still in development (DIEESE, 2011). To help Brazilian organisations face this situation and provide them with the ability to compete in the global market, quality improvement approaches may be one of the solutions and strategies to achieve this aim.

3. Principles of quality improvement approaches

Quality basically means fit for purpose; it is complying with the wishes and aspirations of customers, including economic, security and performance aspects. The term refers to the most appropriate, not the best or the most expensive (Fernandes, 2011). In this context, quality improvement approaches are methods, techniques and tools that support organisations to achieve customer satisfaction. **These methods, techniques and tools were initially applied in the manufacturing sector. However, in the last years they have also been well recognised by**

companies from other sectors around the world as evidence suggests that if effectively implemented, managed and sustained, they can contribute to the increase in revenues and market share of companies (Lee et al., 2001; Adam Jr. et al., 1994; Vouzas, 2009; Rajamanoharan et al., 2011). For instance, China and India, two of the BRICS countries that present a similar economic situation to Brazil, experienced a rapid economic growth between 2000 and 2010, despite having a developing industry (Babones, 2012). In China the concern for quality has been increasing and helping to improve the profit of Chinese organisations (Lee et al., 2011). Not different, Indian companies have obtained global recognition through the implementation of innovative business practice and quality improvement approaches (Burli et al., 2012; Prabhushankar, 2009). On the other hand, Adam Jr. et al. (1994) discuss how not only developing but also developed nations such as South Korea, New Zealand and USA have successfully implemented and used quality improvement approaches, and commented the positive results they have obtained from such implementation and use. These studies generally agree that high quality products and services are the essence to a company's survival in highly competitive international markets.

Due to this situation, there are some specific quality improvement approaches that can help Brazilian companies to grow in a competitive market and global arena. This research is focused on these methods. The first is Total Quality Management (TQM). TQM is a set of guiding principles for managing an organisation. For example, Garza-Reyes et al. (2012) comment that some authors and practitioners consider TQM as a method for organising, planning and understanding different activities. Singh and Ahuja (2012), also observe that TQM is a quality-oriented approach to improve overall effectiveness and performance. TQM is based on the cooperation of everyone and everything in an organisation to produce value-for-money products and services through the attention and satisfaction of costumers' expectations. TQM involves all processes of the organisation and is characterised by the continuous search of improvement in the processes and procedures of a company (Dale et al., 2007). Another widely used approach by organisations which intends to control the process using statistical methods is Statistical Process Control (SPC). Differently to TQM, SPC is a method for monitoring processes and not principles for managing organisational activities. SPC defines the limits of variability of a product and/or process, which helps to identify problems in the process by differentiating assignable causes of variation from those inherent fluctuations that naturally exist in the process. In this way, SPC has helped companies to improve quality and process productivity (Fox, 1995; Akram et al., 2012). Another popular quality improvement approach is the ISO (International Organisation of Standardisation) certification. ISO is a family of norms with several standards and aspects of quality management. It is used by companies to provide standards and tools which have the aim of ensuring that their products and services consistently meet their customers' requirements and that quality is constantly improved (ISO, 2012). According to Jabnoun (2002) and Mady (2011), the ISO 9000 series is the most popular set of standards for quality assurance. On the other hand, Six Sigma is also an important approach and similarly as TQM and SPC, it aims at improving performance, increasing productivity and quality by focusing on the process performance aspects that in the customers' view are critical (Dale et al., 2007; Shanmugaraja et al., 2012). Sigma is based on quality engineering methods that define a problem-solving structure to identify and eliminate problems and improve yield (Dale et al., 2007). This methodology has been described as a process improvement tool responsible for billions of dollars in business improvements (Formby and Dave, 2013). Some of the objectives of Six Sigma are similar to those of TQM; however Six Sigma brings engineering and statistics analysis back into quality, as SPC does. Finally, MEGs (Modelos de Excelência em Gestão), as known in Brazil, or BEMs (Business Excellence Models) is another quality improvement approach, and one of the most modern business concepts, nowadays widely used by organisations not only in Brazil but also in many other countries around the world. BEMs are quality management frameworks based on organisational performance criteria that originated as a result of the evolution of TQM principles. BEMs consist of several fundamentals that provide a criterion for excellence which is recognised worldwide (FNQ, 2008; Zilic, 2013). Rocha-Lona et al. (2009) comment that BEMs have played a significant role in the attempt to improve business among organisations, and that these efforts are well documented by the Quality Foundations that administer BEMs across regions and countries. Some of the most popular BEMs are the Deming Prize (Japan), Malcolm Baldrige (USA), and EFQM (Europe).

In summary, Brazil is a developing country with a large number of developing companies. The quality improvement approaches briefly reviewed in this section can aid in the achievement of such development. However, no study has investigated the adoption of these tools in all sizes and types of Brazilian companies. This was the main motivational driver to undertake this research.

4. Research methodology

When starting a research project two factors must be considered, the goals that it intends to achieve and how the research will be conducted in order to achieve these goals (Saunders et al., 2007). In general, this research aimed at exploring the adoption of quality improvement approaches in Brazilian companies. In order to achieve this, the research method followed in this investigation was that of a questionnaire survey. According to Saunders et al. (2007), in descriptive research questionnaires are normally used and recommended to obtain the data. A

questionnaire survey is a highly structured research method for data collection comprising of a list of questions to obtain people's perceptions, beliefs, motivations, anticipations, feelings and future thoughts; in this case, specifically regarding the implementation and use of quality improvement approaches (Oppenheim, 1992; Fowler, 2002; Sarantakos, 1998). Cooper and Schindler (2008) suggest that online questionnaires give a short turnaround of results and increase the number of participants. Thus, an online questionnaire was defined as the most appropriate format for the purpose of this study. In addition, due to the data collection was conducted in Brazilian companies by the first author of this paper while living in the UK **and the geographically dispersed location in Brazil of the investigated organisations**, this type of survey was easier to conduct to attract participants who would have otherwise been not able to participate using a different format. **Furthermore with an online survey large quantities of questionnaires can be distributed at the same time and the research can quickly quantify the obtained results (Peterson, 2000)**. The questionnaire was adapted from data collection instruments used by Antony and Desai (2009) and Garza-Reyes et al. (2012) in similar studies, and constructed using close questions to facilitate the responses and their tabulation. In terms of the questionnaire's structure and content, it was divided into three main sections. Section one explored general aspects regarding the companies surveyed; including the company's main business, age, and number of employees. On the other hand, section two focused on employees' profile, which included their current job role and length of service in that position. Finally, section three investigated the adoption of quality improvement approaches in the surveyed organisations. This part was divided into two sub-sections, namely: companies that were using quality improvement approaches and companies that were not. If the company was using them, the questionnaire focused on what type of approach or tool and the results they had obtained from them. In case they were not, attention was paid to investigate the reasons for not using them.

According to Robson (1994) and Saunders et al. (2007), a questionnaire must be validated after its construction. A valid questionnaire enables an accurate and reliable data collection and ensures that it measures what it is intended to be measured. Robson (1994) and Saunders et al. (2007) also comment that validation can be achieved by conducting a pilot study. In the case of this study and based on these authors' suggestion, the questionnaire was sent to five different validation sources. One source was a person with expert knowledge on the subject of this research. This person focused on evaluating the questionnaire's content. Furthermore, another person with a degree in Portuguese was asked to identify possible grammar mistakes as the questionnaire was written in this language. Writing the questionnaire in Portuguese was a strategy followed to increase the response rate. Finally, the questionnaire was sent to three companies to validate its general understanding. The specific objectives of carrying out the pilot study were:

1. Evaluate the questionnaire and individual questions in terms of its structure and language
2. Evaluate the questionnaire regarding its logic (i.e. logical sequence and development of questions)
3. Verify if the questions were easily understandable
4. Eliminate any irrelevant question
5. Evaluate if all the links of the electronic questionnaire were working

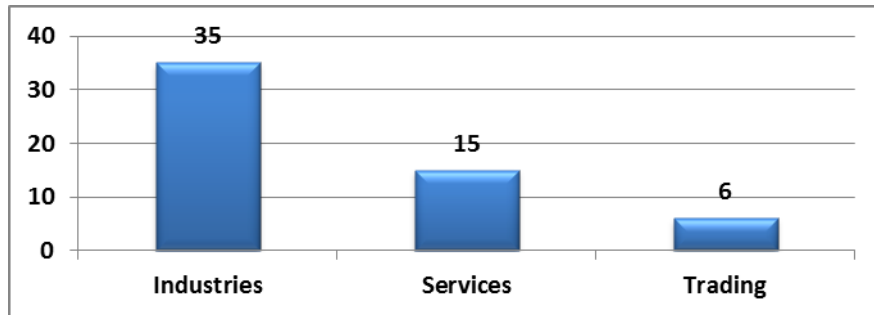
After validated, the method chosen to distribute the questionnaire to the companies was by email. The questionnaire was developed in the online app 'Google Drive', creating a link to access it. Then, an email containing a link to the questionnaire and a cover letter, explaining the aim and objectives of the research, was sent to 100 Brazilian companies. The questionnaire was sent to all kind of private organisations in Brazil, from manufacturing to service companies. Whenever possible, the questionnaire was tried to be addressed to the Quality Manager, a Quality Engineer, or any other senior staff member involved in the day-to-day operation of the company surveyed. Out of the 100 questionnaires that were distributed, a total of 56 responses were received. All of the responses were complete and thus could be used in the analyses. According to Vazzana and Bachmann (2000), a varying responses rate from 27 to 56 percent can be considered acceptable, so the rate of 56 percent obtained for this research can be considered acceptable to analyse the utilisation of quality improvement approaches in Brazil and draw some general conclusions. Similarly, Cohen *et al.* (2007) suggest that a response rate of about 30-35 percent is statistically significant and a representative sample to obtain reliable conclusions after the analysis of the data collected. Although the size of the population surveyed is by no means representative of all Brazilian organisations, the responses provided sufficient data for an initial and general exploratory investigation to understand various aspects and the importance of quality improvement approaches by Brazilian companies.

5. Survey Results, Analyses and Discussion

5.1 Organisations and Respondents Profile

The first part of the questionnaire focused in establishing the profile of the companies that were surveyed. The companies were classified based on their economic activity, from the 56 responses, 63 percent were industries (i.e. manufacturers), 27 percent were service companies and 11 percent were from the trading sector, as shown in the Figure 1.

Fig. 1. Economic activity of companies surveyed



From the 56 companies that answered the questionnaire, 57 percent had more than 20 years of activity and just 11 percent less than 5 years, the rest of the organisations fell within these years of service. Also, 57 percent of the companies had more than 500 employees. Thus, most of the companies that answered the questionnaire had been in the market for a long time and can be considered large organisations. These are ‘traditional’ characteristics of organisations that usually apply quality improvement approaches.

The second section of the questionnaire focused on the respondents. In this case, 11 percent of the responses were provided by the company’s owner. The rest were responded by personnel from different hierarchical levels, especially middle level managers. In regards to the years of experience, 11 percent had more than 7 years, while 55 percent had less than 2 years. Considering that the questionnaire asked about the years of experience in the current position and the respondents answered all the questions, the authors consider that this few years of experience, of some respondents, do not depreciate the quality of the responses.

5.2 Utilisation of Quality Improvement Approaches

The third section of the questionnaire explored the utilisation of quality improvement approaches. When asked to the companies about the utilisation of them, 89.3 percent (i.e. 50 companies) answered that they were currently using one or more quality improvement methods. This indicates that the majority of the Brazilian companies surveyed are employing quality improvement approaches in order to respond to a global trend of awareness regarding quality, as identify by DeFeo and Janssen (2001). Analysing the results, 62 percent (i.e. 31 companies) of the organisations that are using the approaches have more than 20 years of activity and exactly the same number of companies, 31, have more than 500 employees. This corroborates what Andrietta and Miguel (2007) suggest regarding the fact that quality improvement approaches are usually deployed by large companies, with a certain time of experience. In addition, when comparing this information with other countries having a similar economic situation, the same trend is noticed in China, where quality improvement approaches have been largely used, but mostly applied by multinational companies (Li et al., 2003; Chyi Lee et al., 2001).

The next step was to investigate what specific approaches the Brazilian organisations surveyed had deployed as part of their operations. Figure 2 shows the approaches employed by the organisations surveyed. In this case, ‘yes’ indicates that the company was using the specific quality improvement approach shown in the figure while ‘no’ indicates the opposite.

Fig. 2. Quality improvement approaches utilisation

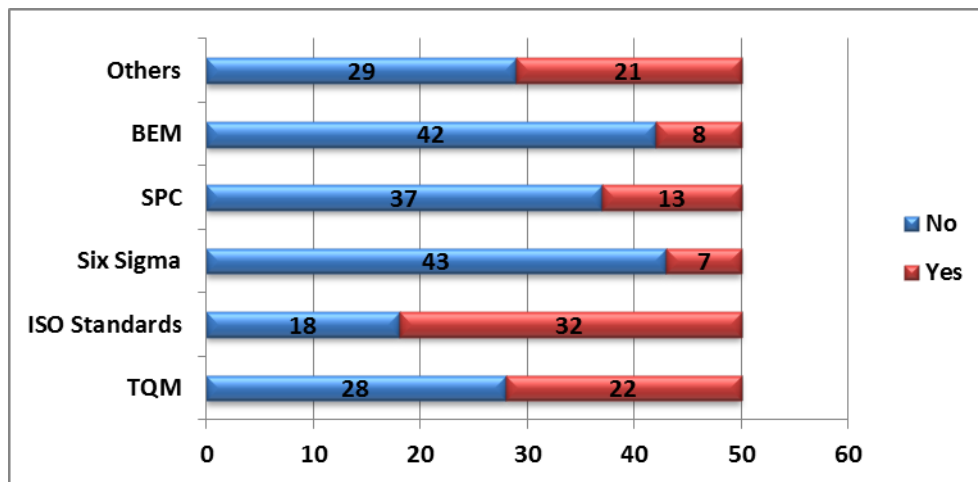


Figure 2 shows that ISO standards is the most utilised quality improvement approach in Brazil. This is probably because ISO standards are recognised worldwide and give formal evidence of the capability of an organisation to attend customer requirements (Franceschini et al., 2006). This may be a desired qualification for Brazilian companies who wish to export to industrialised countries. Also, in view of this and according to the authors' experience, many countries and companies require their suppliers to be ISO certified in order to accept and buy their product. The same situation is described by Chyi Lee et al. (2001) in China, where the ISO standards is the most deployed approach. Seeing the growing exportation level of Brazil and China, the above may justify the high level of adoption of ISO standards in both countries. From the ISO family, Boarin Pinto et al. (2008) comment that ISO 9001:2008 is the most utilised approach by large companies in Brazil. This was corroborated by this study as the respondents identified ISO 9001:2008 as the most highly used ISO standard within the organisations surveyed, with 78 percent. This also confirms the trend described before, seeing that ISO 9001 specifies the criteria for a quality management system (ISO, 2012). Analysing the responses, 78 percent of the companies answered that they had adopted ISO for more than four years, from which 28 percent of them commented that they had used it for more than 7 years. Besides ISO standards being the most utilised approach, it has also been used for longer than any other quality improvement approaches, as it will be discussed later.

After ISO, TQM is the second most utilised approach, applied by more than 39 percent of the companies surveyed. This contradicts the results of a study conducted by Boarin Pinto et al. (2008), which showed that TQM is not widely used in Brazil anymore due to it has been replaced by other approaches like Six Sigma. From the many tools used within TQM, Ishikawa Diagram stands out as one of the most commonly used, with 71 percent of the companies employing it, followed by Benchmarking and Control Charts with 45 and 41 percent respectively. Despite TQM not been as popular as ISO, 29 percent of the companies that applied TQM have used it for more than 7 years, so it is not a new concept in Brazil. The objective of ISO standards and TQM are quite similar, however, the authors consider that ISO is the most popular among the Brazilian companies surveyed because is the only one that provides a formal certificate that is recognised worldwide. Furthermore, despite of being the second most popular method in Brazil according this study, there is not much research and evidence of the application of TQM in Brazilian companies, which may indicate that Brazilian organisations still have a lot to develop in terms of quality.

When questioned about Statistical Process Control (SPC), a technique that has been used in Brazil since the early 1990s (ASQ, 2012), 23 percent of the companies answered that they are currently using it and 30 percent of the companies that are employing SPC have used it for more than 7 years. Evidence suggests that SPC is most commonly employed in the manufacturing industry, fact that was corroborated in this study with 85 percent of the companies currently using it being manufacturers. Thus, the results of this study reinforce the arguments of Lima et al. (2006) and Alvarenga et al. (2012), which indicate that in Brazil, SPC is mainly used within the manufacturing sector. Considering only manufacturers, the number of organisations utilising SPC increases to 33 percent.

Business Excellence Models (BEMs) and Six Sigma are the approaches with the lowest number of adherents; one with 14 percent and the other with 13 percent of companies respectively using them. Relative to BEMs, 50 percent of the Brazilian companies that mentioned that they employ a BEM utilise the Brazilian version (i.e.

MEG - Modelo de Excelência em Gestão), while 50 percent follow a model developed by their own company. All of the respondents commented that they had used the BEM for more than 2 years, from which 29 percent had utilised it for more than 7 years. This indicates that BEMs are not very popular and that they are a relatively new method in Brazil. When analysing what type of companies are deploying BEMs, it is not possible, with the data obtained from this study, to identify a tendency. For example, various organisations from several branches of businesses and with different years of experience have been utilising them. Therefore, from all the approaches considered in this survey, BEMs are the one with the higher diversified application, which is also confirmed by Armitage (2002). In the case of Six Sigma, the study results' contradict those exposed by Boarin Pinto et al. (2008), which indicate that Six Sigma is one of the most utilised approaches in Brazil. All the respondents that utilise Six Sigma said that the company uses Ishikawa Diagram and Pareto analysis. Also, 43 percent said that they have used this approach for more than 7 years. The authors consider that Six Sigma requires a higher level of commitment and organisational maturity in the aspect of quality, as well as technical/statistical knowledge, which is usually found in larger organisations. Thus, it may be argued that due to its own nature, Six Sigma seems to be a more suitable approach for large Brazilian organisations while it may find a more restrictive application within SMEs. The survey's results also corroborated this as all the companies that are using Six Sigma have more than 20 years of activity and more than 200 employees, so they are large organisations with vast experience in their field.

When asked about others approaches that companies may have implemented, 42 percent of the respondents said that they are using other tools, from which 61 percent said they use 5S. Thus, in total 26 percent of the Brazilian companies surveyed that are using some kind of quality improvement approach, are also applying 5S. Also known as 'housekeeping', 5S is a lean manufacturing tool that focuses on organisation, cleaning, standardisation and discipline in the workplace. 5S is one of the pillars of lean manufacturing, and is critical for the successful implementation of any lean manufacturing initiative (Gapp et al., 2008). This may be one of the factors for the high adoption of 5S in Brazil; the companies are engaged with lean manufacturing and thus have implemented 5S to support their lean initiatives.

A global scale market that is nowadays increasing competition is a relatively new scenario to Brazilian companies when compared to industrialised countries. This may justify the ISO standards as the most utilised quality improvement approach, because these standards are applied by organisations all around the world and, to compete with them, Brazilian organisations must prove that they provide the same level of quality, so an ISO certification can be the starting point. On the other hand, new concepts in Brazil, like Six Sigma and BEMs, are not so widespread, and according to the authors' experience, used mostly by multinational companies based in Brazil, rather than by Brazilian organisations. This may explain the fact that only large and experienced organisations are using them.

Despite the relatively increasing adoption of quality improvement approaches by Brazilian companies operating in the manufacturing sector, in the last year the contribution of this sector to the GDP of the country decreased (Ministério do Planejamento, 2013). However, the service and trade sectors have now started to represent 70 percent of the GDP. Analysing the results of the survey, 50 percent of the companies from the trade and service sectors, which answered the questionnaire, said that they are currently using quality improvement approaches. Also, in the past few years several researches about the utilisation of quality methods in service companies in Brazil have been conducted. For example Galoro et al. (2009) carried out a study that aimed at investigating the applications of quality tools in Brazilian clinical laboratory services. On the other hand, Albino Brito et al. (2011) investigated the implementation of quality improvement approaches in a supermarket. Similarly to these studies, the government is currently being ISO 9001 certified, as this is the case of Gramado City Hall (Gramado, 2010) and the purchasing department of the Paraná State government (Paraná, 2012). This may indicate a change in the trend from Brazil being a manufacturing-based economy towards a more service-based economy. In this case, quality improvement approaches seem to be following this transition as each time more of these have been deployed in other sectors of the Brazilian economy, apart from the manufacturing industry.

5.3 Importance of Quality Improvement Approaches for Brazilian Companies and Main Barriers to their Implementation

Customer expectations are increasing in all aspects. Developing countries are exporting even more to industrialised countries, increasing their concern about international standards (DeFeo, 2001). Therefore, the importance of quality for Brazilian companies is also increasing. Out of the 56 organisations that answered the questionnaire, more than 50 percent said that quality improvement approaches are very important to their company, and just two organisations that use them said that they have little importance. Analysing these two negative responses, one is referent to TQM and the other to ISO. In both cases the response came from a large company with more than 500 employees and 20 years of activity. This organisation, however, identified several

benefits provided by these approaches. Looking to the other methods used by this company, they were classified as very important, so the authors believe that even when the company answered that TQM and ISO approaches are not so important, this is probably because the focus and interest of the company lies on other methods, which proves the value of quality improvement approaches to the Brazilian organisations. When referring just to ISO standards, the number is more expressive, 60 percent of the companies answered that the standards are extremely important to the company.

Among the benefits that the approaches have brought to Brazilian organisations, the companies highlighted: (1) increased the operational performance of the company, (2) cost cutting, (3) increased the quality of the products and services, and (4) increased costumers and employees' satisfaction. All these benefits are described by most of the authors as the main benefits presented by these approaches (Fox, 1995; Resende and Fonseca, 2002; FNQ, 2008). Increase in the quality of their products and services was considered the main benefit by around 70 percent of the companies. This finding is in line with Boarin Pinto (2008), who have cited that an increase in the quality and productivity of products and services is the main benefit brought by ISO to large Brazilian companies. According to the responses obtained from this study, it is possible to conclude that quality improvement approaches have helped companies to improve profit. After increasing quality, increasing operational performance and cost cutting were the two most important benefits pointed by the companies. These are both directly related to the performance of the organisations. The same finding was pointed by Chyi Lee (2001), whose study describes that in china the company's financial performance is correlated to the effective implementation, management and sustainment of its quality management and improvement systems. Also, it is important to mention that no company has commented that they have not received any benefit from implementing a quality improvement approach. This suggests the importance of these approaches and tools for Brazilian companies and shows that the approaches are providing several benefits to them. Also, that they have recognised that these are helping them to improve their operational performance and competitiveness.

Despite the benefits, Brazilian organisations still face some challenges to implement quality improvement approaches. The lack of qualified experts to implement them and the lack of training were identified as the two biggest challenges the organisations surveyed have faced. This shows one of the problems in developing countries, qualified manpower, and explains the currently importance that intellectual capital has had for companies, not just in Brazil, but around the world (FNQ, 2007). When comparing this data with other studies, Bhat and Rajashekhar (2009) also identify that the biggest barrier to implement quality improvement approaches in India is manpower, especially due to the strong resistance to change of Indian employees. In addition Bhat and Rajashekhar (2009) comment that in the US, 3 out of the 5 biggest barriers to implement improvement methods are related to employees; this goes from lack of training to resistance to change. This proves that such problem not only applies to developing countries but also to countries like the US where the manpower is highly qualified and corroborates that changing the way of thinking is always a big challenge for organisations. Looking to the organisations that are using ISO standards and Six Sigma, the cost of implementation was identified as a main restrictive barrier. This may be related to the cost that an ISO certification and sustainment involves, including the payment for external audits and certificates. And in the case of Six Sigma, usually the training related to it is expensive, so its implementation also involves a high initial cost.

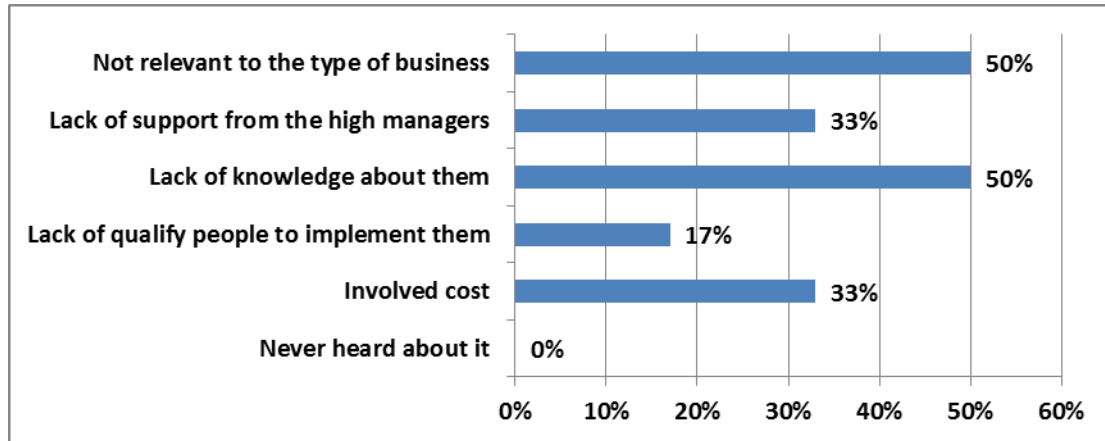
Seven companies (i.e. 12 percent) answered that they had not faced any barriers to implement the quality improvement approaches they were using. This goes against the conclusions obtained by Bhat and Rajashekhar (2009) in their study, which identified the main barriers that all Indian companies faced to implement the approaches. And Boarin Pinto et al. (2008), who also specified some barriers applicable to all Brazilian companies that were deploying ISO, Six Sigma and TQM. The seven Brazilian companies represented large organisations, with around 500 employees and with long experience in their sector. In addition, these organisations utilise more than one approach, so the experience of these companies may had helped them to easily overcome the implementation barriers. According to the information presented above and the authors' experience, implementing a new approach is always complicated, because in most of the cases it involves cultural change. In this case, these seven companies may have not just faced any significant barrier.

5.4 Reasons for Not Using Quality Improvement Approaches

Out of 56 companies that answered the questionnaire, 11 percent (i.e. 6 companies) commented that they were not currently using any quality improvement approach. Furthermore, none of these organisations answered that they had utilised some approaches and/or tools in the past and had stopped using them; another fact that confirms the importance of the approaches. Analysing the respondent organisations, 4 are from the service sector and 2 manufacturers, 5 of them have less than 50 employees and just 1 more than 500. The last respondent (i.e. organisation) is an exception, because is a bank, where the implementation of quality improvement approaches is not common. The rest of the responses came from small companies, mainly from the service sector. There are very limited researches about quality approaches' implementation in small

businesses. Prasad and Tata (2009) and Nwankwo (2000) said that micro-enterprises are worried about customers satisfaction, like all companies, but do not consider the approaches relevant for their business and the cost of deploy them is too high for them. Therefore, the next step of this study was to investigate the reasons as to why Brazilian organisations are not using quality improvement approaches. Figure 3 shows these main reasons.

Fig. 3. Reason for not implementing quality improvement approaches



As shown by Figure 3, the reasons leading these companies to have never used any quality improvement approaches included: (1) implementation cost, (2) lack of qualified people to implement them, (3) lack of knowledge about them, (4) lack of support from top management, and (5) not relevant to the type of business. Despite of the lack of knowledge about quality improvement approaches, no company answered that they had never heard about them. The reasons pointed by the Brazilian companies are in line with those highlighted by Prasad and Tata (2009) as the main barriers found when deploying quality approaches in developing countries.

As noted before, the lack of qualified people has been a problem for Brazilian companies; this has already been highlighted and commented by Ribeiro (2012) and Bouças (2012). Lack of qualified people or experts was identified as a cause for not using quality improvement approaches and as a barrier to apply them. Actually, besides the cost, all the other motives for not implementing quality improvement approaches may be related to this lack of expertise. So the training of Engineers and quality specialists is not growing as fast as the Brazilian's industry and economy, leaving Brazilian organisations stranded in some negative situations (Bouças, 2012). For this reason, more and more companies are investing in training staff and retaining talents, because to implement and maintain a strategy based on quality improvement approaches, companies need qualified staff, capable to analyse situations and propose alternatives to the company. Reflecting on this, the Brazilian government has taken some providence to try to improve the expertise and knowledge of Scientists, Engineers and Technicians. One of these attempts is the programme called 'Science Without Borders', which is based on sending Brazilian students to countries recognised by their high quality educational programmes to get further training. This is the programme in which the first author of this paper is currently participating.

Besides the lack of expertise, two other reasons for not implementing quality improvement approaches were: not relevant to the type of business and cost involved. As mentioned before, most of the companies that were not currently using the approaches are small businesses. Prasad and Tata (2009) and Nwankwo (2000) comment that despite the concern for customer satisfaction of micro-enterprises, most of them do not consider the approaches relevant for their business. They also suggest that the cost involved is too high for a small company, which is in line with the results of this study. Based on this, it is possible to conclude that it is hard for small companies to recognise the importance of quality improvement approaches, perhaps because it is easy to control processes dealing with the production of small scale goods and/or services. Also, the payback for the deployment of quality improvement methods may not justify the cost involved to implement and maintain these in small organisations.

5.5 Key factors to deploy quality improvement approaches

Bhat and Rajashekhar (2009) argue that a company's culture must be conducive of quality, if it is not; the culture must be changed before a quality programme can be successfully implemented. Kumar et al. (2011) also describe on their research some critical success factors to implement TQM in the Indian manufacturing and service industries; saying that the success of this approach's deployment depends upon the efforts made by the

company to attend the desires of its customers. Thinking on this and based on the results of this survey, it is possible to identify some key factors that can help Brazilian companies to implement quality improvement approaches that may help them to become more competitive.

The first factor is 'selecting the right quality improvement method' that suits an organisation's type of business and specific situation. Despite of having the same ultimate objective of ensuring that a company is meeting its customers' requirements, each quality improvement approach offers a different method to achieve this. It is possible to notice in this research that despite of competing in different industries and having different sizes and years of experience, the implementation of specific quality improvement approaches such as SPC and Six Sigma is mainly found in the manufacturing sector while TQM and ISO are also common in service organisations. Thus, it is important that every organisation understands exactly what they intend to achieve and then select the the most appropriate method. Rocha-Lona et al. (2013) suggest that in order for a company to identify the most effective quality management system, an organisation needs first to understand and evaluate its quality maturity level, then the strengths and weaknesses of its business processes, carry out a first party audit, and finally, align the findings of these evaluations to their strategic planning. Rocha-Lona et al. (2013) present a practical approach to help organisations in selecting the most effective quality improvement approach, based on their individual situation and needs, which may be considered by Brazilian organisations to develop this critical factor. Another critical success factor for the effective implementation of quality improvement approaches in Brazil is 'considering all the resources that will be necessary to deploy the approach', especially cost. The company must consider everything that will spend deploying the selected approach, to measure the cost-benefit of implementing a certain type of approach. This critical factor is also considered by Rocha-Lona et al. (2013) in their proposed method.

As mentioned before, some of the most important factors that must be considered to implement quality improvement approaches are the culture of the organisation and the employees. According to Bhat and Rajashekhar (2009), culture is one of the most difficult factors to change in an organisation, and deploying new approaches usually involves this. Therefore, having qualified staff is important, as well the total commitment and support from the top management. In reference to this, the findings of this survey indicate the lack of qualified staff and expertise in Brazilian companies; hence 'investment in training' and 'retaining talents' can be other two important factors to effectively deploy, manage and sustain quality improvement approaches.

6. Conclusions

Global markets are becoming more competitive, and quality improvement approaches have helped companies to develop strategies to successfully survive and grow in these markets. With focus on fully satisfying their costumers, the number of companies using quality improvement approaches is increasing, and the application of them is not restricted to the manufacturing industry only. Companies from different sectors are utilising these approaches to improve business performance. Not different, Brazilian companies are increasingly concerned about quality. This is possible to see through the many studies that have been carried out to aid Brazilian organisations select the correct quality approaches and/or tools and to effectively apply them (Resende and Fonseca, 2002, Oliveira et al., 2011, and Falcão, 2011). However, despite the growing concern about quality, there are no studies that present the current adhesion of Brazilian companies to them. In view of the actual economic situation in Brazil, the country has lived a combination of economic advancement and social progress. Thus, the implementation of quality improvements tools such as SPC, ISO standards, TQM, Six Sigma and BEMs can help the organisations of this country to be globally competitive. This research aimed at investigating the current status of implementation of quality improvement approaches in Brazilian companies.

Generally, the research findings indicate that most of the Brazilian companies surveyed are using quality improvement approaches as part of their strategies to be more competitive, not only in the manufacturing industry, but also in other sectors that include services and trade. The results of this study also indicate that ISO standards is the most utilised approach in Brazil, followed by TQM. On the other hand, SPC is largely used in the manufacturing industry, but the study showed that it is not a popular approach in other sectors. Finally, although Six Sigma and Business Excellence Models are not commonly used in Brazil, large international organisations with operations in this country tend to use them. In this view, this research presented the benefits and the barriers faced by Brazilian companies to apply these approaches and uncovered the reasons as to why some companies are not using them. It also presented some key factors that may be considered by Brazilian companies to effectively deploy quality improvement approaches. Considering the result of the study, it is possible to conclude that quality improvement approaches have had great importance to Brazilian companies and there is no reason, in general terms, as to why not to apply them in Brazil.

Significants theoretical and managerial implications can be drawn from the current study. From the managerial point of view, this research provides an overview of the utilisation of quality improvement approaches in Brazil; hence managers and industrialists that wish to deploy one of the tools can rapidly obtain

an overall picture about the method and understand the benefits and barriers obtained and faced by the surveyed companies. In this way, they can probably decide which tool is more suitable for their organisation. From the theoretical point of view, no similar research, which explores the status of implementation of this group of quality tools in Brazil, has been identified throughout the literature. It also provides an initial analysis to further researches.

This research was based on an exploratory questionnaire survey, distributed to several companies in Brazil. With the amount of responses obtained it is possible to have a general overview of the current status of the application of quality improvement approaches in Brazil. However, the results obtained should be interpreted with caution as the sample size of 56 organisations surveyed may still be considered relatively limited. In addition, the research methodology was based on the analysis of quantitative data, but a qualitative approach can also be adopted in further studies to complement the investigation, specifically when exploring the company's perceptions in terms of benefits and barriers to the implementation of quality improvement approaches. Further research should focus on conducting a more robust study improving the response rate and analysing the collected data with the use of inferential statistics. Nevertheless, despite these limitations, this study provides a general overview of the implementation status of quality improvement approaches in Brazil.

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