



QUALITY KNOWLEDGE INTEGRATION: A BRAZILIAN COMPARISON ANALYSIS

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Abstract *This study associates the idea of knowledge integration through quality management systems (QMS) proposed by Marques et al (2013) to Engineering education. Therefore, the descriptive research method combines multiple case studies. As the foundation for this research two works of XXXIII National Meeting of Production Engineering (ENEGEP) were used. The selected companies are from different segments and have in common the quality management use into their processes. Through qualitative analysis, based on national and international literature, companies were compared in their quality management systems composition. The results indicate that regardless of management systems maturity degree, it is important to invest in knowledge organization integration and information on quality.*

Keywords: *Quality Management System; Knowledge Management; Foreign Trade; Consumer goods industry; ISO 9001.*

1. INTRODUCTION

Due to market competitiveness, organizations have sought to use management tools to achieve their strategic objectives. From the use of quality strategic perspective in production processes, human resources and services improved result in market differential (Collis and Montgomery, 1995; Bateman and Snell, 1998). Any delay in this process affects the bottom line, causing losses in the company cash flow.

Connecting quality to production processes means that there is loss and costs reduction involved. However, the use of the strategic knowledge concept should not be exclusively



intuitively and without adequate use of a particular theoretical framework. In this context, elements of the Quality Management System literature are presented. Therefore, one question may arise: How to compare qualitatively the integration of quality management knowledge in different segments?

In order to answer this question, this work aims to:

- Identify components of quality management system in foreign trade company case study;
- Identify components of quality management system in consumer goods industry case study;
- Compare the applicability of an integrated quality knowledge system by analyzing these corporations' qualitative data

The background methodology research is exploratory and descriptive (Flick, 2004) as to explicit and seek a greater understanding of the problem researched, as well as it was based on multiple case study (Yin, 2001).

This paper was conducted in three stages: the first comprised a literature re-view to search for relevant information on the themes related to management integrated systems and quality management systems; the second, identified quality management variables within two 2013 ENEGEP case studies; the third and final phase compared both cases in adapted quality knowledge integration table (Marques et al, 2013) qualitative analysis.

2. MANAGEMENT & QUALITY MANAGEMENT SYSTEMS

The importance of knowledge is recognized in business and academic communities. One milestone in holistic quality management is the Malcolm Baldrige National Quality Award inception in 1987, leading to an even stronger interest among organizations from all sectors (Ahire et al, 1996). In Brazil, a more specialized approach to quality management took shape from the Foundation for the National Quality Award (FPNQ), founded in 1991.

Among the norms, stand out those of ISO 9000, published in 1987, which were translated and published in Brazil by ABNT, in 1990. The current version, published in 2008, showed no significant changes from the previous version, but introduced an important concept: the process approach.

ISO 9001 adoption is voluntary, but the organization which decides to adopt it must continually improve a quality management system (QMS) meeting the standards requirements. QMS, as developed by ISO, focuses on the critical factors giving sustainability to organizations management, rather than the philosophical and theoretical foundations of management by itself. Consequently, the QMS applies to any organization, regardless of size, sector of activity and complexity of the business (Marques et al, 2013).



3. CASE 1: EXCOM FOREIGN TRADE COMPANY

Excom International Advisory Limited is a foreign trade company strategically located in Rio de Janeiro city: close to major Brazilian ports and international air-ports. The company established in 2003, also has subsidiaries in the United States employing approximately 90 people.

Gronroos (2003) states that it is not only by technical quality that a company will achieve success and meet competition, in turn, what needs to be done is to provide better services in which functional quality is highlighted. Knowledge about goods quality, however, is insufficient to understand service quality. Three well-documented characteristics of services – intangibility, heterogeneity, and inseparability – must be acknowledged for a full understanding of service quality (Parasuraman et al, 1985).

The Excom case study presented the process of calculating benefits accounts and identifying improvements for the time reduction to satisfy charging customer groups. The application of Six Sigma DMAIC (define-measure-analyze-improve-control) to quality control was important in these terms. The need of clients' database standard model was crucial to reduce time flaws calculation and subsequent charge transmission.

Import and export processes in the last quarter of 2012, corresponding to 381 billed cases were analyzed. From those, 80% compound bill delay and lack of documents. The project team analyzed through nominal group technique (NGT) to discuss the issue and evaluate multiple alternatives in order to reach a consensus and thus prioritize them. The GUT analysis (gravity-urgency-trend) on the problems' possible causes showed that 63% represents controllable variable causes at Excom.

One of the main actions to be taken in the short term is to adjust target time for billing. Another important factor which will allow customer receipt optimization is to send documents scanned with charged bill by e-mail. Yet, for this initiative to be implemented it must be negotiated with customers.

Quality tools applications allowed the company to formulate a proposal to reduce the calculation time and shipping charges to its customers as well as specify the criteria for specific customers bringing greater outcomes and profitability. The cost process study allowed the variability reduction and their contribution to performance indicators enhancement, thereby contributing to meet the costumers' quality needs.

4. CASE 2: REDUCING COSTS OF PGB PRODUCTION

PGBX is a multinational consumer goods company founded in the 1800s, spread all over the world (170 countries). The Brazilian production unit studied is located in Rio de Janeiro with 450 employees. In 2012, International PGBX recorded \$83.68 billion in sales. Fortune magazine awarded a top spot on its list of "Global Top Companies for Leaders", and ranked the company in the "World's Most Ad-mired Companies" list.

The case is based on a production unit in which its great challenge is offering consumers quality products at the lowest possible price. In order to achieve executive's goals, production sites receive a great pressure to reduce their direct and in-direct costs. This cost reduction, in PGBX's vision means 'zero loss'. Whereas, is not only considered as loss what was wasted, but also everything which does not add value to the end consumer.

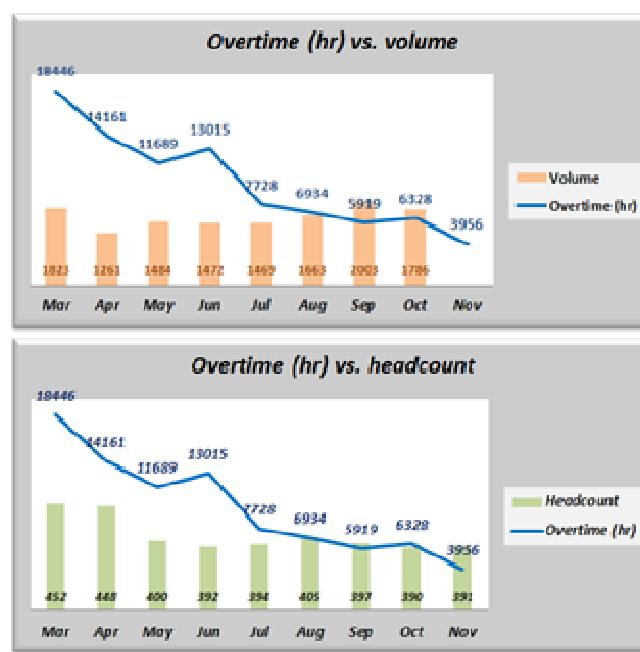


Figure 1 - PGBX overtime work analysis screen
 Source: Guerin et al (2013)

As soon as someone joins into PGBX, he/she receives training focusing on the understanding of PGBX's improvement culture, as well as the importance of each employee in doing everything in his/her power to contribute for continuous enhancement. This contribution tracked by kaizen, which records employees' initiative and allows their results tracking.

Among these opportunities, overtime was considered the selected variable to be referred to intervention study aiming at reducing their costs. Once identified basic points to be worked out, a survey was conducted, based on the PDCA (plan-do-check-act), and then the project started in March 2011. The human resources cost was the most significant, representing approximately 35% of the site total cost. In the PGBX survey, it was found that 17% of cost information concerning persons was due to overtime.

After a year of project the main results were reported. Tracking systems were based on consultations on SAP system and HR System. The obtained results were as follows:



Table 1 - PGBX case study results analysis

GOAL	Case 2 (PGBX)
Overtime employee average	From 160 hours to 70 hours (56,3% reduction)
Production unit total overtime	From 18,000 hours/mo to 7,000hours/mo (61% reduction)
Legal matters risk management	Was cut by half
Cost savings	First year: R\$ 1,5 million (USD 600,000) annually
'Best practices'	Brazilian operations became international benchmarking

It was concluded that apparently, there is no barrier to overtime project implementation in different segments. However, so that it can be implemented, there must be a culture of leadership, a clear and objective communication with employees and, essentially, an automated control point system.

5. QUALITY KNOWLEDGE INTEGRATION

According to Powell (1995), Total Quality Management (TQM) success appears to depend critically on executive commitment, open organization, and employee empowerment, and less upon such TQM staples as benchmarking, training, flexible manufacturing, process improvement, and enhanced measurement. Those can be easily correspondent to ISO QMS, a quality knowledge integration sample.

ISO QMS main virtues identified are: (a) the broad involvement of stake-holders; (b) its generic character, to be applicable to all types, sizes and branches of organizations interested in the subject; (c) voluntary compliance; (d) the optional certification, performed through audits; (e) concern for continuous improvement meaning a mechanism to encourage continuous learning (Marques et al, 2013).

5.1. The National Conference of Production Engineering

The National Conference of Production Engineering (ENEGEP) is a national event organized annually by ABEPRO - Brazilian Association of Production Engineering. The conference gathers academic professionals working in Production Engineering community: researchers, teachers and students, entrepreneurs, consultants, engineers, and administrators. It constitutes one of the main Brazilian promoters of technical and scientific production in the area.

In addition, ENEGEP was consolidated as a forum for relevant Production Engineering discussion in national issues. Besides, the conference promotes sharing of academic knowledge with the productive sector. Thus, ENEGEP becomes unique opportunity for efforts integration of those who work in this vital area for development. The event also seeks a continuous link of the academic community with society.

5.2. ENEGEP Quality Knowledge Integration table analysis

In order to visualize both ENEGEP case 1 and case 2 contribution do Quality Management Systems, they were organized in the table as follows:

Table 1 - Quality Knowledge Integration table based on ENEGEP case studies

ABNT NBR ISO 9001:2008 (ISO QMS)	Case 1 (Excom)	Case 2 (PGBX)
4.1.General requirements	Y	Y
4.2.Documentation requirements	Y	Y
6.RESOURCES MANAGEMENT		
6.1. Resources supply	N	N
6.2. Human resources	Y	Y
6.3. Infrastructure	N	Y
6.4. Work environment	Y	Y
7.PRODUCT COMPLETION		
7.1. Product/service completion planning	Service	Service
7.2. Costumer related processes	External	Internal
7.3.Design and development	N	N
7.4.Procurement	N	N
7.5. Service production & supply	Indirect	Direct
7.6. Measurement & monitoring equipment control	Y	Y

Adapted from Marques et al (2013)

Comparing qualitatively the contributions from each case, it is possible to verify similarities between them. On the other hand, there are a few differences worth to note, such as: while case 1 does not necessarily deploys infrastructure as relevant factor, in case 2, was crucial do determine overtime gaps mapping; costumer related process in case 1 are directly related to external client, while case 2 represents internal demands; as in regard to service production & supply, case 1 indirectly affects organizations performance whereas case 2 directly bound to operational productivity.

6. FINAL CONSIDERATIONS

For effective management means, the concept of quality as a strategic tool needs to be absorbed in all employees thinking and acting, from the strategic to the operational level. As a consequence, quality value in organizational culture is attained. Therefore, quality should have a strategic background, but it effectively achieves actual goals when is practiced by tactical and operational levels.

ISO QMS standardized fulfill an important role in guiding organizations first steps of those that had no managerial or technical expertise in this area as well as to Engineering education. This could be observed in Excom, quality management case. Still, ISO QMS also



represents a great deal contribution to well-established companies as it occurred to PGBX operations in Brazil.

Given the lack of structured approaches integrating and ordering the growing body of knowledge management, the recent biggest challenge is how to translate the principles of knowledge management in structural elements and management processes, so that parties obtain more precise guidelines to direct their efforts.

Based on this premise, this paper presented elements of Marques et al (2013) feasibility of designing a system for knowledge management in the mold of quality management systems recommended by ISO using two quality management case studies from different sectors used in Quality Management Engineering & Business education.

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INTEGRAÇÃO DO CONHECIMENTO EM QUALIDADE: ANÁLISE COMPARATIVA BRASILEIRA

***Resumo:** Este estudo associa a ideia de integração do conhecimento por meio de sistemas de gestão da qualidade (SGQ) proposto por Marques et al (2013) para a educação em engenharia. Portanto, o método de pesquisa descritiva combina múltiplos estudos de caso. Foram utilizadas como base para esta pesquisa duas obras do XXXIII Encontro Nacional de Engenharia de Produção (ENEGEP). As empresas selecionadas são de segmentos diferentes e têm em comum o uso de gestão da qualidade em seus processos. Através da análise qualitativa, com base na literatura nacional e internacional, as empresas foram comparadas em sua composição de sistemas de gestão de qualidade. Os resultados indicam que, independentemente do grau de maturidade de gestão de sistemas, é importante investir em integração de organização do conhecimento e informações sobre a qualidade.*

***Palavras-chave:** Sistema de Gestão da Qualidade; Gestão do Conhecimento; Comércio Exterior; Indústria de bens de consumo; ISO 9001.*