



UNIVERSITI PUTRA MALAYSIA

**IMPLEMENTATION OF AN ELECTRONIC QUALITY MANAGEMENT
SYSTEM OF A MANUFACTURING COMPANY**

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**IMPLEMENTATION OF AN ELECTRONIC QUALITY MANAGEMENT
SYSTEM OF A MANUFACTURING COMPANY**

By

NAGUR AZIZ BIN KAMAL BASHAH

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia
In Fulfilment of Requirements for the
Degree of Master of Science**

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*Dedicated to my parents,
Kamal Bashah b. Jamaluddin and Sabariah bt. Segi Rahmat,

my lovely family,
Asnor Juraiza bt. Dato' Hj Ishak, Anis Amalina and Anas Aeyman,

and
my dearest sisters.....

.....With Love.....*

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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January 2005

Chairman : Hasan Yudie Sastra, PhD

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Most of the International Organization for Standardization (ISO) certified Small and Medium Industries (SMI) in manufacturing industry are using manual quality management system, which is paper intensive, to manage their quality and productivity records. Numerous problems occur when managing ISO by manual methods. Among repeated problems are lost of documents, long time for document approval, space required for document storage and considerable time taken for document searching.

This project describes the features of the Electronic Quality Management System (e-QMS) including standardization requirements, automation tools being used and documentation methods practised in a manufacturing company in Malaysia.

The objective of this project is to study the effectiveness of e-QMS implementation strategies in a manufacturing company.

e-QMS is concerned with use of the internet and electronic business (e-business) technologies in companies for quality management system. It covers all aspects of business; sales, marketing, customer service, new product development, procurement, supplier relationships, logistics, manufacturing, production and strategy development.

The e-QMS can be measured in term of paper consumption, productivity, document approvals lead time, reduction of reject parts and average time taken to search documents. The e-QMS minimized document approval cycle time (0.6 minutes by electronic mail compared to 3.9 minutes by manual method) by sending notification to document approver via email, minimized document lost as all submitted document are electronically tracked and recorded. The document search engine greatly reduced document search time by 2.3 times compared to manual. That will be able to locate the requirements need quickly, minimizing lost opportunities while maximizing productivity. The number of part rejects reflects the productivity capability.

Significant improvements in time-to-market, product quality, and productivity have been realized without compromising engineering, manufacturing or configuration management needs.

Abstract tesis dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**PELAKSANAAN SISTEM PENGURUSAN QUALITI ELEKTRONIK
DALAM SYARIKAT PEMBUATAN**

Oleh

NAGUR AZIZ BIN KAMAL BASHAH

Januari 2005

Pengerusi : Hasan Yudie Sastra, PhD

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Kebanyakan Industri Kecil dan Sederhana (IKS) dalam industri pembuatan yang diiktiraf dalam ISO 9001:2000 menggunakan sistem pengurusan kualiti manual dalam mengurus rekod kualiti dimana penggunaan kertas adalah intensif. Pelbagai masalah berlaku apabila pengurusan ISO 9001:2000 dilakukan secara manual. Masalahnya yang sering berulang adalah seperti kehilangan dokumen, kelulusan dokumen yang mengambil masa lama, ruang yang besar diperlukan untuk penyimpanan dokumen dan pengambilan masa yang panjang dalam carian dokumen.

Projek ini menjelaskan ciri-ciri teknik Sistem Kualiti Pengurusan Elektronik (e-QMS) termasuk keperluan standard, peralatan automasi yang digunakan serta kaedah mendokumentasi yang dipraktikkan dalam syarikat pembuatan di Malaysia.

Objektif bagi projek ini adalah untuk mengkaji keberkesanan strategi pelaksanaan e-QMS dalam syarikat pembuatan.

e-QMS di istilahkan sebagai menggunakan internet dan teknologi elektronik perniagaan dalam syarikat untuk sistem pengurusan kualiti. Ianya merangkumi semua aspek perniagaan seperti jualan, pemasaran, khidmat pelanggan, pembangunan produk baru, pembelian, perhubungan pembekal, logistik, pembuatan, pengeluaran dan strategi pembangunan.

e-QMS dapat diukur dalam bentuk menghadkan penggunaan kertas, produktiviti, masa mengesahkan dokumen, pengurangan pembaziran alatan dan purata masa yang di ambil untuk pencarian dokumen. e-QMS dapat meminimakan masa yang diperlukan untuk meluluskan dokumen (0.6 minit melalui kaedah mail elektronik berbanding 3.9 minit melalui kaedah manual) dengan menghantar notifikasi melalui e-mel, kehilangan dokumen yang minima dimana semua dokumen yang dihantar dikesan dan direkod melalui sistem elektronik. Enjin carian dokumen dapat mengurangkan masa carian dokumen sebanyak 2.3 kali jika dibandingkan dengan kaedah manual. Ini membolehkan keperluan dipercepatkan, meminimakan peluang kehilangan serta memaksimakan produktiviti. Faktor pembaziran alatan adalah bergantung kepada keupayaan produktiviti.

Peningkatan bersignifikan dalam masa di pasaran, kualiti produk dan produktiviti boleh dirialisasikan tanpa melibatkan kompromi kejuruteraan, pembuatan atau konfigurasi keperluan pengurusan.

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Nagur Aziz Kamal Bashah

I certify that an Examination Committee met on 19th January 2005 to conduct the final examination of Nagur Aziz b. Kamal Bashah on his Master of Science thesis entitled “Implementation Of an Electronic Quality Management System of a Manufacturing Company” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

NAGUR AZIZ BIN KAMAL BASHAH

Date:

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LIST OF ABBREVIATIONS

BOM	Bill of Materials
CAD	Computer Aided Design
DCC	Document Control Center
ECO	Engineering Change Order
e-QMS	Electronic Quality Management System
ICT	Information and Communication Technology
ISO	International Organization for Standardization
KPI	Key Performance Index
LKTA	LKT Automation Sdn Bhd
PQS	Preferred Quality Supplier
QMS	Quality Management System
SMI	Small and Medium Industries
SMTP	Simple Mail Transfer Protocol
SOP	Standard Operating Procedure
TS	Technical Specification
WI	Work Instruction

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the current global market place, many factors change simultaneously. Continuous cost and newly industrialized countries are entering global markets for the first time. Technology development, particularly in computers and communications is increasing rapidly. Ecological pressures are getting stronger. In recent years, time-based competition has become very important (Hindson et al., 1997).

In the last decade, there have been widespread interests in quality due to the stiff competition from both local and abroad (Waters, 1995). The latter factor is due to the expanding range of lower priced and high quality goods, often produced at the leading edge of technology (EC White Paper, 1993). As a result, businesses irrespective of size have to be competitive and stay competitive (Drihlon, 1993). In a nutshell, a company must have the ability to react quickly to ensure it has the right product or services of the right quality, at the right price, and on the market at the right time.

In the challenging, competitive and high technology state of the business environment today, everyone knows or ought to know that preservation of document integrity and quality of their end products are the most basic and fundamental recipe for success in any project undertaken. As competition and the cost of acquiring new

customers continue to increase, the need to build and maintain the relationships has become a fundamental priority for businesses (Kohli et al., 2001).

The effective and efficient communication of information internally within an organization and externally between organizations is a strategically important competence for almost all organizations. While it is true that an increasing proportion of such communications takes place through common access to shared database, the reality is that the vast majority of 80-90 per cent according to a recent report still uses the concept of documents transfer (Harris et al., 1997).

Producing and receiving documents is something that almost everyone does regardless of the industrial or commercial sectors within which they work. Those working in an ISO 9000 or other quality-assured environment will also be familiar with the need to formally manage documents. Due to the needs of continuous quality improvement, they have remarkably accelerated the modification cycle of the guidelines (Auer et al., 1996). Companies require a quality management solution, developed specifically for a distributed computing environment, to fulfil these kinds of requirements. However, general understanding about document management strategies is very variable and is not itself well documented.

1.2 Problem Statement

When new technologies appear, they are often perceived as a means of improving current practices, for example by saving time or reducing costs, etc. In order to attain customer satisfaction and improve business performance companies need to reduce

levels of non-conformance and attendant failure costs such as rework, scrap, warranty claims, product liability claims and recall (Swift et al., 1997). However, many of the new technologies that have appeared since the early 1980s have often provided the opportunity to radically modify accepted practices or offered the potential to enable entirely new approaches. Commonly, these innovative aspects of new technology have not been fully exploited or have only been slowly understood by companies.

Rapid change and uncertainty in the business environment are becoming an increasingly important issue. This rapid change and uncertainty are caused by many factors, including the pace of technological developments, more diverse and ever-changing niche markets, increased competition, and demanding customers with increasing expectations. With the rapid change in all types of working environments, there is a constant need to rapidly train and retrain people in new technologies, products and services found within the environment (Harun, 2002).

The traditional Quality Management Systems (QMS) or paper-based QMS is able to handle low volume production of documents effortlessly. However, these traditional systems are no longer adequate to meet the demands of today's businesses with the 'explosion' of documents and information, and the need to access and work with them collaboratively with others across the globe. Traditional paper-based documents have caused many related problems such as maintaining, customisation, sharing, reusing, tracking and accessing of documents (Yao et al., 2003). So, there is a need to divert from the traditional method of storing all knowledge and information at one specific location.

In order to be competitive with the current technology and market trends, electronic documentation has automated the routine aspects of creating and maintaining quality system that can bring benefits and increase an organization's productivity regardless of whether it is a large multi-national corporation or small-medium sized company.

LKT Automation (LKTA) Sdn Bhd had developed Electronic Quality Management System (e-QMS) since year 2000 when the company has to obtain ISO 9001:2000 in March 2001. LKTA had used electronic documentation during the compliances audit of ISO 9001:2000 by SIRIM compliances audit. This project is to study and evaluate the effectiveness of electronic documentation towards the company performance, in terms of productivity and cost savings.

Currently, the electronic documentation system is only used for ISO documentation handling such as document approvals, distribution, retention and revision.

1.3 Research Objectives

The overall objective of this research is to study the effectiveness of Electronic Quality Management System (e-QMS) implementation strategies in a manufacturing company.

Specific objectives are as follows:

- a) To conduct a motion study for comparing time taken for electronic search and manual search.

- b) To determine factors that can show effectiveness of e-QMS by observing number of rejects, time to retrieve data, etc.

1.4 Scope and Limitation of Study

This project was mainly carried out using a case-study-type of research method whereby data collection is from secondary. Means this was obtained from books, journals, articles, the web and other similar case studies that have been carried out in the past years. Nevertheless, primary data was still gathered through interview sessions and observations.

There were number of company user's requirement study and analysis conducted which was basically to understand customer's requirements on electronic documentation, to carry out interview sessions with the management levels as well as other levels and also to have a first hand experience with the plant processes through visual observations.

By focusing into ISO 9001:2000 frameworks, this project objective is to study the effectiveness of e-QMS implementation for quality management success.

It is almost impossible to study the whole plant implementation within the short period of time given. Therefore, to make this study more effective and focused, the Production Department of LKTA where the design process flow and assembly activities in Bay C is chosen as the study subject, as this bay is involved in producing semiconductor equipment for multinational companies.. The problems are identified

within this department and the recommendations are made based on the evaluations made at this particular department only.

This mission is to implement e-QMS strategies across the manufacturing company, where there is an integrated improvement approach under the QMS umbrella, which problems can be identified and measured earlier, and the most important is cost effective.

1.5 Thesis Organization

The thesis is presented in five (5) chapters. The first chapter is the Introduction covers the general overview of this thesis, problem statement and why it is necessary, and the research objectives of this thesis.

Literature reviews of related subjects to the study are summarized in Chapter Two. This chapter will define quality management system, definition of SMI, the business nature of SMI, the introduction of ISO 9001:2000, problem face when implementing quality management system under traditional way and a brief description of electronic documentation. Comparison between traditional and e-QMS for quality management system were made in this chapter.

Chapter Three explains the company's introduction of e-QMS, e-QMS implementation methodology, and the analysis and evaluation methodology for this proposed project.

Chapter Four evaluates and looks at the results by analysing the effects of the implementation after its introduction.

Lastly Chapter Five summarizes the thesis with a conclusion that demonstrated the objectives have been met thus far and recommendation for further improvements.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In the challenging, competitive and high technology state of the manufacturing environment today, most companies are aware of the importance of quality products or services rendered to customer. To ensure that their products or services have quality, the Small and Medium Industry (SMI) seeks certification in Quality Management System. Often, SMIs will use their certification in Quality Management System as a marketing tool. It indicates to potential customers that the organization has taken the trouble to get its systems and procedures in order, and up to an objectively assessed standard such that its customers can have the confidence that the quality function is effectively performed (Pike et al 1994).

Most of the SMIs is seeking certification in ISO 9000 series; the international standard of quality management and quality assurance. One main requirements of ISO 9000 is the quality system documents and data control including of document approval, issuing, accessing and changing. Traditional or manual paper-based documents have caused many related problems such as maintaining, customizing, sharing, reusing, tracking and accessing of documents. According to Finney (1993), the major ISO non-conformances are document-related problems.