

**A STUDY OF QUALITY TOOLS AND
TECHNIQUES EMPLOYED IN PERLIS AND
KEDAH MANUFACTURING COMPANIES**

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**UNIVERSITI MALAYSIA PERLIS
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by

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LIST OF ABBREVIATIONS

AND	-	Activity network diagram
ANOVA	-	Analysis of variances
CE	-	Cause-and-effect diagram
CPM	-	Critical path method
DOE	-	Design of experiments
FFA	-	Force-field analysis
FMEA	-	Failure mode and effect analysis
FMM	-	Federation of Malaysian Manufacturers
FTA	-	Fault tree analysis
GMP	-	Good Manufacturing Practice
HACCP	-	Hazard Analysis and Critical Control Points
HRDF	-	Human Resource Development Fund
NGT	-	Nominal group technique
NPCB	-	National Pharmaceutical Control Bureau.
OSH	-	Occupational safety and health
PDPC	-	Process decision programme chart
PERT	-	Program evaluation and review technique
PSMB	-	Pembangunan Sumber Manusia Berhad
QC	-	Quality control
QCC	-	Quality control circles
QFD	-	Quality function deployment
SEDC	-	State Economic Development Corporation
SPC	-	Statistical process control
SQC	-	Statistical quality control
TQM	-	Total Quality Management
TSM	-	Total Safety Management

KAJIAN PENGGUNAAN TEKNIK DAN PERALATAN KUALITI DI INDUSTRI PEMBUATAN PERLIS DAN KEDAH

ABSTRAK

Penggunaan teknik dan peralatan kualiti dapat menambahbaikkan lagi kualiti produk dan proses di industri pembuatan. Kajian ini memfokuskan kilang-kilang pembuatan yang terletak di Perlis dan Kedah. Ia bertujuan mengenalpasti samada terdapat penggunaan peralatan kualiti dan teknik dalam operasi seharian, di samping mengenalpasti masalah dan cabaran yang dihadapi semasa penggunaan peralatan kualiti dan teknik di lantai bengkel. Soalan kaji selidik secara pos dan temuduga secara berstruktur adalah alatan utama pengumpulan data. Empat hipotesis dibina berdasarkan rangka teori (theoretical framework) yang dibangunkan, di mana pembolehubah-pembolehubahnya adalah di dalam kategori 'independent', 'dependent' dan 'moderating'. 'Independent variables' terdiri daripada lokasi kilang, tempoh beroperasi kilang, kedudukan ekonomi kilang, bilangan pekerja kilang, jenis produk yang dikeluarkan, dan sijil kualiti. Sementara itu, 'dependent variables' pula ialah pelaksanaan teknik dan peralatan kualiti dan bagaimana teknik dan peralatan kualiti dapat menolong organisasi. 'Moderating variables' ialah penggunaan sebenar teknik dan peralatan kualiti, dan informasi tentang responden yang menjawab soalan kaji selidik sebagai wakil kilang. Data yang didapati dianalisis menggunakan "independent T-test" dan "one-way analysis of variance (ANOVA)". Hasilnya, masalah dan cabaran yang dihadapi semasa pelaksanaan penggunaan peralatan kualiti dapat dikenalpasti. Hasil kajian menunjukkan terdapat penggunaan peralatan kualiti dan teknik di kilang-kilang tersebut tetapi dalam pelbagai tahap pelaksanaan. Syarikat-syarikat yang melaksanakan sistem kualiti ISO 9000 lebih cenderung menggunakan peralatan kualiti dan teknik dibandingkan syarikat yang tidak melaksanakan sistem kualiti ISO 9000. Kajian menunjukkan bahawa nilai jualan tahunan tidak memberi kesan kepada perancangan, kewangan dan latihan dalam isu pelaksanaan penggunaan peralatan kualiti dan teknik. Dapatan menunjukkan bahawa umur kilang tidak mempengaruhi isu pelaksanaan penggunaan peralatan kualiti dan teknik. Akhirnya, bilangan pekerja tidak semestinya mempengaruhi isu semangat berpasukan dan komunikasi dalam penggunaan peralatan kualiti dan teknik. Kesimpulannya, latihan, semangat berpasukan, komunikasi, perancangan dan kewangan sebenarnya bukan merupakan masalah di kilang-kilang di Perlis dan Kedah.

A STUDY OF QUALITY TOOLS AND TECHNIQUES EMPLOYED IN PERLIS AND KEDAH MANUFACTURING COMPANIES

ABSTRACT

Quality tools and technique can be used to achieve continuous improvement of quality in the manufacturing industry. This research is focused on manufacturing companies located in the states of Perlis and Kedah. The study examines whether manufacturing companies employ quality tools and techniques in their daily operations. In addition, it identifies the problems and challenges faced during the implementation of the tools and techniques on the manufacturing shop floor. The study uses mail questionnaires and structured interviews as its main instruments of data collection. In this study four hypotheses are developed based on the theoretical framework, of which the variables are in the categories of independent, dependent and moderating variables. Independent variables comprise of company location, number of years the company has been operating (referred to as "level of maturity"), annual sales turnover, number of full time employees, product(s) of the company, and quality standard certification. Meanwhile, the dependent variables are the issues in the implementation of quality tools and techniques, and how quality tools and techniques help the companies. Moderating variables in this research are the actual use of quality tools and techniques and information regarding the respondents who answered the questionnaire on behalf of the company. Data was analysed using independent T-Test and one-way analysis of variance (ANOVA) and the results helped to identify the problems and challenges faced during the implementation of the tools and techniques. The findings of this study reveal that quality tools and techniques are indeed being used by the companies but each with varying degree. The results reveal that companies that implement ISO 9000 quality system tend to use more quality tools and techniques compared to companies without quality systems. The study indicated that high sales turnover has no impact on planning, budget and training as well as the implementation of quality tools and techniques. It also indicates that the level of maturity does not have any bearing on the implementation of quality tools and techniques. Lastly, higher numbers of work forces do not necessarily bring about issues of communication and teamwork in order to implement quality tools and techniques in the company. In conclusion, the overall results from this study show that training, teamwork, communication, planning, and budgeting have no impact at the companies in Perlis and Kedah.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The pressure of increasing competition forces manufacturing organisations to find ways to reduce costs while maintaining customer satisfaction and making continuous improvement to both products and processes. A corresponding range of tools and techniques have been developed to assist in achieving these objectives.

Spengler, Stanton and Rowlands (1999) state that many companies, including manufacturing companies, have little knowledge on the range of quality tools and techniques available to improve the quality of their processes and products. Quality tools and techniques, used as part of quality schemes such as the plan-do-check-act cycle, can be used to help in the continuous improvement of quality. Many companies have heard about quality tools and techniques, but do not know when and how to use them effectively.

There are many quality tools and practices that can be used in the manufacturing industry. Many authors such as Singhal and Hendricks (1999), Easton and Jarrell (1998), Ittner and Lacker (1996) and Cappola (1993) have shown that the proper use of quality tools and techniques can increase quality and productivity, which in turn translates to improved financial performances for the organisations. Bunney and Dale (1997) report that the use and selection of quality management tools and techniques are vital to support and develop quality improvement process carried out in manufacturing industries.

According to Bunney and Dale (1997), quality management tools and techniques were applied in organisations at different times during the period from

1987 to the end of 1994. In the early stages, the tools and techniques were applied in a haphazard manner, without serious thought to the implication on the long-term development of the improvement strategy and process. By the end of 1994, a wide range of tools and techniques was being applied in different parts of the organisation for different reasons. The main users of these tools were quality improvement facilitators through quality improvement teams of sorts.

It is reported that the choice of tools and techniques are affected by the resources available within the company to facilitate their introduction. On several occasions, it is seen that the tools are viewed as the “quick-fix” for problems and continuous improvement, and lack commitment from senior management in terms of their use and implications on the shop floor. This is serious, as lack of understanding as well as commitment from top management when it comes to tools and techniques implementation will result in overall failure of the quality initiative. As it is, the literature is littered with many reports of failed Total Quality Management (TQM) initiatives (see for example Dooley & Flor, 1998; Martins & Toledo, 2000; Van Allen, 1994). The ‘wrong’ use of quality tools and techniques are a part of this observable fact.

1.2 Statement of problem

There are currently nine manufacturing companies operating actively in Perlis, Malaysia. In neighbouring Kedah, the number is approximately 150. In Perlis, there used to be more manufacturing organisations, but due to the 1998 economic downturn and several other reasons, many were closed.

Given that the literature indicates that quality tools and techniques are applied in a haphazard manner in many organisations (see for example Bamford & Greatbanks, 2005; Thia, Chai, Baully & Xin, 2005; Dale, Boaden, Wilcox & McQuater, 1998), and that the proper use of them can increase quality and productivity of the organisation (Ahmed & Hassan, 2003; Murphy & Ledwith, 2007;

Jayaram, Handfield & Ghosh, 1997), it is imperative than surviving manufacturing companies in Perlis and Kedah be invited to have training and consultation collaborations, particularly in the field of quality, with institutions of higher learning and the State Government. Unfortunately, systematic investigations into the quality practices used in manufacturing companies in Perlis and Kedah are rarely carried out. Without this knowledge, it is difficult to develop good training and consultancy programmes that can be implemented in these organisations.

1.3 Purpose of the study

The purpose of this study is to examine the extent of employment of quality tools and techniques in manufacturing companies in Perlis and Kedah, and the way in which the implementation affects other attributes and outcomes of the organisation.

The study also aims to find the problems associated in the implementation of the tools and techniques. This knowledge will help management recognise the symptoms, root causes, issues and problems that affect process and product quality, which ultimately lead to the organisation's survival.

Once the problems and challenges faced are identified, the study further aims to document the findings so as to promote greater understanding of the situation. This may eventually lead to the development of plans that can be carried out to ultimately improve the quality and productivity of processes run in the manufacturing companies, particularly in Perlis and Kedah.

1.4 Scope and methodology of the study

The research focuses on manufacturing companies located in the state of Perlis and Kedah. In Perlis, there are only nine manufacturing companies currently operating actively in industrial estates designated by the State Economic

Development Corporation (SEDC). All nine companies in Perlis are chosen as subjects in this study.

In Kedah there are ten industrial estates under the Kedah State Development Corporation. There are approximately 150 manufacturing companies currently operating actively in the industrial estates. However, only 136 companies in Kedah are targeted as subjects in this study because from the feedback received, some of the companies are very small and with limited workforce (typically less than five employees). In addition, these small companies do not have ISO 9000 certification and have no designated 'quality department'. Some of them amongst this group even inform that they have "no time to fill in the questionnaire".

All in all, a total of 145 manufacturing companies from Perlis and Kedah are selected for the research (see Appendix A).

The main data collection methodology utilised in this study are the questionnaire and structured interview. A total of 145 questionnaires are distributed between Perlis and Kedah (March 2006), of which 45 responses (six from Perlis and 39 from Kedah) are collected. This means the response rate of the questionnaire is at 31.03 %. After the questionnaire, structured interviews follow. A total of five structured interviews are conducted (one in Perlis and four in Kedah).

As will be seen through out the thesis, the information on the implementation of quality tools and techniques and the organisations' commitment is garnered mainly from the respondents' perceptions, and hence is subjected to the degree of truthfulness extended by the respondents when answering the questionnaire and structured interview.

1.5 Research questions

There are four research questions in this study, namely:

1. How different are companies which are not ISO 9000-certified compared to those which are ISO 9000-certified, as far as the application of quality tools and techniques are concerned?
2. Does sales turnover have any impact on planning, budgeting and training as well as the method of implementation of quality tools and techniques?
3. Are companies with higher maturity more interested in implementing quality tools and techniques? Higher maturity here refers to the length of time the company has been in operation. The longer the company has been in operation, the higher its level of maturity is.
4. How is the number of workforce correlated to the problem of teamwork and communication, and as such, resulting in quality tools and techniques not being able to be fully implemented?

1.6 Research objectives

The above research questions are expanded in the following research objectives:

Research Objective 1

To investigate whether manufacturing companies which implement the ISO 9000 quality management system are better at implementing quality tools and techniques in their day-by-day operations compared to those without a quality management system.

This objective seeks to survey the difference in the application of quality tools and techniques. It is probable that the use of quality tools and techniques has become a trend nowadays, and that management has realised their importance, regardless of whether or not the company is ISO 9000-certified

Research Objective 2

To investigate whether sales has an impact on planning, budgeting and training, as well as the method of implementation of quality tools and techniques.

This objective expands on the perception that low sales correlate to little planning, which can consequently affect the implementation of quality tools and techniques. On the other hand, if management puts training and implementation of quality tools and techniques as high priority, then this will appropriately be budgeted for, regardless how much the amount of sales is.

Research Objective 3

To investigate whether companies with higher maturity are more interested in implementing quality tools and techniques.

This objective aims to determine if age determines the level of interest in the use of quality tools and techniques. Some quarters assume that companies with higher maturity sometimes ignore the importance of quality tools and techniques as they may think that they can survive in the market due to their name and the fact that they are well received by their customers.

Research Objective 4

To investigate whether the number of workforce correlates to the problem of teamwork and communication, which affect the effectiveness of quality tools and techniques implementation.

This objective is to determine whether the number of head count correlates to teamwork and communication problems which can result in quality tools and techniques not being able to be fully implemented. Logically, if there are too many people, there will be teamwork and communication issues. However, with today's advances in telecommunication technology, the problem of communication should not be an excuse anymore. In addition, with motivation and team-building techniques now available, teamwork can be made to be more effective. Therefore, the number of head count should not correlate to the problems of teamwork and communication.

1.7 Limitations of the study

The study is limited to manufacturing companies in Perlis and Kedah only. Hence, the findings of the study may not be representative of all manufacturing companies in Malaysia apart from the two states in the country. Data collected from other states might differ due to different state-specific economic infrastructure and different working environments of the organisation.

1.8 Significance of the study

The findings of the study provide an insight of respondents' points of view on the implementation of quality tools and techniques in the companies they work for. This will expand the understanding of the effect quality tools and techniques practices on manufacturing companies in Perlis and Kedah. This in turn contributes

to the body of knowledge of how quality tools and techniques are implemented in manufacturing companies in the two Malaysian states.

The outcome of the study enables organisations to re-evaluate their current quality practices and to plan further actions where necessary.

1.9 Summary

The study is reported in this thesis which is divided into five chapters. Chapter One presents the background of the study, statement of problem, purpose of the study, research questions, research objectives and brief methodology, limitations of the study and significance of the study. Chapter Two provides a review of the literature relating to quality, Total Quality Management (TQM), quality tools and techniques, and reports of their use in manufacturing organisations. Chapter Three describes the research methodology as well as the theoretical framework of the study. It elaborates on the research variables, research hypothesis, development of research instruments (questionnaire and structured interview), and their reliability and validity. Chapter Four presents the results of the research. Here, descriptive statistics, reliability analysis, independent T-Test, and one-way analysis of variance (ANOVA) are utilised in order to answer the research questions. Lastly, Chapter Five concludes the findings of the study, and proposes the recommendations for future research.