1

PM-1 3 1/2" x 4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

PRECISIONSM RESOLUTION TARGETS

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

**AN EVOLUTIONARY PROCESS MODEL FOR THE EFFECTIVE DESIGN
AND IMPLEMENTATION OF FORMAL BENCHMARKING**

by

Greg Burke, B.Comm. (Honours)

**A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of**

Master of Management Studies

School of Business

Carleton University

Ottawa, Ontario

January 1995

© Copyright

1995, Greg Burke

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

THE AUTHOR HAS GRANTED AN
IRREVOCABLE NON-EXCLUSIVE
LICENCE ALLOWING THE NATIONAL
LIBRARY OF CANADA TO
REPRODUCE, LOAN, DISTRIBUTE OR
SELL COPIES OF HIS/HER THESIS BY
ANY MEANS AND IN ANY FORM OR
FORMAT, MAKING THIS THESIS
AVAILABLE TO INTERESTED
PERSONS.

L'AUTEUR A ACCORDE UNE LICENCE
IRREVOCABLE ET NON EXCLUSIVE
PERMETTANT A LA BIBLIOTHEQUE
NATIONALE DU CANADA DE
REPRODUIRE, PRETER, DISTRIBUER
OU VENDRE DES COPIES DE SA
THESE DE QUELQUE MANIERE ET
SOUS QUELQUE FORME QUE CE SOIT
POUR METTRE DES EXEMPLAIRES DE
CETTE THESE A LA DISPOSITION DES
PERSONNE INTERESSEES.

THE AUTHOR RETAINS OWNERSHIP
OF THE COPYRIGHT IN HIS/HER
THESIS. NEITHER THE THESIS NOR
SUBSTANTIAL EXTRACTS FROM IT
MAY BE PRINTED OR OTHERWISE
REPRODUCED WITHOUT HIS/HER
PERMISSION.

L'AUTEUR CONSERVE LA PROPRIETE
DU DROIT D'AUTEUR QUI PROTEGE
SA THESE. NI LA THESE NI DES
EXTRAITS SUBSTANTIELS DE CELLE-
CI NE DOIVENT ETRE IMPRIMES OU
AUTREMENT REPRODUITS SANS SON
AUTORISATION.

ISBN 0-315-98623-9

Canada

Name GREG BURKE

Dissertation Abstracts International is arranged by broad, general subject categories. Please select the one subject which most nearly describes the content of your dissertation. Enter the corresponding four-digit code in the spaces provided.

MANAGEMENT

SUBJECT TERM

0454

SUBJECT CODE

U·M·I

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS

Architecture 0729
Art History 0377
Cinema 0900
Dance 0378
Fine Arts 0357
Information Science 0723
Journalism 0391
Library Science 0399
Mass Communications 0708
Music 0413
Speech Communication 0459
Theater 0465

EDUCATION

General 0515
Administration 0514
Adult and Continuing 0516
Agricultural 0517
Art 0273
Bilingual and Multicultural 0282
Business 0688
Community College 0275
Curriculum and Instruction 0727
Early Childhood 0518
Elementary 0524
Finance 0277
Guidance and Counseling 0519
Health 0680
Higher 0745
History of 0520
Home Economics 0278
Industrial 0521
Language and Literature 0279
Mathematics 0280
Music 0522
Philosophy of 0998
Physical 0523

Psychology 0525
Reading 0535
Religious 0527
Sciences 0714
Secondary 0533
Social Sciences 0534
Sociology of 0340
Special 0529
Teacher Training 0530
Technology 0710
Tests and Measurements 0288
Vocational 0747

LANGUAGE, LITERATURE AND LINGUISTICS

Language 0679
General 0289
Ancient 0290
Linguistics 0291
Modern
Literature 0401
General 0294
Classical 0295
Comparative 0297
Medieval 0298
Modern 0316
African 0591
American 0305
Asian 0352
Canadian (English) 0355
Canadian (French) 0593
English 0311
Germanic 0312
Latin American 0315
Middle Eastern 0313
Romance 0314
Slavic and East European

PHILOSOPHY, RELIGION AND THEOLOGY

Philosophy 0422
Religion
General 0318
Biblical Studies 0321
Clergy 0319
History of 0320
Philosophy of 0322
Theology 0469

SOCIAL SCIENCES

American Studies 0323
Anthropology 0324
Archaeology 0326
Cultural 0327
Physical
Business Administration
General 0310
Accounting 0272
Banking 0770
Management 0454
Marketing 0338
Canadian Studies 0385
Economics
General 0501
Agricultural 0503
Commerce-Business 0505
Finance 0508
History 0509
Labor 0510
Theory 0511
Folklore 0358
Geography 0366
Gerontology 0351
History 0578

Ancient 0579
Medieval 0581
Modern 0582
Black 0328
African 0331
Asia, Australia and Oceania 0332
Canadian 0334
European 0335
Latin American 0336
Middle Eastern 0333
United States 0337
History of Science 0585
Law 0398
Political Science
General 0615
International Law and Relations 0616
Public Administration 0617
Recreation 0814
Social Work 0452
Sociology
General 0626
Criminology and Penology 0627
Demography 0938
Ethnic and Racial Studies 0631
Individual and Family Studies 0628
Industrial and Labor Relations 0629
Public and Social Welfare 0630
Social Structure and Development 0700
Theory and Methods 0344
Transportation 0709
Urban and Regional Planning 0999
Women's Studies 0453

THE SCIENCES AND ENGINEERING

BIOLOGICAL SCIENCES

Agriculture 0473
General 0285
Agronomy
Animal Culture and Nutrition 0475
Animal Pathology 0476
Food Science and Technology 0359
Forestry and Wildlife 0478
Plant Culture 0479
Plant Pathology 0480
Plant Physiology 0817
Range Management 0777
Wood Technology 0746

Biology
General 0306
Anatomy 0287
Biostatistics 0308
Botany 0309
Cell 0379
Ecology 0329
Entomology 0353
Genetics 0369
Limnology 0793
Microbiology 0410
Molecular 0307
Neuroscience 0317
Oceanography 0416
Physiology 0433
Radiation 0821
Veterinary Science 0778
Zoology 0472

Biophysics
General 0786
Medical 0760

EARTH SCIENCES

Biogeochemistry 0425
Geochemistry 0996

Geodesy 0370
Geology 0372
Geophysics 0373
Hydrology 0388
Mineralogy 0411
Petrology 0345
Paleoecology 0426
Paleontology 0418
Paleozoology 0985
Polynology 0427
Physical Geography 0368
Physical Oceanography 0415

HEALTH AND ENVIRONMENTAL SCIENCES

Environmental Sciences 0768
Health Sciences
General 0566
Audiology 0300
Chemotherapy 0992
Dentistry 0567
Education 0350
Hospital Management 0769
Human Development 0758
Immunology 0982
Medicine and Surgery 0564
Mental Health 0347
Nursing 0569
Nutrition 0570
Obstetrics and Gynecology 0380
Occupational Health and Therapy 0354
Ophthalmology 0381
Pathology 0571
Pharmacology 0419
Pharmacy 0572
Physical Therapy 0382
Public Health 0573
Radiology 0574
Recreation 0575

Speech Pathology 0460
Toxicology 0383
Home Economics 0386

PHYSICAL SCIENCES

Pure Sciences
Chemistry
General 0485
Agricultural 0749
Analytical 0486
Biochemistry 0487
Inorganic 0488
Nuclear 0738
Organic 0490
Pharmaceutical 0491
Physical 0494
Polymer 0495
Radiation 0754
Mathematics 0405
Physics
General 0605
Acoustics 0986
Astronomy and Astrophysics 0606
Atmospheric Science 0608
Atomic 0748
Electronics and Electricity 0607
Elementary Particles and High Energy 0793
Fluid and Plasma 0759
Molecular 0609
Nuclear 0610
Optics 0752
Radiation 0756
Solid State 0611
Statistics 0463

Applied Sciences

Applied Mechanics 0346
Computer Science 0984

Engineering
General 0537
Aerospace 0538
Agricultural 0539
Automotive 0540
Biomedical 0541
Chemical 0542
Civil 0543
Electronics and Electrical 0544
Heat and Thermodynamics 0348
Hydraulic 0545
Industrial 0546
Marine 0547
Materials Science 0794
Mechanical 0548
Metallurgy 0743
Mining 0551
Nuclear 0552
Packaging 0549
Petroleum 0765
Sanitary and Municipal 0554
System Science 0790
Cerotechnology 0428
Operations Research 0796
Plastics Technology 0795
Textile Technology 0994

PSYCHOLOGY

General 0621
Behavioral 0384
Clinical 0622
Developmental 0620
Experimental 0623
Industrial 0624
Personality 0625
Physiological 0989
Psychobiology 0349
Psychometrics 0632
Social 0451

**The undersigned recommend to the Faculty of Graduate Studies
and Research acceptance of the thesis**

**AN EVOLUTIONARY PROCESS MODEL FOR THE EFFECTIVE DESIGN
AND IMPLEMENTATION OF FORMAL BENCHMARKING**

**submitted by Greg Burke, B.Comm. (Honours)
in partial fulfilment of the requirements for
the degree of Master of Management Studies**

Thesis Supervisor

Director, School of Business

Carleton University

January 3, 1995

ABSTRACT

AN EVOLUTIONARY PROCESS MODEL FOR THE EFFECTIVE DESIGN AND IMPLEMENTATION OF FORMAL BENCHMARKING

Greg Burke

The objective of this research is to examine the introduction and development of benchmarking, (BMK) practices within organizations. A number of benchmarking key success factors have been derived from the literature. These factors include the level of top management support, benchmarking knowledge and expertise, quality maturity, team skills, process owner involvement, performance expectations, structural characteristics, and the link to the customer. These success factors were used to define a model which characterizes the stages of benchmarking evolution. The model was tested by comparing the patterns of introduction and development within several firms that have utilized benchmarking practices. The results of the analysis identified two more refined models of benchmarking development. Each model addresses key managerial considerations when planning BMK use; in addition, the models may be employed as roadmaps to guide the efforts of managers currently using BMK within their organizations.

ACKNOWLEDGEMENTS

I would like to thank the School of Business for providing the opportunity to do this research. Financial support for this thesis came from the Research Program in Managing Technological Change in Manufacturing at Carleton University. The sponsors are: the Natural Sciences and Engineering Research Council, the Social Sciences and Humanities Research Council, the Semiconductor Components Group of Northern Telecom Ltd., Mitel Corp., Gandalf Data Ltd., and Lumonics Inc. I am also indebted to the many respondents in the companies that participated in my research.

I would also like to express my gratitude to my thesis supervisor, Donald Gerwin, and to my thesis committee members, Oscar Hauptman, and Moses Kiggundu for their assistance and efforts throughout this effort. I would also like to thank Joe Hatz for his input into the thesis.

TABLE OF CONTENTS

ACCEPTANCE SHEET	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF APPENDICES	ix
CHAPTER 1 INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 WHAT IS BENCHMARKING AND WHAT ARE ITS BENEFITS	3
1.3 OBJECTIVES OF THE STUDY AND RESEARCH QUESTION	8
CHAPTER 2 LITERATURE REVIEW	11
2.1 BENCHMARKING LITERATURE	11
2.1.1 OVERVIEW	11
2.1.2 KEY BENEFITS OF BENCHMARKING	15
2.1.3 TYPES OF BENCHMARKING	16
2.1.4 REPRESENTATION OF THE BENCHMARKING USER PROCESS	17
2.2 LITERATURE ON INNOVATION	18
2.2.1 OVERVIEW	18
2.2.2 STAGES OF INNOVATION	19
2.2.3 BENCHMARKING AS AN INNOVATION	24
2.3 LITERATURE ON ORGANIZATIONAL LEARNING	28
2.3.1 OVERVIEW	28
2.3.2 BENCHMARKING AS A LEARNING MECHANISM	28
2.4 SELECTED LITERATURE ON PROCESS EVOLUTION AND ASSESSMENT	31
2.4.1 AN ORGANIZATIONAL EVOLUTION PERSPECTIVE	31
2.4.2 RELATIONSHIP OF ORGANIZATIONAL EVOLUTION MODEL TO BENCHMARKING DEVELOPMENT	34
2.4.3 THE SOFTWARE ENGINEERING INSTITUTE SOFTWARE MATURITY FRAMEWORK	35
2.4.4 THE SEI MODEL AND BENCHMARKING DEVELOPMENT	40

CHAPTER 3	A DEVELOPMENTAL MODEL OF THE BENCHMARKING PROCESS AND RESEARCH PROPOSITIONS	41
3.1	CRITICAL SUCCESS FACTORS	41
3.1.1	OVERVIEW	41
3.1.2	WHY USE KEY SUCCESS FACTORS TO DEMONSTRATE DEVELOPMENT ?	42
3.1.3	KEY SUCCESS FACTORS OF THE BENCHMARKING PROCESS	43
3.1.4	SYNTHESIS	52
3.2	STAGE 1: BEGINNER	54
3.3	STAGE 2: INTERMEDIATE/SKILLED	56
3.4	STAGE 3: KNOWLEDGEABLE/ADVANCED	58
3.5	STAGE 4: PROFICIENT	60
CHAPTER 4	RESEARCH METHOD	62
4.1	POPULATION	62
4.2	SAMPLING DESIGN	63
4.3	SAMPLING UNIT	65
4.4	STUDY PROCEDURES	67
4.5	DATA ANALYSIS PROCEDURES	69
4.6	VALIDITY AND RELIABILITY ISSUES	73
CHAPTER 5	DISCUSSION OF RESULTS	76
5.1	COMPARISONS BETWEEN RESPONDENT DATA AND RESEARCH PROPOSITIONS	76
	PROPOSITION 1	76
	PROPOSITION 2	89
	PROPOSITION 3	101
	PROPOSITION 4	117
CHAPTER 6	ANSWER TO RESEARCH QUESTION, MANAGERIAL IMPLICATIONS, AND LIMITATIONS OF THE STUDY	130
6.1	ANSWER TO RESEARCH QUESTION	135
6.2	MANAGERIAL IMPLICATIONS	144
6.3	RESEARCH IMPLICATIONS	149
6.4	BENEFITS OF THE STUDY	153
6.5	LIMITATIONS OF THE STUDY	154
REFERENCES		156

LIST OF TABLES

Table	Description	Page
1	Comparing Benchmarking With Related Activities	3A
2A	Summary of Propositions For Central Effort Firms	131
2B	Summary of Propositions For Non-Central Effort Firms	133

LIST OF FIGURES

Figure	Description	Page
1	A Comparison of Process Models and Stages	52A
2	A Developmental Model of Benchmarking	54A
3A	Revision of Developmental Model Beginner Stage	87A
3B	Revision of Developmental Model Intermediate/Skilled Stage	100A
3C	Revision of Developmental Model Knowledgeable/Advanced Stage	115A
3D	Revision of Developmental Model Proficient Stage	128A
4A	Revised Model of Development for Central Effort Firms	135A
4B	Revised Model of Development for Non-Central Effort Firms	135B

LIST OF APPENDICES

Appendix	Description	Page
A	Quantitative Questionnaire	160
B	Qualitative Questionnaire	170
C	Descriptive Statistics	175
D	t-Test For Differences In Means	187

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A benchmark can be described as a "best-in-class" achievement. It can be a level of service provided, a process, or a product attribute that sets a standard in excellence against which others are compared. The formal benchmarking process is a systematic and continuous approach which involves identifying a benchmark, comparing against it, and identifying practices and procedures that will enable firms to become the new best-in-class (Camp 1989, Spendolini 1992). Benchmarking practices trigger discontinuous and incremental improvements in products, processes, and services, which ultimately lead to competitive advantage and customer satisfaction (Camp 1989).

Effective benchmarking is not simply comparing the performance of one company to another. It is an active search process that identifies which companies are best at performing specific activities, uncovering why they are the best, and transferring that knowledge into action plans which can be used to improve existing practices above and beyond the current "best-in-class".

Formal definitions of the process often differ between firms based on their experiences and their perceptions of benchmarking as a practice (Mittelstaedt 1992). Xerox, a pioneer of benchmarking strategy and practices defines it as

"...the continuous process of measuring our products, services and practices against our toughest competitors or those companies renowned as the industry leaders."

Evans-Correia 1991, 135

Related definitions provided by the International Benchmarking Clearinghouse read:

"...a process in which companies target key improvement areas within their firms, identify and study best practices by others in these areas, and implement new processes and systems to enhance their own productivity and quality."

Mittelstaedt 1992, 302

and

"...the process of continuously comparing and measuring an organization with leaders anywhere in the world to gain information that will help the organization take action to improve its performance."

American Productivity and
Quality Centre 1992

The common theme running through each definition is that benchmarking uses external comparisons to promote change and to make both discontinuous and incremental improvements in products, processes and services which ultimately lead to a source of competitive advantage through improved customer satisfaction (Camp 1989).

Frequent problems for which the benchmarking process would be used in practice include: identification of a problem or weakness in the organization, low customer satisfaction, the need to establish new levels of quality, performance or cost, or wanting to know how a firm's products rank against those of the competition in terms of reliability, functionality, and cost (Digital Equipment Corp. 1992).

1.2 WHAT IS BENCHMARKING AND WHAT ARE ITS BENEFITS

While benchmarking is a distinct quality improvement activity, it is not intended to be a standalone process, but rather an integral component of a comprehensive total quality management (TQM) program. TQM programs encompass quality control tools and methods which include, but are not limited to quality function deployment, statistical quality control, and cycle time reduction (Digital Equipment Corp. 1992, Gunn 1992).

Benchmarking promotes proactive change in that the focus is not only on quantifiable results (metrics) but on identifying practices and processes (enablers) that produce superior products and services (Bogan and English 1994, Digital Equipment Corp. 1992, Watson 1993). Therefore, when BMK is added to TQM programs, the framework for achieving total customer satisfaction and cost competitiveness is strengthened (Digital Equipment Corp. 1992, Thor 1994, Watson 1993).

It is important to note that benchmarking is a distinct information gathering activity that is separate from other comparable processes which include site visits, reverse engineering, competitive analysis, and reengineering (See Table 1). Site visits are often used for idea generation, but generally lack the focus required for the transfer and application of new practices. Reverse engineering is concerned with the functionality and characteristics of

Table 1
Comparing Benchmarking With Other Activities

Elements	Site Visits	Reverse Engineering (Tear Down)	Competitive Analysis	Reengineering	Benchmarking
Purpose	General Information Gathering, Learning New Ideas	Comparison to Similar Product	Influence on Business Decisions	Redesign of Existing Management Processes	Change Leading To Improvement in Customer Satisfaction
Focus	Usually Undefined	Characteristics and Functionality	Competitive Strategies and Tactics	Process Chars, Measures, and Methods	Best Practices and Methods
Application	May or May Not Directly Apply	Mainly Manufactured Products	Markets, Products, Functions and Services	Organizational Process Redesign	Products, Processes, Functions, Sales and Services
Information Sources	Anyone	Competitors	Competitors and Industry Analysis	Internal Sources, Competitors, Customers, Suppliers	Best-In-Class Worldwide Leaders and Competitors

Source: Digital Equipment Corporation, "Introduction to Benchmarking", 1992. (with modifications).

competing products, without examining the processes used to produce them. Traditional competitive analysis is generally used to influence business decisions, relying on information relating to markets, products, and services relative to industry competitors. Reengineering focuses on the radical redesign of a company's processes, organization, and culture (Hammer and Champy 1993). Contemporary benchmarking differs from all of these practices in that it places heavy emphasis on processes and practices, rather than an "after the fact" analysis, although it can include reverse engineering, site visits, or competitive analysis as a subset or element of the information gathering process.

The practice of benchmarking was first given prominence in the early 1980's when used as an improvement tool by Xerox to meet required levels of product cost and quality. In the mid-1970's, Japanese manufacturers began to enter the low price copier market. Their products were cheap, reliable, and easy to use. Xerox watched their share of the U.S. copier market drop from 96 to 46 percent (Garvin 1988). To address this challenge, the corporation underwent a restructuring from a functional basis to a strategic business unit basis. Divisional management also began to study Japanese quality practices, including a careful analysis of Fuji-Xerox, its joint venture in Japan. As a result of the study, new quality programs were put in place, including a large scale benchmarking initiative (Camp 1989, Pryor 1989).

The introduction of benchmarking marked a major philosophical shift for the company. Once an introspective company that focused solely on its own performance, Xerox began to focus on external competitors, relative improvement, and the identification and reduction of performance gaps (Camp 1989, Garvin 1988). As a result of these initiatives, some of the gains to date that can be attributed to the introduction of benchmarking (Garvin 1988) include:

- Unit manufacturing costs are half of comparable 1980 product costs for the same products.
- Machine defects have decreased by over 90%.
- Inventory months of supply has been reduced by at least two-thirds.
- Service labour costs have been reduced by 30% since the inception of benchmarking.

Recent statistics from the International Benchmarking Clearinghouse in Houston, Texas (American Productivity and Quality Centre 1992) based on a survey of 76 of its member firms indicate:

- Benchmarking is a necessary tool for survival, but most firms do not know how to do it. Ninety-five percent of the companies surveyed agreed that most firms do not know how to benchmark, and eighty-nine percent believed success can take place only if top management is committed to the process.

- Leading companies from most industries are benchmarking, and ninety percent of the benchmarkers have an active TQM program under way.
- Most firms consider themselves to be beginning users of benchmarking.
- The factors encouraging firms to benchmark include top management commitment and the desire for improved customer service, financial performance, and product development cycle and delivery time.
- Eighty percent of the firms indicated that they use a benchmarking process model, but the specific number and nature of steps varies greatly. Common steps in the benchmarking process include preparing, researching, selecting benchmarking partners, collecting and sharing information, analysing, adopting and improving.
- The key factors in benchmarking are "understanding your process" and "process owner involvement". A process owner is a group or individual directly responsible for a given function or operation and who assumes the risk and responsibility associated with it.
- Benchmarking studies fail because of poor planning, lack of process owner involvement, lack of top management support, and insufficient skills.

Until the late 1980's, very little emphasis was placed on benchmarking, either as a dedicated process, or part of a larger improvement program (Camp 1989, Grayson 1992,

Spendolini 1992). The emphasis on benchmarking has changed markedly in the 1990's, and numerous reasons have been cited as to why benchmarking must play a larger role in competitive strategy at both the national and organizational level.

"If the U.S., collectively, doesn't benchmark, it is likely to lose in global competition."

Grayson 1992, 8

Grayson, Chairman of the APQC, notes the failure of U.S. industry to learn the competitive practices of other nations, which has greatly contributed to America's lagging productivity growth relative to competing nations. Although some improvements in competitiveness are being made in selective industries, he argues the process is "neither fast nor deep enough" to maintain competitive positions. Grayson argues that the two best change tools available to accelerate the competitiveness of U.S. firms, are TQM and benchmarking (ibid).

This point of view is well shared by leading benchmarking firms and industry consultants. Other arguments propelling benchmarking forward as a competitive tool include 1) the potential for breakthrough thinking, process change and idea sharing 2) the introduction of benchmarking as a key criterion of the Malcolm Baldrige National Quality Award, and 3) the above mentioned increase in global competition (American Productivity and Quality Centre 1992, Bogan and English 1994, Camp 1989, Grayson 1992, Mittelstaedt, 1992, Spendolini 1992, Watson 1993).

1.3 OBJECTIVES OF THE STUDY AND RESEARCH QUESTION

The information I obtained from involvement in a local benchmarking interest group has demonstrated that benchmarking is not as widely practised as other tools of total quality management. Although benchmarking is not a "cure all" improvement practice, it can be used to increase the competitive stance of firms by promoting performance targets that are based on hard data. However, its potential as a quality tool has not been tapped by many organizations; in fact, many firms in the above mentioned local group were just beginning to explore benchmarking. Part of the problem for these firms was the lack of applied literature on the subject. Many of the interest group members simply did not know where to begin, others wanted to see concrete results from benchmarking studies before they planned to undertake one of their own. In addition, most firms in the group were unsure if they could benchmark given the absence of processes they felt had to be in place in order to support a benchmarking project. These problems suggest that some framework of how benchmarking practices are introduced and evolve is warranted.

The purpose of this research is to introduce a formal developmental model of the benchmarking process by identifying key variables in the benchmarking process that evolve over time as the firm's use of benchmarking increases. These variables include key factors for benchmarking to be successful such as the level of top management support, team

skills and training, and ownership of the benchmarking process.

These variables will be used to define and characterize stages of benchmarking evolution. For example, there should be an initial stage during which the firm is introduced to the concept of benchmarking. The stage should contain some specific activities and events such as seminars or overviews provided to senior managers (by specialized external consultants) on the potential value of benchmarking. The outcomes of these activities would affect how benchmarking would evolve within the company leading to the creation of additional stages of development. The results of this research can be used to generate insight into the process of benchmarking development and to indicate some of the roadblocks and facilitators to the practice at each stage of evolution.

The specific research question to be addressed in this thesis is:

What are the stages of benchmarking development within organisations and how do variables that characterize effective benchmarking and organisational support for effective benchmarking change over time ?

To address the research question, numerous areas of literature will be reviewed. First, the benchmarking literature, especially on user process models (the steps required to conduct a benchmark study) will be examined in

order to extract key success factors (which are the variables that characterize effective BMK and BMK support) of the benchmarking process. Secondly, an examination will be made of selected literature on the innovation process, and on organizational learning. Finally, a number of developmental process models from the social science domain will be analyzed, in order to draw parallels between these models and the development of benchmarking. From these sources of research, a theoretical model of benchmarking development will be proposed.

It should be noted that there is literature on evolutionary processes which depends on biological analogies (Campbell 1969, McKelvey 1981). However, this research tends to focus on populations of organizations undergoing change, rather than on the change processes within specific organizational types. Therefore, this literature will not be integrated into this study.

CHAPTER 2

LITERATURE REVIEW

In section 2.1, I will overview a number of benchmarking articles and publications that cover the basic tenets of BMK, rationale for BMK use, and the steps required to undertake BMK studies. In section 2.2, I will examine the process of innovation, and relate some key concepts of innovation theory to possible parallels in BMK innovation and development. In section 2.3, I will demonstrate how BMK serves as a means of organizational learning, and how initial learning can be used to foster BMK evolution. Finally, in section 2.4, I will illustrate two existing models of evolution which will be used to develop a preliminary model of BMK development.

2.1 BENCHMARKING LITERATURE

2.1.1 OVERVIEW

Although literature on the subject of benchmarking has increased as a result of the factors noted above, it is still not well developed. In particular, there is a lack of research oriented literature on the benchmarking process. This presents a problem for many managers in that the existing research is mainly conceptual in nature, and provides little insight on the practical application of the benchmarking process and related issues. The aim of this paper is to provide some empirical research that will clarify some of the key issues managers will face should they wish to introduce benchmarking to their organizations.

Based on discussions with benchmarking managers and consultants, some of the reasons for this shortage of empirical work include:

- benchmarking provides an important strategic advantage and as such, detailed information on its use and results is guarded internally,
- benchmarking cases cover proprietary subjects, and
- several benchmarking specialists noted that with respect to benchmarking case studies, often the information is not that proprietary, but the gains and insights yielded from the study indicated significant weaknesses in current operations which might prove embarrassing and even damaging.

The discussions also revealed that most firms were willing to discuss the application of benchmarking within their firms. The proprietary issues were more related to the types of benchmarking performed, the nature of a particular study, and benchmarking partner confidentiality. By avoiding the specific issues of a benchmarking study, and focusing on the related processes and activities, information can be more readily acquired. Firms that intend to examine benchmarking as a practice will have significantly greater interest in how the process is introduced and disseminated within organizations. This paper will provide insight on these issues, as well as identify practical considerations such as

facilitators and roadblocks to the development and use of benchmarking.

The available literature can be divided into three main groupings. The first category focuses on the need to implement benchmarking practices in order to remain competitive. This literature provides a generic overview of the process of benchmarking (ie: basic principles of BMK as a quality tool), and often provides suggestions for undertaking small scale studies (Bemowski 1991, Camp 1989, Maturi 1990, Mittelstaedt 1992, Spendolini 1992).

While this literature is useful for learning about benchmarking basics, it is of little use to those wishing to explore the topic in greater depth. However, recent literature from the benchmarking community (Bogan and English 1994, Kaiser Associates 1994, Thor 1994, Watson 1993) has begun to examine benchmarking in much greater depth. This newer literature has addressed some of the limitations of earlier publications by adding a strategic and organizational competitiveness dimension to benchmarking use.

The second category of literature focuses on benchmarking methods, strategies and detailed models that can be employed by each organization in conducting studies. Noted benchmarking companies such as AT&T, Motorola, Digital Equipment Corporation, and Xerox have each developed multistage user process models which can be used either as is, or as baseline guides for a customized user process unique to

each organization (Camp 1989, Digital Equipment Corp. 1992, Mittelstaedt 1992, Watson 1993). It should be pointed out that these multistage process models are for the benchmarking user process (ie: step by step how-to guides), and do not address how the practice of benchmarking itself develops and evolves within organizations.

While these models are useful for developing a benchmark framework, they do not permit firms to assess their current abilities to successfully implement benchmarking practices. This research will go beyond existing user process models to address how benchmarking developed within several firms. It will examine some of the key issues and choices that have made benchmarking practices an integral part of corporate strategy in some firms, and an insignificant peripheral activity in others.

The final category of benchmarking literature is that of case examples. Some firms will share their benchmarking experiences, generically citing the qualitative and quantitative improvements they have obtained through successful projects (Bogan and English 1994, Camp 1989, Mittelstaedt 1992, Pryor and Katz 1993, Watson 1993). However, many benchmarking projects cover areas that are proprietary in nature. Additionally, the strategic value of benchmarking is seen as a competitive advantage. This often results in case examples that are not only vague with respect to information disclosure, but also to the ways in which

information was elicited and collected.

The body of literature on benchmarking is growing, but a review of a large number of articles, papers, and journals on the subject all reiterate the same concepts and ideas put forth from the start, providing minimal value-added to managers wanting to go beyond benchmarking basics. The value of this research will be in its empirical approach; to elaborate on existing benchmarking practices in several organizations and provide direction for firms wanting to learn more about the topic.

2.1.2 KEY BENEFITS OF BENCHMARKING

Benchmarks establish a standard of excellence that legitimize organizational goals and objectives since they are proven achievements (Camp 1989, Watson 1993). This motivates employees to set realistic and challenging goals, and to set higher performance standards since the external focus on the benchmark reduces resistance to change (Spendolini 1992, Thor 1994).

As noted above, BMK allows for consistent and objective decision making based on objective data rather than intuition. Through the adoption of best practices, productivity can increase, technological breakthroughs result, and new industry leaders are established.

Possibly the most important benefit is the customer focus that is the core of the benchmarking process. When considering the role that customers play in new product

development, lead user processes, and their overall importance as the lifeblood of a corporation, it is critical that customer requirements set the direction for any firm's benchmarking activities (Digital Equipment Corp. 1992, Thor 1994).

A final benefit that BMK can provide is in its potential to effect long term strategic change. While the short term orientation of benchmarking is to catch up to an industry leader, the long term goals of the process are to eventually leapfrog these leaders and push the organization to become the new best-in-class (Camp 1989, Spendolini 1992).

2.1.3 TYPES OF BENCHMARKING

There are four general types of benchmarking:

- 1) **Internal to the organization:** While this arrangement has advantages relating to common data measures and confidentiality concerns, there are also negative aspects to this approach including internal biases, and the fact that the internal partner may not be the best-in-class.
- 2) **Functional:** By comparing business functions that are similar to those of firms in similar industries, the prospects for knowledge sharing and corporate acceptance are favourable, but can lead to missed chances by examining the process too carefully instead of examining the nature of the work (ie: they examine similar practices in their industry, instead of any industry performing similar practices).

- 3) **Competitor:** While clearly identifying advantages and disadvantages, many firms are reluctant to share strategic information with competitors, or are uncooperative. Legal issues can also be a significant concern in price competitive industries. A final consideration is that firms may assume that competitors have the best practices, when in fact they may not.
- 4) **Generic:** Choosing organizations with similar products in different industries (ie: automobile and small plane engines) is a common form of benchmarking, and can provide insight to practices that may not yet exist in particular business domains. The risk involved is that practices observed may not be easily transferable across industries.

2.1.4 REPRESENTATION OF THE BENCHMARKING USER PROCESS

The user process can be defined as the steps taken in conducting a benchmarking study. They are well defined, sequential methods that aim to lead users through the various stages of a benchmarking project (Hatz 1993, Thor 1994). Numerous companies have developed multistage models of the process, including Digital (4 quadrant), Xerox (10 step), AT&T (12 step), Alcoa (6 step), and IBM (14 step). Although each firm may tailor a process to their own needs, each process model incorporates five basic activities, which include determining what to benchmark, team formation, partner

identification, data collection and analysis, and results implementation (Spendolini 1992).

The user process addresses how to conduct a step-by-step benchmarking process. It also provides indications of the resource commitments required by the firm in order to undertake benchmarking studies. In addition, critical success factors of the user process may be useful variables to measure benchmarking evolution. Since the user process will bring to light a number of factors critical to the evolution of the practice, several user process models were examined and a number of benchmarking success factors were drawn from them. A more detailed overview of the user process may be obtained from a number of sources (American Productivity and Quality Centre 1992, Camp 1989, Mittelstaedt 1992, Spendolini 1992, Watson 1993).

2.2 LITERATURE ON THE PROCESS OF INNOVATION

2.2.1 OVERVIEW

It is important to note that benchmarking is not a technological innovation process, but a managerial one since it relies on a reconfiguration of existing management practices and methods rather than on the use of new tools or technologies. Introducing a managerial innovation will require the support of a significant number of individuals within the organization (Daft 1978, Kimberly 1981). Without this support, internal resistance may arise from real or perceived incompatibilities between the nature of the

innovation and the existing configuration of interests and resources (Kelley 1976, Walton 1975), making the likelihood of adoption poor.

While technical innovations often come from experts in the technical core of the organization (Zaltman et. al. 1973, Daft 1978), managerial innovations frequently originate from administrative levels (Daft 1978). Regardless of the source, organizations must develop the ability to critically evaluate internal and external contingencies, in order to adopt innovations that provide them the greatest utility, while discarding those that do not measure up to minimum expectations (Kimberly 1981).

It is also important to recognize that not all managerial innovations will be right for all organizations at the same point in time. At any given time, organizations are in different stages of their life cycles, and facing different internal and external constraints. What is appropriate for one firm may be wholly inappropriate for another (Kimberly 1981).

2.2.2 STAGES OF INNOVATION

The value of a stage model for the development of an innovation can be argued from two aspects. Hage (1980) notes that conflicts and resistances are more likely to occur at certain times during the innovation change process, thus distinguishing between these time periods is worthwhile. More importantly, each stage represents a new functional problem

that must be addressed by those advocating the use of an innovation. Hage and Aiken (1970) and Hage (1980) present a four stage model of the organizational change process that highlights key innovation stages, as well as the key functional problems present at each stage. This model has also been supported by additional research, (Clark, McLoughlin, Rose and King 1988, Hall 1982) suggesting that it has remained a reliable overview of the innovation process.

First there is the Evaluation stage, which focuses on what Hage and Aiken term pattern "maintenance" and the determination of "performance gaps". Performance gaps are defined as "discrepancies between what the organization could do by virtue of a goal-related opportunity in its environment, and what it actually does in terms of exploiting that opportunity" (Zaltman et. al. 1973, 14). The performance gap may be characterized by new competitive challenges such as increased competition, newly developed markets, new technological advancements, and increased regulatory pressures. It is also important to note that these gaps often develop as a result of an organization setting new levels of performance expectations. These events evoke change across one or more levels, which may create or widen gaps between the organization's current and normative performance in light of changes in the external or the internal environment (ibid).

This gap may exist for a period of time during which it is unnoticed, and may never be recognized. Once aware of the

gap, a need can be said to exist. This involves a second assumption; that the performance gap is perceived by the organization as having significant adverse consequences if it is not narrowed or bridged (ibid). The existence of awareness and need act to unfreeze elements within the organization most closely related to the change. This precipitates conditions for altering the structure and function of the organization or one or more subsystems or processes. As a result, a search begins for methods to narrow or close the performance gap. An internal search can be performed to determine if the organization has the internal knowledge and resources to develop a solution independent of external sources.

An external search can permit the adoption of existing practices, or indicate the need for directed research and development to uncover solutions. As a result of the search process, a number of alternatives may be discovered, which introduces a decision making process to be undertaken by relevant individuals within the organization. Once a course of action is chosen, the innovation can initiate social change. An ongoing and active interaction thus occurs between new ideas, practices and products, and social structure and functions. At this point, a number of innovations may be considered as a way to reduce the performance gap, with one or two innovations being championed for their use.

Mohr (1987) provides a different perspective on the evaluation of innovations. He argues that evaluation is not

always a rational process, but often more a subconscious or emotive one. He argues that change need not be driven by a recognized performance gap, but rather by a series of organizational and individual routines (ibid). He listed a series of routine change sub-models that reflect facets of organizational change. These include the discovery of new technologies or practices that appear to be manageable by the organization, imitation (bandwagon effect), status maintenance, market survival, stakeholder satisfaction, and organizational maturation. The value of this perspective is that innovation and the evaluation of new technologies or processes need not be crisis driven, and rational, but rather opportunistic and intuitive.

Secondly, there is the Initiation stage. It is at this stage that a decision is made on whether or not to try the innovation, and if so, to actively search for funding and resources to support the innovation. Hage (1980) notes that many innovations fail at this stage due to lack of funding or available personnel to support the innovation effort. Hage (1980) in his research on radical innovations within the organization noted that as the radicalness of the innovation increased, so did the need for new personnel, new technology, and new funding. He also maintained that new occupations would need to be created to support the innovation.

Thirdly, is the Implementation stage. It is during this stage that significant resistance and conflict may arise as

changes are made in the roles, responsibilities and power structures within the organization (Hage 1980, Hage and Aiken 1970).

Kimberly (1981) notes that organizations may opt for a number of strategies when implementing innovations. These strategies include packaging innovations in a manner to create a receptive environment, reshaping the attitudes and perceptions of organizational members, or recombining interests and resources.

Hage (1980) argued that it was the change in new personnel and technology that tended to cause changes in behaviour, thus increasing role conflict. To alleviate this conflict, he argues it is necessary to get consensus from all organizational stakeholders on what type of performance gap exists, and how the new innovation will address that gap.

Specific facilitators to the implementation process include obtaining user involvement (Ackoff 1967), meeting the needs of managers (Gorry and Morton 1971), creating new roles to facilitate the introduction of the innovation (Quinn 1973), and insuring that the backgrounds of new staff brought in to support the innovation are compatible with existing organizational members' (Hebden 1971). Thus, the implementation stage focuses on goal achievement, namely, reducing the performance gap.

The final stage is Routinization. Routinization is the integration of the innovation into standardized organizational

practices. It is at this stage that the organization decides whether to retain the innovation, or reject it, possibly in favour of another (which would start the process once again at the evaluation stage). Hage (1980) cites several factors which positively influence the routinization of an innovation. They include an organizational consensus on the value of the innovation and an increase in the perceived benefits from the innovation. Routinization is also apt to occur when benefits can be meaningfully and objectively measured and when the net benefits exceed the costs of the innovation. (Gerwin and Kolodny 1992, Hage 1980, Hage and Aiken 1970).

2.2.3 BENCHMARKING AS AN INNOVATION

Since benchmarking is a managerial innovation by nature it should be introduced by management, and trickle down to the rest of the organization (Daft 1978, Kimberly 1981). However, this can create problems, since the nature of benchmarking requires changes at low levels within the organization, often directly impacting upon the roles and responsibilities of experts in the firm's core technologies. These experts are best qualified to assess the suitability of new tools and techniques for their respective areas.

The innovation literature also addresses the role of top management in the adoption and use of innovations. This role may be in the form of support or involvement in initial activities. The nature of this support and related activities is unclear in the context of benchmarking. Commitment is

cited in the benchmarking literature as critical (Camp 1989, Spendolini 1992, Watson 1993) but the nature of the commitment both in the initial and latter stages of benchmarking development is vague, and requires further elaboration.

At the evaluation stage of the innovation process, a central focus of the literature has been to ascertain what factors influence the need to innovate (Hage 1980, Mohr 1987, Tornatzky and Fleisher 1990, Zaltman et. al. 1973). A few possible motivators include the reduction of a performance gap (Zaltman et. al. 1973), or "pattern maintenance" (Hage 1980). Mohr (1987) provides a different, less rational view by embracing a belief that innovation and innovation outcomes may be more subconscious and emotive than rationally deliberate. While the literature on benchmarking advocates the former view of the performance gap as prime motivator (Camp 1989, Mittelstaedt 1992, Spendolini 1992) to introduce benchmarking, it is certainly within the realm of possibility that firms will proactively adopt benchmarking practices within their organizations as a means to develop new challenges and combat future threats.

At the initiation stage of innovation, a significant factor leading to the failure of many innovations is a lack of funding and resources (Hage 1980, Kimberly 1981). This suggests that if benchmarking is to be properly evaluated by the organization, top management will have to support BMK learning at the onset, by providing both funding and

organizational resources to assess its value and potential role within the organization.

Managerial innovations are more likely to be used if organizational subunits are permitted to evaluate potential innovations independently and make their own decisions on implementation (Kimberly 1981). This approach allows placing an innovation initially in a subunit or department that is likely to accept it, allows innovation champions to observe and debug any problems that might be encountered in initial trials, and facilitates subsequent use across the organization (Kimberly 1981). This suggests that process owners who are given the opportunity to test the value of benchmarking at their discretion are likely to be more receptive to the practice than those who are mandated into using it.

Kimberly additionally notes the use of a particular innovation often hinges on the commitment of a key individual. This corresponds to the concept of an idea champion in the benchmarking literature, who pushes for the use of benchmarking while observing various priorities and interests within the organization.

The literature also clearly indicates that organizational innovation and implementation strategies must minimize the amount of role restructuring involved. For those functions that must change, early involvement of participants is critical in order to shape expectations of how the roles will be altered (Alderfer 1976). In the context of benchmarking,

new roles are often created by top management to oversee and assume control of BMK within the organization, thus minimizing the need for role restructuring.

Once an organization has learned about benchmarking practices and possibly initiated a study, it is unclear how the value of benchmarking processes is judged. There are in fact, two issues to address. The first is the cost/benefit assessment. This may be difficult to do since benchmarking may not provide significant tangible benefits in the short run. In addition, it may be unclear how to assess the intangible benefits associated with BMK.

The second issue in judging benchmarking efficacy, is who will judge the relevant costs and benefits. As a managerial innovation, top management would normally make the go/no go decision, but the role of technical managers in the firm's core technologies cannot be overlooked, since they are the ones who will be most involved with benchmarking practices.

In sum, the issues of what criteria are used to judge the role of benchmarking, as well as who will make the decision whether to implement needs to be addressed in a developmental model.

2.3 LITERATURE ON ORGANIZATIONAL LEARNING

2.3.1 OVERVIEW

Definitions of organizational learning abound. Stata states

"Organizational learning occurs through shared insights, knowledge and mental models...(and) builds on past knowledge and experience, that is, on memory"

Stata 1989, 43

An additional perspective from Huber reads

"An entity learns if, through its processing of information, the range of its potential behaviours is changed"

Huber 1991, 89

While there is abundant literature on the topic of organizational learning, there is significant debate regarding the mechanisms by which learning takes place, how learning occurs, and even the most basic question of what constitutes learning (Garvin 1993, Huber 1991).

The focus of this literature review will be to examine learning as a process of development and establish some relationships between benchmarking and the learning processes of organizations.

2.3.2 BENCHMARKING AS A LEARNING MECHANISM

At the simplest level, individuals and organizations learn by acquiring and assimilating information. Individuals learn when they acquire new information and assess its impact on how they function. They may ignore the new information, or take action based on its potential to affect their current

state. Through this series of outcomes and observations additional learning also takes place. Organizational learning occurs when the sum of all of the experiences of organizational members coalesce on common mental models which create synergies that leverage the organization. The process of organizational learning in turn encourages development as the organization evolves and matures over time.

For any organization to learn and thus develop, Huber (1991) identifies four underlying constructs and processes from his review of a number of articles and publications. These four constructs are knowledge acquisition, information distribution, information interpretation, and organizational memory. It is important to note that the process of obtaining, assimilating, interpreting and acting upon information must be coordinated and effectively managed in order to derive value which can be leveraged across the firm.

Benchmarking by its nature relies upon acquiring new information, assessing its impact on the firm, and initiating change to provide additional value to the organization. As an organization changes to reflect new learning, there is a direct impact on how the organization will develop over time. So a question may be asked about the role of benchmarking in fostering organizational learning, and what if anything makes it special or even unique.

Benchmarking practices can provide a number of new ways of examining what and how organizations learn. Many

organizations learn by experimenting internally, and using the resultant information to guide the development of the organization. While this type of learning is valuable to the organization, it does not always recognize the influence of the external environment on the firm. Thus, internal learning may direct the firm to initiate change that appears to be beneficial from an inward focus, but totally inappropriate given the nature of the economic, political, or business environment surrounding it. Benchmarking requires an outward focus on those practices that are proven as superior, thus providing a greater balance between the inner and outer environments of the organization.

A second critical function that benchmarking can serve as a learning tool is its ability to initiate change in the governing values of the organization. Argyris (1982) identified the concepts of single and double loop learning. With single loop learning, errors or perceived mismatches are corrected based on a set of underlying values and principles inherent to the organization. However, in some cases, it is these values that are causing the organization to lose its competitive stance. Such patriarchal firms have a set of core values or organizational culture that is at the root of the organization's inability to adapt to changing competitive conditions. Double-loop learning is the process by which these underlying values and principles are altered, to meet the demands of the environment. Benchmarking provides immense

value in this case, because it can be used to seek external comparisons, and establish new frames of reference.

Because benchmarking uses hard data and proven results as a basis for comparison and initiating change it introduces a bias for change that operational managers will be hard pressed to ignore. Thus benchmarking provides not only direction and impetus for change, but a means to refocus the core values of an organization in keeping with the changing pace of the environment.

2.4 SELECTED LITERATURE ON PROCESS EVOLUTION AND ASSESSMENT

2.4.1 AN ORGANIZATIONAL EVOLUTION PERSPECTIVE

Greiner (1972) argued that 5 distinct phases of organizational development were observable, with each characterized by an evolutionary period, followed by a revolutionary period.

PHASE I- Creativity

During the creativity phase, the founders of the organization are technically oriented and focus on developing and selling new products. Communication among employees is frequent and informal and the control of activities is performed through feedback from customers. The crisis that marks the end of the evolutionary period is one of control. Management has a responsibility to delegate, control, and focus organizational resources and processes. As a solution to the crisis, strong managers need to be located who are

acceptable to the founders in order to pull the organization together.

PHASE II- Direction

The direction phase is characterized by a period of sustained growth through directive leadership. Often maintained through a functional structure, the organization begins to develop accounting and control systems, as well as adopting standards and incentives for employee activities. Communication becomes more formalized and impersonal, and managers and key supervisors institute direction by taking ownership of the process. The revolutionary crisis marking the end of the evolutionary phase is again related to organizational control; in that the management hierarchy has become too cumbersome and centralized. As a result, employees are no longer able to take initiatives, or diffuse their direct knowledge to the organization.

PHASE III- Delegation

During the delegation phase, increased responsibility is given to managers of manufacturing plants and market territories. Profit centres and bonuses are used to motivate workers, and management is by exception. As a result, top level communication is infrequent and informal. Through the delegation of authority and control, decentralized managers are able to be more responsive to customer needs. The crisis bringing an end to this phase of evolution is the loss of control by top executives. With field managers responsible

for their own operations intrafirm coordination of plans, resources, and technology is minimized, creating waste and lack of direction for the firm as a whole. As a result, top management seeks to regain their authority in order to reorient the direction and goals of the firm.

PHASE IV- Coordination

The coordination phase is characterized by the use of formal systems to achieve greater coordination, with management ownership of the coordination mechanisms. Decentralized groups are also reformed into product groups, and formal planning procedures and reviews are instituted. Staff roles are created for control and review, and capital expenditures are parcelled out across the organization. Each product group is treated as an investment centre, certain technical functions are centralized, while daily operations remain decentralized. Growth during this stage is maintained through the efficient allocation of scarce resources. The crisis signalling the end of phase IV is the mounting tension between line and staff roles. Incompatible views result in decision lags and delayed implementation, reducing the competitive position of the firm.

PHASE V- Collaboration

In the collaboration phase, management develops a greater spontaneity and becomes more responsive to the organizational environment. Members of the firm learn to confront interpersonal differences, and engage in efficient problem

solving through team action. Teams begin to combine actions across functions, and the number of staff experts is reduced. Matrix management is introduced, educational programs are implemented, and an emphasis is placed on the development of real-time information systems. Rewards are now based on team performance, and experiments in new practices are encouraged. Phase V is a stressful stage on the employees and as a result, it is suggested that time be allocated periodically for employees to relax, reflect, and revitalize their thoughts in order to further improve the organization at the collaborative phase.

2.4.2 RELATIONSHIP OF ORGANIZATIONAL EVOLUTION MODEL TO BENCHMARKING DEVELOPMENT

This model adds value to the development of a benchmarking developmental model in that it demonstrates that a variety of organizational forces, constraints and environments exist in any firm. Further, any organizational process like benchmarking cannot isolate itself from such factors, which would include competing political and social processes. From this, it can be stated that benchmarking evolution will have two distinct components: first, the evolution of benchmarking as a quality practice within a firm, and secondly, the organizational context within which it will evolve. Both of these factors must be carefully considered when infusing benchmarking practices to the organization.

The organizational framework can significantly affect how benchmarking may be perceived, and utilized within any given firm. Organizations at a lower level of organizational maturity may not have the communications infrastructure required to support benchmarking across the organization, limiting the potential of even the best equipped benchmarking project teams.

2.4.3 THE SOFTWARE ENGINEERING INSTITUTE SOFTWARE MATURITY FRAMEWORK

Based at Carnegie-Mellon, the SEI developed the software process maturity framework for software capability assessment. It is used to identify important areas for improvement. As a process framework, many of the assessment criteria are generic and can be applied to other domains, including generic quality assurance systems, computer aided design and benchmarking.

Humphrey (1988) argues that in order to address software development problems it is necessary to treat the development task as a process that can be controlled, measured, and improved. He defines a process as "a sequence of tasks that, when properly performed, produces the desired result" (Ibid, 75). The SEI model characterizes a software process into one of five software maturity levels. This assessment allows a firm to judge what steps must be taken to improve their processes in order to proceed to the next maturity level. As defined by SEI, the five maturity levels are: initial, repeatable, defined, managed, and optimized.

The author selects these levels for four reasons:

- 1- They reasonably represent the actual historical phases of evolutionary development of real software organizations,
- 2- They represent a measure of improvement that is reasonable to achieve from the prior level,
- 3- They suggest interim improvement goals and progress measures, and
- 4- They make obvious a set of immediate improvement priorities once an organization's status in the framework is known.

While the SEI model incorporates a lengthy management and assessment methodology, the focus for the purposes of this research will be to examine the nature of the maturity framework, the assessment criteria, and attempt to draw some parallels between the software development process and the development of benchmarking.

LEVEL I- Initial Process

This is essentially an ad-hoc process, where the organization operates without formalized procedures, cost estimates and project plans. Tools and mechanisms may be used but are poorly integrated into processes and are usually not uniform across the organization. There are no controls over change management and top management involvement is minimal, owing to a lack of knowledge surrounding key problems and issues. As a result, progress may be made but in the wrong direction.

In order to improve performance at this level, one solution is to implement basic project controls, including project management, management oversight, quality assurance, and change control.

LEVEL II- Repeatable Process

At this level, organizational strength is derived from past experience at similar work. Past experience dictates how future work will be performed, providing a level of consistency in practices that was non-existent at the initial level. Humphrey does caution that care must be taken to ensure that new ideas and methods which might provide gains to the development process are not overlooked in favour of familiar, organizationally embedded practices. He recommends that a monitoring process be enacted in order to properly assess any potential gains or costs of assimilating new ideas or technologies. The key tasks identified to advance from the repeatable process to the defined process include the establishment of a software development process group, software development process architecture, and a grouping of engineering methods/technologies.

LEVEL III- Defined Process

Organizations at the defined process level have established a foundation for ongoing improvement to their development processes. The data at this level is still only qualitative in nature, which can cause uncertainty as to the effectiveness of the current process. The uncertainty comes

from a weak process definition and confusion as to which specific items are to be measured. With a defined process drawing on an articulated process architecture, it is possible to focus on and effectively measure specific tasks.

The author identifies four key steps to advance from the defined to the managed process, which include the establishment of process measurements, a process database, resources for guidance and analysis, and quality assessment criteria as a management check.

LEVEL IV- Managed Process

Organizations at the managed process level will have experienced substantial quality improvements. The main obstacle for firms reaching this level is the cost of data collection. The costs arise given the task of gathering and maintaining numerous useful measures of software development and support. While careful selection of specific measures is possible, it is common that different groups will rely on different measures to guide their efforts. Even if the same data is collected, it may be defined by each department or group in a different way. As a result, whatever measures are used should not be used for comparing groups, but rather, aimed at improving the development process.

Two requirements are indicated to progress from the managed to the optimized level of development, which include the automated gathering of process data and modification of the process based on this data to improve efficiency.

LEVEL V- Optimizing Process

At the final level of the software maturity framework, a paradigm shift occurs as managers begin to shift their improvement focus to the process itself, rather than letting improvement be guided solely by a product focus. Specific data is available to both identify and improve upon weak components in the development process. At this stage, the information that is available also aids managers in determining what areas need increased resources and support. It allows for an increase in knowledge transfer because communication is conducted in concise and quantitative terms. It can also be used to justify the application of new technology to critical tasks.

There is a shift in how the process is monitored, from lengthy qualitative descriptions, to more quantitative statistical plots and yield curves. This acts to assure both the quality of the development process, as well as confidence in the resultant products. The SEI model provides the framework for understanding work performance, as well as the direction to be set in improving it.

The central challenges faced by level V organizations stem from the fact that the development process is human labour intensive and this presents a major challenge in maintaining the organization at an optimized state.

2.4.4 THE SEI MODEL AND BENCHMARKING DEVELOPMENT

The SEI model provides insight on the software development process. Software development, like many other activities, has a maturity curve in that firms will learn from past experience and integrate that learning into ongoing practices. The model clearly identifies practices that mark the transition from one maturity level to the next, as well as the nature of resources required to support each level. The levels are also generic in nature, such that there is applicability of the model's characteristics to a specific domain such as benchmarking, if the data support a general evolutionary model of benchmarking development.

CHAPTER 3

A DEVELOPMENTAL MODEL OF THE BENCHMARKING PROCESS AND RESEARCH PROPOSITIONS

3.1 CRITICAL SUCCESS FACTORS

3.1.1 OVERVIEW

A critical success factor (CSF) is defined as a characteristic, condition or variable that has a direct impact on your customer's satisfaction, and hence, your own success (Camp 1989, Digital Equipment Corp. 1992). Examples of specific CSF's would include labour overhead rate, mean time between failure for a product, cost per order, billing error rate, or service response time.

For this research, I will use the concept of a key success factor (KSF) to describe those variables affecting the development of benchmarking within firms. While a CSF and a KSF are fundamentally the same in this context, there are minor differences. KSF's are not necessarily identified by customers, nor do they have a direct impact on customer satisfaction. For simplicity, I have used the term KSF to identify characteristics of BMK development (organization level evolution of BMK), and to distinguish these items from CSF's (which are focused and well detailed elements used to drive specific BMK studies).

For this research, the aim is to outline what key success factors (KSF) can be used to characterize the process of

benchmarking evolution (ie: what variables or characteristics influence how benchmarking practices develop within a firm).

3.1.2 WHY USE KEY SUCCESS FACTORS TO

DEMONSTRATE DEVELOPMENT ?

In order to develop an effective model of benchmarking development, both the pattern of evolution from stage to stage as well as the transition between stages must be taken into account. This means looking at the characteristics of each stage of benchmarking development and identifying key events or milestones that represent a level of benchmarking use, comprehension, and recognition of its potential value.

Existing models of development (Greiner 1972, Humphrey 1988) often demonstrate good encapsulation, or assessment of a specific operation or activity, but provide poor linkages between one or more levels of maturity. Other models may provide a better view of transition but at a high level of abstraction, causing difficulty in establishing functional objectives (Hage 1980). An additional criticism that may be made of these process models is their inability to direct long term change given that variables used to induce change may not be constant or controllable over the development of the process.

As a result, constructs and variables must be selected that are represented at different stages of the developmental process, are criteria suitable for assessment (cost, availability, comprehension etc.); and are preferably easy to

understand by all levels of the organization.

3.1.3 KEY SUCCESS FACTORS OF THE BENCHMARKING PROCESS

A review of the literature on benchmarking practices and models has identified the following key success factors (KSF) relevant to the development of benchmarking. It should be noted that these are hypothesized success factors for the development of benchmarking, though empirical evidence can be cited to support the existence of similar KSF's in the innovation literature. These KSF's would include the role of top management in promoting new practices, the mix of employee skills that impact on the ability to assimilate new processes, and the role of operational level workers in the implementation process (Hage 1980, Gerwin and Kolodny 1992, Kimberly 1981, Tornatzky and Fleisher 1990).

KSF #1- Level of Top Management Support

Several authors note the importance of top management support in order for benchmarking practices to take place (Camp 1989, Digital Equipment Corp. 1992, Mittelstaedt 1992, Spendolini 1992). It is important to note that in the context of benchmarking, top management often refers to corporate level managers. While their input in fostering benchmarking use is critical to BMK success, it is equally important to highlight the role that divisional or product line managers play in implementing BMK practices at the operational level. For this research, I will use the term "top management" to mean either senior corporate managers who exercise direct

control over operations (highly centralized firms), or to mean divisional managers who are responsible for guiding their own operations (decentralized firms).

In order for BMK to become an integral part of an organization's quality processes, top management must provide support for the practice on a corporate wide basis. This may take the form of direct project involvement, or more commonly, take the form of a statement committing their support to the practice, in terms of resource allocation, and integration into a total quality management program. While the commitment of top management to benchmarking as an improvement tool may be difficult to establish during initial or pilot projects, it will be required if the practice is to be implemented across organizational boundaries.

Based on interviews conducted with local benchmarking experts, it is not uncommon for top management to have little involvement in early benchmarking efforts. However, this tends to increase as the benefits of the practice become more widely known, or as the projects for which benchmarking practices are adopted take on a greater operational or strategic importance relative to overall organizational strategy.

KSF #2- Benchmarking Knowledge and Expertise

Generalized knowledge about benchmarking practices, applications, and even process models is readily available in the public domain. However, based on discussions with BMK

consultants, one of the key obstacles for firms contemplating BMK use is the lack of personnel trained or experienced in driving BMK efforts. If the firm lacks the internal expertise or resources to begin a benchmarking exercise, external sources can be tapped including training courses and specialized benchmarking consultants.

While benchmarking consultants can direct or perform the necessary steps to complete the exercise, firms should strive for long term in house expertise and capabilities if benchmarking is to play a key role in long term competitive strategy. One possible way in which a firm might ground its steps to develop competency is to rely on existing skills and abilities developed through the use of related processes. For example, organizational members currently performing traditional competitive analyses, product tear downs, or performance benchmarking will possess a number of skills and knowledge that could greatly bolster process benchmarking efforts.

In addition to developing benchmarking process capabilities, mechanisms are needed to capture benchmarking learning, knowledge, and expertise in order to embed and leverage benchmarking practices across the organization (Bennett 1993, Bogan and English 1994, Hatz 1993, Watson 1993). Such mechanisms could include the collection and maintenance of a database of benchmarking project information accessible to all within the organization.

In an additional effort to develop benchmarking programs within their firms, many organizations have designated benchmarking primes for their companies, whose responsibilities include developing training programs and guides that facilitate the process. Primes are also responsible for documenting benchmarking studies and guiding users in the selection of appropriate benchmarking topics. In sum, it is important to recognize that both

- a) knowledge capture and dissemination mechanisms, and
- b) the role and extent of consultant/benchmarking primes to manage capture mechanisms and diffuse knowledge to the organization,

play key roles in shaping an organization's benchmarking capabilities.

KSF #3- Quality Maturity

In the context of benchmarking, quality maturity can be viewed as both the role of BMK as a quality tool (until BMK is a part of the quality function in an organization) as well as the level of supporting practices available to an organization that has embraced benchmarking as an improvement tool. Many firms actively pursuing benchmarking projects already have broad TQM programs in place. In order to leverage the knowledge gained from benchmarking studies, many authors have indicated the need to link benchmarking to other quality improvement efforts (Camp 1989, Mittelstaedt 1992, Spendolini 1992).

From discussions with benchmarking coordinators at local telecommunications firms, many managers believe that effective benchmarking cannot take place without a TQM or other quality support process in place. The rationale behind this is the nature of benchmarking activities, which require that firms understand their own processes, costs, and relevant metrics before examining those of benchmarking partners.

Benchmarking may not be conceived as part of a broad quality program when first introduced to the organization. It is important however, that benchmarking be advocated by management as an alternative method of quality assessment in order to generate discussion on how benchmarking might be integrated with existing tools, methods and procedures. As firms become more experienced and proficient with benchmarking as a tool, its use will spread within the organization, it will be linked into new and existing quality measures.

KSF #4- Team Skills

The skills, knowledge, and abilities of individuals within benchmarking teams will greatly affect the chances of success for any benchmarking exercise. Unlike benchmarking knowledge and expertise, team skills in this context refer to more generic attributes required of team members in order to function in a collective.

Based on interviews conducted with several benchmarking managers, many of the skills required to utilize benchmarking as a tool are already part of an organization's competencies.

Individuals within organizations will possess a broad set of skills which include, but are not limited to functional expertise, credibility within the organization, communications skills, and team spirit. Spendolini (1992) noted five key characteristics required for effective benchmarking teams: process expertise, technical skills, people skills, team spirit, and a manager capable of driving the project. It is also equally important that team individuals have an active interest in the project.

It should be noted that two distinct skill sets are involved in the context of benchmarking. The more common set are those which are technically oriented (technical understanding of a process, related metrics, report writing) or group related (interpersonal skills). The second skill set is that relating to the benchmarking management process project (project management skills, team assembly, budgeting considerations and management, providing focus etc.).

KSF #5- Process Owner Involvement

A process owner is a person responsible for the development and control of a given operation used to generate a product or service. In the context of benchmarking, process ownership identifies a level of responsibility and risk an individual assumes. This degree of assumed risk is often directly linked to performance evaluation, and as a result, anyone taking ownership of a process must have a voice in any actions taken to modify it. In other words, the more the

owner has to gain or lose will influence the range and choice of actions he/she will consider.

Process ownership is critical to benchmarking success, since it evokes a sense of commitment to improving the process; the process owner is a significant stakeholder of any gains, as well as potential setbacks. Without a process owner committed to benchmarking as an improvement tool, potential roadblocks include lack of interest in improving the status quo, as well as resistance to the implementation of new methods based on benchmarking findings.

While process owners will be uncommitted to benchmarking early in its introduction to the organization, it is important that they be informed as to what the practice entails. If tangible benefits can be shown for process owners as well as the organization, these owners will be more open to using benchmarking practices within their areas of control. Based on interviews with BMK consultants, process owners obtaining benefits from benchmarking will take the initiative to lead benchmarking teams, thus assuming a greater role in the improvement of their respective areas.

KSF #6- Performance Expectations

Performance expectations reflect the level of improvement expected based on a comparison to a benchmarking partner. I would hesitate to state a comparison to a "best-in-class" partner, since many firms may be constrained in their initial studies as to the extent of the information search they may

perform, based on either time or resource availability. Spendolini (1992) outlines a five box analogy as to the type of search firms conduct in seeking a suitable benchmarking partner. The innermost box represents internal operations, moving outwards to direct competitor, industry, country and finally worldwide comparisons. At the worldwide level, firms are searching for the true best-in-class firm for a given process or service.

By searching out a benchmarking partner who is less than world class, a paradigm of "catching-up" is maintained. In the long run, firms wishing to develop world class operations through benchmarking initiatives will have to benchmark the top performer to establish a leapfrog mentality consistent with a paradigm of world class performance.

KSF #7- Structural Characteristics of the Benchmarking Effort

This success factor encapsulates a number of characteristics that impact on benchmarking within the organization (including the designation of BMK primes, funding, and the creation of a central benchmarking office) as opposed to the benchmarking process itself. While not specifically indicated in the literature, it can be argued that organizational characteristics provide managers contemplating BMK with a frame of reference, as well as ideas of the resource commitments required to implement benchmarking practices. These characteristics would include such quantitative items as the number of people involved in the

effort, and the budget size for benchmarking initiatives, as well as items of a more qualitative nature, including the organizational structure supporting the benchmark effort.

Although initial infrastructures to support BMK initiatives may be very limited, once benchmarking begins to take hold within the organization, an infrastructure may develop to support it. This would permit greater coordination between organizational units in order to focus and streamline benchmarking use to meet long term strategic objectives.

KSF #8- Link To Customer

Link to customer reflects the role that the customer (recipient of the output of a process) plays in establishing the scope and direction of benchmarking studies. Customers define what is important to them, whether it be product or process quality, timeliness, cost, or reliability. A customer defined critical success factor (CSF) becomes the basis on which good benchmarking is based, and sets the direction and focus an organization must take in order to ensure customer satisfaction.

In the initial stages of benchmarking development, the role of the customer may be non-existent, since the focus will be on learning about the function and potential applications of benchmarking as a tool. Once the decision to commit to a benchmarking study has been made, the input of the customer may become more pronounced. As benchmarking use proliferates throughout the organization, the customer assumes an even

greater role in the selection of benchmarking projects. Benchmarking topic areas are directly linked to, and wholly driven by customer requirements. This is facilitated by an ongoing dialogue between customer and supplier.

As a result of stronger ties to the customer, a greater level of coordination can be achieved, permitting the customer to take the initiative in commissioning benchmarking studies.

3.1.4 SYNTHESIS

Although the stages of a developmental model of the benchmarking process can be characterized by the critical success factors outlined above, the KSF's alone do not provide value to end users who wish to introduce benchmarking within their organizations. They serve to characterize stages of evolution after certain events have transpired. For example, any firm wishing to initiate benchmarking would have to have some mechanism by which the concept is introduced to the organization, such as involvement in a benchmarking interest group, or a presentation by a benchmarking practitioner to top management.

In drawing comparisons between a number of process models (Greiner 1972, Hage 1980, Humphrey 1988), the following stages may be observed (See Figure 1):

- 1) An initial stage which focuses on the examination of a new innovation and contrasts or compares new ideas with established paradigms in the organization.

Figure 1

A Comparison of Process Models and Stages

Model	Stage			
Organizational Change and Innovation 1980 Hage	Evaluation	Initiation	Implementation	Routinization
Organizational Evolution Greiner 1972	Creativity	Direction	Delegation	Coordination and Collaboration (2 stages)
Software Maturity Framework SEI 1988	Initial	Repeatable	Defined	Managed and Optimized (2 stages)
Synthesis Focus of Stage	Exploratory Stage of Innovation	Initial Testing and Limited Use of Innovation	Definition and Formalization of Innovation	Use and Proficiency of Innovation Across Organization

- 2) A second stage which represents limited testing or use of an innovation.
- 3) A third stage which introduces increased formalization and definition of the innovation.
- 4) One or more additional stages which focus on routinization of the innovation across the organization through greater emphasis on coordination and collaboration between organizational units.

For the purposes of this research, the initial framework for a developmental model of benchmarking will be based on these four generic stages, and the eight KSF's I have identified.

3.2 STAGE 1: BEGINNER

The initial model of development is illustrated in Figure 2. At the beginner stage of benchmarking development, the focus will be on developing an awareness and learning about benchmarking practices through some mechanism such as involvement in a network or a seminar provided by a benchmarking consultant. Very little will be known about the subject firsthand, but informal learning may take place as additional materials and literature are acquired on the practice of benchmarking. Exposure will be localized to the domain of the benchmarking advocate, who will attempt to sell the value of benchmarking to management in that particular functional area or division.

The nature of top management support (TMS) is expected to be limited to funding for learning about benchmarking. Benchmarking competency (KE) will be limited to any prior experience of organizational members, and benchmarking will not be integrated into total quality management (QM). It is expected that organizational members will possess many of the team skills (TS) required for benchmarking. Due to the uncertainty of benchmarking results or potential, process owners (PO) will be non-committal about testing benchmarking in their respective areas of control. Benchmarking will be perceived as a means of reducing performance gaps (PE), but the intended scope will be limited so that a "catch-up" mentality will prevail. While management will fund learning,

Figure 2

Developmental Model of Benchmarking

Key Success Factors	Stages			
	Awareness And Learning	Conduct BMK Study	Success Through Division	Diffusion of Practice Throughout Organization
	BEGINNER	INTERMEDIATE/ SKILLED	KNOWLEDGEABLE / ADVANCED	PROFICIENT
TOP MANAGEMENT SUPPORT	Management Funds Learning	Management Willing To Support BMK Study	Management Paves Way For BMK Standardization	Management Paves Way For BMK Process Improvement
BENCHMARKING KNOWLEDGE AND EXPERTISE	Limited	Beginnings Of Knowledge Capture	Accumulation of Knowledge	Knowledge Disseminated
QUALITY MATURITY	No Links To TQM Efforts	BMK Considered As Quality Improvement Measure	Key Metrics Developed	Key Metrics Tracked
TEAM SKILLS	Process, Functional And Communication Expertise	Specific Training For Team Members	Teams Aided By Facilitator	Teams Operate Without Facilitator Assistance
PROCESS OWNER INVOLVEMENT	Uncommitted	Process Owners Aware Of BMK	Process Owner Provides Funding	Process Owner Leads Team
PERFORMANCE EXPECTATIONS	Reduce Competitive Gap	Studies Are Based On Cost	Quantum Improvement	New Best In Class
STRUCTURAL CHARACTERISTICS	Limited Budget, No Specialized Roles, No Standardization	Infrastructure Created, No Standards Established	Specialized Roles And Dedicated Funding Within Divisions	BMK Infrastructure Extends Across Divisions
LINK TO CUSTOMER	No Link To Customer	Customer Requirements Set BMK Direction	Wholly Driven By Customer Requirements	Customer Initiates Benchmarking Studies

they will not establish a BMK infrastructure (SC) at this early stage of development. The role of the customer (RC) (internal or external recipient of the outputs of a given process) in setting any benchmarking direction is also expected to be negligible at the initial stage of development.

The following hypotheses have been formulated for the beginner stage of development:

PROPOSITION 1:

The beginner stage of benchmarking will be characterized as follows:

- TMS1) Management will provide limited funding for learning about benchmarking.**
- KE1) Benchmarking knowledge will be very limited.**
- QM1) Benchmarking will not be linked to TQM efforts.**
- TS1A) Employees will possess many process, functional and communications skills required for benchmarking.**
- TS1B) Middle management will possess the project management skills required for benchmarking.**
- PO1) Process owners will be uncommitted to benchmarking.**
- PE1) Benchmarking will be perceived as a means to reduce the competitive gap.**
- SC1) A limited budget for benchmarking related activities will prevent any standardization of benchmarking use or the development of a support infrastructure.**

RC1) The role of the customer in setting benchmarking activities will be negligible or non-existent.

3.3 STAGE 2: INTERMEDIATE/SKILLED

At the intermediate/skilled stage, benchmarking learning is still localized to the championing division or area, but knowledge about the subject is being captured by those individuals assimilating the literature about it.

At this stage, benchmarking is perceived as a valid quality improvement measure, but the appropriateness of it to the specific organization is still unanswered. A test project/study is considered and it is the role of upper management within the division to approve it (it is at this stage that top management support expands beyond initial funding for learning to expressed support of benchmarking practices within the organization). A team would be formed to conduct an initial study. The team would receive some form of training to complement existing skill sets and process owners within the division or area would be informed about benchmarking practices and principles. A limited infrastructure (which may include dedicated funding, roles, and a competency centre) is also created to support BMK initiatives. The benchmarking advocate would look for the support of a process owner within the division to perform an initial benchmark study based on perceived customer requirements.

However, the study will be limited in scope and strategic impact due to resource constraints (available funds).

PROPOSITION 2:

The intermediate/skilled stage of benchmarking development will be characterized as follows:

- TMS2)** Management is willing to provide the resources and budget necessary to support a limited benchmarking study.
- KE2)** Formal knowledge capture will begin.
- QM2)** Benchmarking will be perceived as a potentially useful quality improvement measure.
- TS2)** Benchmarking team members will be provided with specific training to complement existing skill sets.
- PO2)** Promotion of benchmarking practices will be made to key process owners, but buy-in will be limited for initial benchmarking studies.
- PE2)** Project selection and expected returns are based on cost.
- SC2)** An infrastructure (dedicated funding, roles, and competency centre) to support benchmarking is created.
- RC2)** Customer requirements will be used to set the direction of benchmarking activities.

3.4 STAGE 3: KNOWLEDGEABLE/ADVANCED

Firms progressing to the knowledgeable/advanced stage will have met with limited but measurable success within a division or championing area. At this point, upper management must decide whether or not benchmarking should be introduced to the rest of the division or across the organization. If it is seen as a means to leverage the firm's competitive position, then management will begin to initiate change to support benchmarking activities.

Some of the key activities will be to standardize benchmarking policies and practices throughout the division. To achieve this, management will provide dedicated benchmarking funding, create new roles (BMK primes) within the organization, and designate benchmarking coordinators to assume them. It will be the role of these coordinators/primes to assist in the selection of potential benchmarking projects, act as facilitators for benchmarking teams, devise ways to effectively elicit and capture benchmarking knowledge, and establish formalized procedures and methods for benchmarking use that mesh into the structure and nature of the organization.

At this stage, projects will be actively funded by process owners, key business process metrics will be developed, and projects will be selected based on their ability to provide significant returns to the organization.

PROPOSITION 3:

The knowledgeable/advanced stage of benchmarking development will be characterized as follows:

- TMS3) Management will introduce policies and mechanisms to actively promote and facilitate benchmarking standardization.**
- KE3) Knowledge will be accumulated by designated benchmarking primes (support specialists).**
- QM3) Key process metrics will be deployed.**
- TS3) Facilitators (the new BMK support specialists) assume an active role on benchmarking teams.**
- PO3) Process owners will provide funding for benchmarking efforts.**
- PE3) Studies that provide the potential for quantum improvement will be selected.**
- SC3A) Specialized benchmarking roles will be created within divisions/functional areas where BMK is employed.**
- SC3B) Individuals assuming these roles will be charged with developing key process metrics, accumulating benchmarking knowledge, assisting in the selection of benchmarking studies that support organizational goals, and facilitating teams charged with undertaking these studies.**

SC3C) Dedicated funding for benchmarking will exist within divisions/functional areas where BMK is employed.

RC3) Benchmarking efforts will be wholly driven by customer requirements, which are based on existing customer satisfaction surveys.

3.5 STAGE 4: PROFICIENT

Firms at the proficient stage will have well-developed and standardized benchmarking procedures that span the organization and provide strategic gains. There will be a support infrastructure (dedicated BMK specialists and an organizational competency centre to manage and leverage BMK information) that incorporates new learning and improvements into the process of benchmarking. Routine and consistent tracking of key business metrics will be performed in each division within the organization where appropriate and resources to support strategic benchmarking activities will be provided by management either at the divisional or corporate levels. Benchmarking teams will have the ability to operate without facilitator assistance when undertaking benchmarking studies, with process owners assuming the role of team leader. At this stage, benchmarking is used proactively to leapfrog current best in class firms.

PROPOSITION 4:

The proficient stage of benchmarking development will be characterized as follows:

- TMS4) Management will pave the way for benchmarking standardization across the organization as well as for benchmarking process improvement.**
- KE4) Benchmarking knowledge will be disseminated across the organization by specialized benchmarking coordinators.**
- QM4) Key metrics will be tracked automatically.**
- TS4) Benchmarking teams will operate autonomously.**
- PO4) Process owners will initiate and lead benchmark studies.**
- PE4) Firms at this stage will strive to establish new performance levels that leapfrog current best-in-class firms.**
- SC4) Benchmarking infrastructures will span divisions/functions.**
- RC4) Customers take a proactive role in initiating benchmarking studies by voicing their immediate and long run requirements.**

For the purposes of this research, the model will be limited to the four stages noted above given that there is a lack of available information to extend the model into further stages. However, information regarding additional stages beyond the proficient stage in benchmarking will be sought from respondents in leading edge firms.

CHAPTER 4

RESEARCH METHOD

4.1 POPULATION

The population for this research is Canadian and American manufacturing firms that have utilized benchmarking processes for a minimum of one year. The term "utilized benchmarking processes" is defined as having undertaken and completed, as a minimum, at least one benchmarking project. This length of experience has been selected based on published information regarding the limited diffusion of the practice in North American manufacturing firms and discussions with benchmarking primes/coordinators at local telecommunications firms. They noted that this duration was sufficient for them to observe the results of benchmarking studies, and make inferences about the integration of benchmarking as a tool with other practices. They also stated that this duration provided an opportunity to assess the benchmarking process and draw insights regarding the patterns of evolution within the firm.

In addition, several consulting firms with experience in benchmarking were contacted and benchmarking specialists within these companies were asked to participate. These individuals perform functions similar to benchmarking primes in large corporations, but for smaller companies lacking internal resources or expertise.

It is important to note that some respondents may be from firms that are not at a level of proficiency that allows them to comment on latter stages of the model. Since the population includes only those firms that have completed at least one benchmarking study, all respondents will have reached the intermediate/skilled stage on the developmental model.

One weakness of the research is that respondents who by definition have not surpassed the intermediate/skilled stage may provide expectations of future events, rather than historical fact with respect to benchmarking development. It is difficult to screen such firms out unless detailed qualitative data can be obtained that suggests a firm is not yet past an early stage of development.

The lack of applied literature on the subject of benchmarking (detailed cases and experiences or other empirical results) makes it difficult to isolate specific companies that have introduced benchmarking within their organizations. While listings are available of certain companies, they do not tend to be grouped by industry, size, or organizational characteristics, since the practice of benchmarking is only now beginning to command attention as a mechanism for quality improvement.

4.2 SAMPLING DESIGN

The selection of the sample was performed by judgment and convenience sampling. The lack of a large identifiable

population rules out any form of random sampling. Judgement sampling was used to select companies/individuals that would provide a more representative view of the development of the benchmarking process. Practical considerations for the research also include time and cost. As a result, the sample size was not overly large, but includes companies based in both Canada and the United States that have international operations.

It is important to note that the sample was carefully chosen to include members of the International Benchmarking Clearinghouse, firms that were recognized as having superior benchmarking practices as judged by other companies or from the literature, or firms that were Malcolm Baldrige award winners or finalists. Baldrige winners or finalists are good candidates for benchmarking research, because 550 points out of 1000 on the Baldrige scoring system are directly, or indirectly tied to a firm's benchmarking practices. As a result, nineteen of the twenty-two firms in the sample (nineteen of twenty four respondents) met one or more of these criteria.

Twenty-one respondents were obtained, representing 19 organizations from a variety of manufacturing fields, including semiconductors, computer equipment, imaging/reproduction, industrial manufacturing, pharmaceuticals, petrochemicals, telecommunications, and the automotive industry. Three benchmarking consultants provided

input on their experiences with particular clients. In this context, the consultant performed the same functions as a benchmarking coordinator or process owner in firms lacking the talent or expertise to undertake a benchmarking study. In sum, this provided a total sample of 22 firms and 24 respondents (given that one firm provided three respondents). Respondents indicated that a wide variety of BMK topics had been, or were currently under study. The topics included, but were not limited to: warehousing costs, shipping costs, delivery systems, key process cycle times, test methods (for electronics or semiconductors), number of new product designs per year, engineering change order costs, and transaction processing systems.

4.3 SAMPLING UNIT

The sampling unit for this research was one or more benchmarking coordinators/primes or process owners at each selected organization. It is important to note that the respondent was either a benchmarking coordinator or a process owner, depending on the way in which benchmarking was implemented. In many of the respondent firms (9 of 22 firms), corporate benchmarking coordinators or specialists were designated by management at the onset of benchmarking use. In the remaining thirteen companies, benchmarking use was, and in many cases still is driven by one or more process owners who are responsible for all facets of benchmarking data collection and results implementation. In either case, it is the

benchmarking coordinator or the process owner who are the individuals who have seen the patterns of benchmarking development firsthand.

Additional research is needed to assess if these two types of individuals (benchmarking coordinators and process owners) share similar perceptions regarding the role of benchmarking over the course of its development. For the purposes of this research, either the process owner or the benchmarking prime was the best respondent. They will therefore, be treated as equivalent respondents. The type of respondent (either process owner or benchmarking prime) will be discussed in greater detail in section 4.5.

One issue that did arise was with regards to one company that provided three different respondents. I noted for the purposes of the research that each of the three respondents worked in a different geographical and functional area than the other two. Each respondent also indicated distinct patterns of development for their BMK efforts. Since the efforts of each respondent were independent of the other respondents (3 separate projects), and given that this firm did not have a central BMK effort, I considered each instance of development as unique up to the proficient stage. At the proficient stage, BMK efforts were becoming standardized across the organization, which suggests that all three respondents would provide similar views of BMK development. To adjust for this, only one of the three respondents from

this firm was used for the proficient stage qualitative and quantitative analysis. The respondent that was selected had a background similar to all other respondents in the non-central effort group, and was the only one of the three respondents to provide complete quantitative data.

Contact was made with preselected firms identified from the literature as having established benchmarking programs. Based on the author's experience with a local benchmarking interest group, some contacts were already established and indicated their willingness to cooperate in this research project.

Permission was obtained from these firms to set up interviews with key benchmarking coordinators/primes. All respondents were guaranteed anonymity, and companies participating were not individually identified.

Respondents were provided with a copy of the results obtained from the study, as well as a letter of thanks.

4.4 STUDY PROCEDURES

The research was carried out in two stages.

Stage 1 (Initial model and refinements): An initial model of benchmarking development was created, based on existing research into the innovation process, organizational learning, assessment/maturity, and the benchmarking process.

For the first stage analysis, respondents from three firms were interviewed. The purpose of the interviews was to obtain guidance and opinions on the accuracy of the developmental

model. In addition, information was solicited that identified some of the facilitators and roadblocks to benchmarking use. From the results of these interviews, changes were made to the initial developmental model which allowed the formation of hypotheses regarding the development process. (See Figure 2).

Data regarding the development of benchmarking was gathered from a number of different sources, which included three seminars on benchmarking (two by members of a large international computer systems manufacturer, one by a leading TQM consultant), an informal presentation (by a global manager of benchmarking in a multinational research and development organization) and involvement in a local benchmarking interest group. This group was composed of eight local firms with various degrees of knowledge and experience concerning benchmarking practices. Monthly meetings provided a forum to compare and contrast the role of benchmarking within each organization, and its integration with other quality mechanisms. This data was collected between September 1993 and March 1994.

Stage 2 (Testing the model): The focus of this stage was to empirically test the accuracy of the model and refine it. The second stage analysis was performed through the use of two instruments: 1) a quantitative questionnaire comprised of a series of scaled questions elicited responses from benchmarking managers/primes or process owners regarding the specific development of the benchmarking process with respect

to the dimensions identified in the model, and tested the research hypotheses (See Appendix A) and 2) A follow up structured qualitative interview schedule was administered in person, or by phone to eleven of the twenty-four respondents (See Appendix B).

Once more, many respondents participating in the study did provide detailed qualitative comments on the quantitative questionnaires, and I considered these responses in any qualitative based analysis. The qualitative instrument was designed to elicit additional complementary information regarding the benchmarking process as well as identify possible directions for future research.

Data for this stage was collected from April until the end of June 1994.

4.5 DATA ANALYSIS PROCEDURES

The quantitative cases were analyzed to identify patterns of benchmarking development and practices. Based on the nature of the research, descriptive statistics were utilized (See Appendix C). Mean, median, and mode were calculated for each variable in aggregate, then for each of two sub-groups within the sample. Sub-groups were identified by characteristics such as size, industry, or benchmarking experience. After a number of iterations, patterns began to emerge in the responses.

The sample was split into two groups. Specifically, firms that:

- 1) were mandated by top management to use benchmarking (10 of 22 firms) OR
- 2) established competency centres or centralized benchmarking offices (8 of 22 firms including firms that overlap with characteristic 1 above)

were separated from those firms that did not meet either of these criteria (10 of 22 firms). This division produced two groups of firms ($n_1=12$ firms and 12 respondents, $n_2=10$ firms and 12 respondents) and made it possible to provide distinct perspectives on many of the characteristics at each stage of the model. These categories were selected as a basis for analysis for a number of reasons. Benchmarking consultants who provided input to the early developmental model indicated that a mandate to benchmark provided a focus for action in several companies they had dealt with.

A comprehensive literature review also indicated that many organizations well recognized in industry for their benchmarking efforts had central BMK specialists who managed and coordinated organizational level benchmarking efforts. A two sample t-test was performed to test for differences between means of the two groups for each key success factor over the stages of development. This would determine if there were significant differences in the patterns of benchmarking development between the two groups of firms (See Appendix D).

As noted above, I split the sample into two sub-samples ($n_1=12$ respondents from 12 firms, $n_2=12$ respondents from 10

firms given that one firm provided three different respondents). In order to distinguish more easily between the two subgroups, the group of firms characterized by a mandate to benchmark, or the establishment of a central benchmarking office are denoted as firms with a **central benchmarking effort**. Those companies that did not possess either of these characteristics are denoted as **non-central benchmarking effort** firms, or firms **without central efforts**. In this context, "central effort" refers to the involvement of upper management and the measures they implemented to guide BMK use and development within the organization.

The use of these two criteria (existence of mandate or established central office) to separate the two groups of firms provided meaningful quantitative results. This resulted in a more sophisticated understanding of the underlying dynamics affecting benchmarking development.

All quantitative scores (See Appendix C) were calculated on a five point Likert scale as follows:

- 5- Strongly Agree
- 4- Agree
- 3- Neutral
- 2- Disagree
- 1- Strongly Disagree

The raw quantitative scores provided by the respondents were used for initial analysis. However, the scores were not the final basis for confirming or disconfirming the research propositions given that in some cases, the raw scores were unreliable due to respondent interpretation of the question in

a different manner than was intended. In order to adjust for these inconsistencies, results were reinterpreted based on the qualitative data provided by each respondent.

A raw quantitative average greater than 3 but less than 4 was considered to initially support the proposition, while a raw score of three or less was considered as initially refuting it. However, the final decision to affirm or disaffirm the proposition was based on the qualitative data. For example, given a raw average score of 3, I considered the proposition initially disconfirmed. I then examined the qualitative data to find the number of instances that the data supported the research proposition. If this number was greater than 50% of the sample, then I considered the research proposition affirmed. This approach provided a consistent base of analysis given that in each case, qualitative evidence was used in conjunction with low quantitative scores to support or refute each research hypothesis.

In each instance where the raw average score was a 4 or stronger for a research proposition, I considered the research proposition affirmed.

There were also instances in which only parts of a specific proposition were affirmed. When a hypothesis had only partial support, I relied upon the qualitative data to detail what parts of the hypothesis were supported.

Finally, in a large percentage of cases, there was no statistical difference between the two groups of firms based

on the quantitative scores. However, in some of these cases qualitative information suggested a number of differences. In these cases, both groups of firms were also contrasted using qualitative data in order to flesh out the developmental model and address the key elements of the research question.

4.6 VALIDITY AND RELIABILITY ISSUES

Experts on benchmarking from three organizations were used to provide input to the formation of the developmental model and the initial questionnaire. Two of these experts, plus an additional benchmarking specialist served to pretest and make recommendations regarding the data collection instruments. The diverse base of opinion used to develop and test the collection instruments specific to benchmarking development helps ensure content validity. The variables used to characterize benchmarking development (eg: level of top management support, process owner involvement) are also well documented in a number of research domains (innovation, business strategy, and CAD/CAM to name a few). A sound argument may therefore be made to support the validity of the constructs for the purposes of this research.

The reliability of the study was addressed in a number of ways. Respondents were informed of the nature of the research, and were faxed a copy of the quantitative questionnaire to complete. Once that was returned, the structured qualitative questionnaire was administered by phone or in person when circumstances permitted.

The quantitative instrument was designed to address the research propositions by characteristic (down the model), whereas the qualitative questionnaire was used to provide complementary data by stage (across the model). This presented data on the developmental process in two different, yet compatible ways. Of the firms in the central effort group, seven of twelve respondents were administered the qualitative instrument. In the non-central effort group, four of twelve respondents participated. Questions were asked on all four stages of development which required references and due consideration to each key success factor addressed beforehand on the quantitative instrument. The qualitative questionnaire, which overlapped the content of the quantitative questionnaire therefore served as a check on the consistency of respondent data. In a large percentage of cases (hypotheses KE1, QM4, PE4, PO2, and RC1 for example) there were no differences between the quantitative and qualitative data, with both types of data either supporting, or refuting the research hypothesis. In a few instances, (hypotheses TMS1 for example) qualitative data did suggest different views on the hypotheses than the quantitative data. In these cases, quantitative and qualitative data were compared to reconcile any differences. From this, I would make a determination on whether the proposition was supported.

The non-intrusive method for collecting the quantitative data, and the follow up qualitative questionnaire which was

more interactive provided a balance between maximizing the amount and richness of the data collected, and minimizing researcher bias thus strengthening the reliability of the results.

In addition, one firm provided three respondents which normally might grant an opportunity to test for reliability. However, each respondent from this company worked in a different geographical area, as well as a different functional discipline than the other two respondents. Most importantly, the respondents were not involved with the same BMK projects. As a result, checks for the reliability of responses within this organization could not be performed.

CHAPTER 5

DISCUSSION OF RESULTS

This chapter contains the results of the research. Section 5.1 discusses the extent that the data were able to support the research propositions, and highlights some of the additional qualitative information that was obtained regarding benchmarking activities at each stage of the developmental process.

5.1 COMPARISONS BETWEEN RESPONDENT DATA AND RESEARCH PROPOSITIONS

PROPOSITION 1:

The beginner stage of benchmarking will be characterized as follows:

TMS1) Management will provide limited funding for learning about benchmarking.

Mean For Aggregate Sample	2.708	(n=24)
Firms with Central Effort	2.083	(n1=12)
Firms without Central Effort	3.333	(n2=12)

The above data suggest that on average respondents in firms with a central effort did not agree that their managements provided funding, while respondents in firms without a central effort agreed that their managements did. Analysis of the qualitative data however presents a different picture. The qualitative comments from all twelve of the respondents in firms with central efforts indicated management funding was available. The low scale scores from many

respondents were due to a misinterpretation of the question. They interpreted the question as asking if management provided funding for just learning (and not other activities). Respondents whose managements provided funding not only for learning but for other activities such as establishing a direction for benchmarking use and developing a competency centre to coordinate BMK efforts therefore indicated relatively low scale scores.

In firms with non-centralized efforts, nine of twelve respondents indicated through qualitative data that the level of top management support they observed was consistent with the research proposition since specific funds were allocated at the onset for learning about BMK practices (ie: seminars, workshops, library research). The remaining three respondents indicated that top management did not provide specific funds or support for benchmarking efforts, but that a pool of discretionary funds was accessible for this purpose from the overall TQM budget, suggesting some disagreement with the research proposition.

In sum, while a t-test revealed a significant difference in sample means between firms with and without central efforts, this result is highly suspect due to the reasons given above and will not be considered here. On the basis of qualitative information, it appears both subgroups agreed with the proposition. Overall, the data indicated that management funding for learning about BMK practices was made available,

but that the extent of funding (which ranged from token resources to long term budgets for BMK infrastructures) and scope of "learning" (which ranged from superficial BMK mechanics to deeper BMK impact as a long term strategic tool) varied considerably among respondents. The data highlight that while respondents from central effort firms did support the research hypothesis, management involvement was not limited to funding for learning. Similarly, respondents from non-central effort respondents agreed with the research proposition based not only on the quantitative data, but also on supporting qualitative data. Therefore, I shall consider that the proposition is affirmed.

KE1) Benchmarking knowledge will be very limited.

Mean For Aggregate Sample	4.613	(n=24)
Firms with Central Effort	4.500	(n1=12)
Firms without Central Effort	4.727	(n2=12)

The above data suggest that on average, respondents in both groups indicated strong agreement with the proposition. Almost every firm noted that formal benchmarking skills were very limited at the onset, given that it was a new quality practice to the organization. An interesting note was that fifteen respondents indicated that pockets of knowledge did exist within their organizations (mostly of individuals that had been exposed to benchmarking in previous employment) but they had been unable to systematically tap that existing knowledge in the early stages of benchmarking development.

Therefore, based on the quantitative data I conclude that this proposition has been confirmed.

QM1) Benchmarking will not be linked to TQM efforts.

Mean For Aggregate Sample	2.625	(n=24)
Firms with Central Effort	2.833	(n1=12)
Firms without Central Effort	2.417	(n2=12)

The above data suggest that on average both firms disagreed with the research proposition. The qualitative information in general supported this result. Eight of the twelve respondents in the group with centralized efforts indicated that the initial focus of BMK efforts was to get the central office or competency centre operational, and to provide BMK visibility. Once that was in place, the search for integrating BMK with TQM took hold. This suggests that benchmarking was linked to TQM efforts in terms of long range planning.

In firms without central efforts, the linkage of benchmarking to existing quality practices depended greatly on the BMK driver/champion. Each was free to set whatever direction he or she deemed appropriate considering functional and organizational objectives. However, nine of twelve respondents indicated that in each firm, forward thinking process owners often understood the potential of BMK, and integrated it with existing quality efforts.

In sum, both quantitative and qualitative data suggest that both groups of firms on average, did not support the

research proposition. Therefore, I shall consider this proposition disconfirmed.

Team Skills

Two aspects of team skills were examined with the questionnaire; first, the level of process (technical knowledge), functional (analytic and comprehension), and communications (report writing and group interaction) skills required for successful benchmarking (TS1A) and second, project management skills such as coordinating and directing activities, or locating funding sources (TS1B).

TS1A) Employees will possess many process, functional and communications skills required for benchmarking.

Mean For Aggregate Sample	3.458	(n=24)
Firms with Central Effort	3.583	(n1=12)
Firms without Central Effort	3.333	(n2=12)

The above data suggest that on average both groups of firms supported the proposition. When additional qualitative data was factored in, support for the proposition became more evident. Ten of twenty-four respondents indicated that they moderated their quantitative scores to indicate their belief that their organizations needed to improve and build upon their skill bases. Sixteen of twenty-four respondents indicated that their organizations had pools of talent and these skills, while important to BMK activities, are also very generic, and required of individuals involved in any type of focused project. It is valuable to note that BMK requires

both generic and task specific knowledge. Unlike proposition KE1 which addressed BMK specific knowledge, this proposition (TS1A) indicated that most companies in the sample possessed adequate generic process, functional, and communications knowledge/skills to undertake benchmarking studies.

In conclusion, the scores for the two groups of firms when combined with supporting qualitative data represent views that are consistent with the research proposition, and I shall therefore consider it affirmed.

TS1B) Middle management will possess the project management skills required for benchmarking.

Mean For Aggregate Sample	3.417	(n=24)
Firms with Central Effort	3.500	(n1=12)
Firms without Central Effort	3.333	(n2=12)

The above data suggest that on average, both groups of firms supported the research proposition. Qualitative data from sixteen companies indicated that organization in the sample possessed multiple management levels and this guaranteed that individuals with project management skills were abundant. However, BMK projects do differ from internal projects in a number of ways, e.g. with respect to disclosure of information (what is/is not proprietary), timing, external coordination, and results implementation. It was noted that these BMK specific project management issues caused six respondents to moderate their quantitative scores to reflect a lower level of support for the hypothesis. In sum, the

scores for the two groups of firms when combined with supporting qualitative data support the research proposition, and I shall therefore consider it affirmed.

PO1) Process owners will be uncommitted to benchmarking.

Mean For Aggregate Sample	2.625	(n=24)
Firms with Central Effort	2.833	(n1=12)
Firms without Central Effort	2.417	(n2=12)

The above data indicate that on average, both groups of firms disagreed with the research proposition, that is, they believed process owners were committed to BMK. The qualitative information in general supported this result. Nine of twelve respondents in central effort firms indicated that in principle, process owners were committed to BMK use (low mean scores). In each of these cases, top management pushed for a long term BMK strategy and placed greater emphasis on BMK competence building than immediate practice.

Seven of twelve respondents from non-central effort firms disagreed with the suggested hypothesis indicating that a few forward thinking process owners in their organization were committed to BMK use.

In conclusion, two patterns emerged here. The first was characterized by high organization-wide process owner commitment due to a management mandate, but with increased focus on the development of benchmarking competency, rather than immediate application (central effort firms). The second

2

PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

PRECISIONSM RESOLUTION TARGETS

was characterized by the commitment of a few forward thinking process owners to initial BMK use (non-central effort firms). Therefore, based on both quantitative and qualitative evidence, I conclude that respondents from both groups refuted the research proposition.

PE1) Benchmarking will be perceived as a means to reduce the competitive gap.

Mean For Aggregate Sample	3.516	(n=23)
Firms with Central Effort	3.364	(n1=12)
Firms without Central Effort	3.667	(n2=11)

The above data suggest that on average, both groups of firms supported the research proposition. The qualitative information in general supported this result, and presented some differences in the scope of competitive gap reduction that was sought by each group. Seven of twelve respondents in the centralized group saw the potential for benchmarking to deliver frame breaking change and sought that level of improvement through the development of a long term, performance enhancing benchmarking strategy. Ten of eleven respondents from non-central effort firms indicated that benchmarking was viewed as a means to obtain some level of improvement, but that the actual expected level of improvement was undefined.

Therefore, based on both quantitative and supporting qualitative information I shall consider the proposition affirmed.

SC1) A limited budget for benchmarking related activities will prevent any standardization of benchmarking use or the development of a support infrastructure.

Mean For Aggregate Sample	3.792	(n=23)
Firms with Central Effort	3.583	(n1=12)
Firms without Central Effort	4.000	(n2=11)

The above data suggest that on average, both groups of firms supported the proposition. However, the qualitative information presents a different picture. Eight respondents from the central effort group indicated that they observed the rudimentary formation of a competency centre or central office within the company. While these centres were limited in funding and ability to serve organizational units at that time, it was nonetheless, a definite indication that a support infrastructure was evolving. This information refutes the research proposition.

In non-central effort firms, eight firms specifically indicated that management did not establish a competency centre. This forced process owners/product line managers to allocate BMK funding for learning or to conduct studies from their own budgets on an ad-hoc basis. In these cases the qualitative data is in accord with the quantitative scores which support the research proposition. In sum, on the basis of qualitative information, respondents in central effort firms disconfirmed the research proposition, while respondents

in non-central effort firms supported it.

RC1) The role of the customer in setting benchmarking activities will be negligible or non-existent.

Mean For Aggregate Sample	3.292	(n=24)
Firms with Central Effort	3.333	(n1=12)
Firms without Central Effort	3.250	(n2=12)

The above data suggest that on average both groups of firms supported the proposition. Qualitative information supported this result, and highlighted perspectives common to the majority of respondents. Thirteen respondents indicated customer requirements were measured by existing satisfaction surveys, but that this information was not used to guide early BMK efforts. In twelve of these thirteen cases, direct input (active involvement in BMK planning and development) was viewed by respondents as undesirable in the context of infrastructure development because the customer did not have a clear grasp of the available resources to the firm, the organizational climate, or corporate priorities. An additional two respondents indicated that BMK activities were strictly an internal planning function, and there was no customer involvement at all. In sum, fourteen respondents in this group did provide qualitative evidence to support the research hypothesis, and while customer requirements were well understood and documented in general, direct customer input was negligible.

In this sense the quantitative and qualitative data for both groups of respondents supported the research proposition.

Key Activities At The Beginner Stage

Additional qualitative information was obtained regarding key activities or events that were relevant to firms at the beginner stage. A question of interest to most firms contemplating benchmarking practices is how organizations were first introduced to them. Many respondents indicated that benchmarking had been an informal practice for years in manufacturing industries such as electronics and semiconductors. Formal introduction of the practice was made by exposure to articles, seminars, or conferences relating to quality in a number of domains. In many cases, a customer or supplier approached the company and asked to do benchmarking work with the organization.

Most respondents also indicated that regardless of the way in which benchmarking practices were made known to them, the actual use of benchmarking was proactive/opportunistic in nature. Proactive interest often resulted from a management mandate to integrate benchmarking with other quality efforts. In firms indicating that benchmarking use was reactive/crisis-driven in nature, formal use of benchmarking was not sanctioned until crises developed in one or more areas of the business. However, informal product (and some process) benchmarking had been done in many cases, mostly by engineering staff in manufacturing and development.

Once the decision to utilize benchmarking practices was made, a number of steps were taken to develop an understanding of the subject. Typically, firms brought in consultants to educate upper or middle managers on BMK as a quality practice, and some firms became involved in local interest groups or organizations like the International Benchmarking Clearinghouse. Both of these sources provide generalized knowledge on BMK practices and applications, as well as specialized training or education on the subject in order to position BMK in a manner appropriate to the organization.

Developmental Model At The Beginner Stage

A total of nine propositions were tested at this stage. In sum, central effort firms supported six of the hypotheses, while non-central effort firms confirmed seven of them. From these results, two patterns of development were derived from the data, with differences in five of the eight key success factors (See Figure 3A).

Differences were apparent with respect to the following. Firms with a central BMK effort were provided direction and resources from senior management to integrate benchmarking from the onset, while non-central effort firms generally lacked top management support outside of funding for learning about the practice. With respect to quality maturity (role that BMK plays in the quality function of a firm), central effort firms tended to have a better perception of how to integrate benchmarking with existing quality efforts

Figure 3A

Developmental Model of Benchmarking

Beginner Stage

Key Success Factors	Awareness And Learning	Awareness And Learning
	BEGINNER (Firms Without Centralized BMK Efforts)	BEGINNER (Firms With Centralized BMK Efforts)
TOP MANAGEMENT SUPPORT	<i>Management Funds Learning</i>	<i>Management Provides Direction And Focus For BMK</i>
BENCHMARKING KNOWLEDGE AND EXPERTISE	Limited	Limited
QUALITY MATURITY	<i>Locally Linked To TQM Efforts By Process Owners</i>	<i>Organization Wide Links To TQM Efforts Being Forged</i>
TEAM SKILLS	<i>Adequate Process, Functional, Communication And PM Expertise</i>	<i>Adequate Process, Functional, Communication And PM Expertise</i>
PROCESS OWNER INVOLVEMENT	<i>Small Proportion Of P.O. Committed To Initial Studies</i>	<i>High Commitment Across Orgn. Through Mandate To BMK</i>
PERFORMANCE EXPECTATIONS	<i>Reduce Competitive Gap</i>	<i>Plan For Long Term Frame Breaking Change</i>
STRUCTURAL CHARACTERITICS	<i>Limited Budget, No Specialized Roles, No Standardization</i>	<i>Beginnings of Specialized Roles and Competency Centres</i>
LINK TO CUSTOMER	<i>Direct Customer Involvement Negligible</i>	<i>Direct Customer Involvement Negligible</i>

organization wide than non-central effort firms and tended to focus on the development of BMK competency rather than the establishment of short-run linkages at the onset.

Organization wide process owner commitment to benchmarking was significantly higher in firms with central offices owing to mandates from management to utilize BMK.

Another contrast between the two groups of firms was the level of performance expectations. Firms with a central BMK effort were more visionary in their thinking and saw the potential of BMK to deliver long term frame breaking change. This attributed to the efforts of some organizations to focus on competency building rather than BMK use at the onset. This approach was designed to support longer term strategic initiatives, as opposed to shorter term tactical ones. Non-central effort firms did not have any expectations about benchmarking except in terms of reducing the competitive gap.

The final difference was in the structural characteristics of each group. Top management in central effort firms provided specific funding for the development of a competency centre to support organization wide BMK whereas non-central effort firms used ad hoc structures to support BMK initiatives, and lacked any dedicated BMK budget to drive efforts.

Both groups of firms possessed limited benchmarking knowledge, had room to improve their team skills, and indicated they had a solid understanding of customer

requirements (but that direct customer involvement was negligible).

PROPOSITION 2:

The intermediate/skilled stage of benchmarking development will be characterized as follows:

TMS2) Management is willing to provide the resources and budget necessary to support a limited benchmarking study.

Mean For Aggregate Sample	4.542	(n=24)
Firms with Central Effort	4.667	(n=12)
Firms without Central Effort	4.417	(n=12)

The above data suggest that on average both groups of firms strongly supported the proposition. Twenty one respondents indicated that management support for a benchmarking study was a logical step once some initial understanding about the practice had taken place, thus moving from theory to practice. It is important to note here that five of these twenty-one respondents indicated that their initial or learning stage incorporated a BMK study per management directive. This does not disconfirm the hypothesis because it demonstrates that resources were provided to undertake a BMK study. The only difference in these five firms was that the initial study was undertaken at a different point in time than was hypothesized. This discovery also suggests that some firms move more quickly from theory to practice than others.

Every respondent indicated that a benchmarking study was undertaken at or before this stage, and seven respondents in central effort firms indicated that management supported projects within a few divisions or product lines concurrently. Therefore, based on the quantitative information, I conclude that the research proposition has been affirmed.

KE2) Formal knowledge capture will begin.

Mean For Aggregate Sample	3.917	(n=24)
Firms with Central Effort	4.000	(n1=12)
Firms without Central Effort	3.833	(n2=12)

The above data suggest that on average both groups of firms supported the proposition. Nineteen respondents indicated that efforts at this stage were under way to capture and organize benchmarking knowledge. This knowledge included common BMK practices, user process models, metrics, best-in-class data, and general information (including where to obtain training, reference material, and where to find prospective BMK partners). Qualitative information indicated that differences did exist between organizations in terms of knowledge content, completeness, purpose, and perceived value, as well as who was responsible to collect and consolidate BMK information. In essence, it was the responsibility of the central office coordinator to collect and maintain a database of knowledge in central effort firms, whereas it was a more localized process in non-central effort firms and a function of the process owner to capture and document relevant

information. Therefore, based on both the quantitative and qualitative evidence above, I shall consider the proposition affirmed.

QM2) Benchmarking will be perceived as a potentially useful quality improvement measure.

Mean For Aggregate Sample	4.167	(n=24)
Firms with Central Effort	4.250	(n1=12)
Firms without Central Effort	4.083	(n2=12)

The above data suggest that on average both groups of firms supported the proposition. Twenty respondents indicated that both process owners and upper management had an increased awareness of benchmarking's capabilities and limitations by this stage of development. Based on this data, I conclude that the research proposition is affirmed.

TS2) Benchmarking team members will be provided with specific training to complement existing skill sets.

Mean For Aggregate Sample	3.822	(n=23)
Firms with Central Effort	3.917	(n1=12)
Firms without Central Effort	3.727	(n2=11)

The above data suggest that on average both groups of firms supported the proposition. Qualitative data supported this result and highlighted that the differences between companies were mostly based on the type of training used (which ranged from single day overviews, to in-depth case studies, and discussion). One important point made by five

respondents in central effort firms and three in non-central effort firms was with regards to the need for formal training. Respondents in these organizations felt that formal training was not as pivotal to success as a lot of the literature would indicate. In six cases, respondents indicated that they based their actions and project plan on common sense and existing literature on benchmarking. While this insight does not affirm or disaffirm the proposition in itself, it does suggest that for some companies, formal training may not be a critical enabler to successful benchmarking. In sum, eighteen firms indicated that they supported the research proposition, and based on both the quantitative and qualitative data, I conclude that the research proposition is affirmed.

P02) Promotion of benchmarking practices will be made to key process owners, but buy-in will be limited for initial benchmarking studies.

Mean For Aggregate Sample	3.000	(n=24)
Firms with Central Effort	2.583	(n1=12)
Firms without Central Effort	3.417	(n2=12)

The term "promotion" in this context refers to the efforts of divisional management to advocate BMK education to process owners through presentations and seminars given by benchmarking consultants. The above data suggest that on average, respondents in central effort firms did not support the research proposition, while those in non-central effort firms did.

The qualitative information obtained in general supported this result. In seven firms with central BMK efforts, supporting qualitative information indicated that process owner buy-in was higher (lower agreement with proposition) based on a mandate from top management to implement BMK. This information disaffirms the research proposition.

In non-central effort firms, seven respondents indicated in their qualitative responses that the lack of exposure to BMK (or proven results) often limited the organization wide willingness of process owners to experiment. As a result, BMK use was ad-hoc at the discretion of the individual process owner, which tends to support the research hypothesis.

In sum, based on all respondent information, I conclude that respondents in central effort firms did not support the research proposition (given that process owners were committed to BMK through a top management mandate) while respondents in non-central effort firms did support it (given that organization wide buy-in was limited). I did note however that respondents in both groups of firms were at the extremes of agreement and disagreement with the research proposition, which made it difficult to generalize. This weakens the results noted above and suggests that other factors are at play.

PE2) Project selection and expected returns are based on cost.

Mean For Aggregate Sample	2.250	(n=24)
Firms with Central Effort	2.167	(n1=12)
Firms without Central Effort	2.333	(n2=12)

"Cost" in this context referred to the investment cost of selecting/running a BMK study. There was disagreement from both groups with the research proposition based on both quantitative and qualitative data. Fourteen respondents indicated that return on investment (measured by estimated dollar savings or estimated increase in revenues) was the primary driver for benchmarking studies, not investment cost. Other factors motivating how a benchmarking study was chosen included the ability to impact profitability, increase customer satisfaction, reduce cycle time or defect levels, match with strategic goals, and reducing expenses. In each of the fourteen cases, studies were chosen based on one or more of the factors listed above, balanced with the practical issues of undertaking a project such as the availability of comparative data.

Based on both the quantitative and qualitative data, I conclude that both groups of respondents disagreed with the research proposition.

8C2) An infrastructure to support benchmarking is created.

Mean For Aggregate Sample	3.259	(n=24)
Firms with Central Effort	4.167	(n1=12)
Firms without Central Effort	2.250	(n2=12)

The above data suggest that on average, respondents in central effort firms supported the research proposition, while those in non-central effort firms did not. The qualitative information in general supported this result. Firms with central benchmark efforts agreed with the research proposition owing to the mandates of the competency centres to develop and manage a support infrastructure. At its inception, the infrastructure was often very limited, comprised mostly of a coordinator who had limited funds to work with in promoting and supporting BMK activities. As benchmarking took on a more critical role, interest in BMK grew, and a more concrete infrastructure was established through increased funding, the development of a central office, and designation of full time benchmarking facilitators and support staff. In only three cases respondents indicated that benchmarking process standardization was neither warranted nor desired, owing to the differences in functions across the organization.

Respondents from firms without centralized benchmarking efforts tended to disagree with the research proposition. Seven respondents in this group specifically indicated that an infrastructure was neither developed nor necessary since

benchmarking was not a standardized or mandated activity.

In summary, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). When combined with supporting qualitative evidence, I conclude that respondents from central effort firms supported the research proposition, while those in non-central effort firms did not.

RC2) Customer requirements will be used to set the direction of benchmarking activities.

Mean For Aggregate Sample	3.898	(n=23)
Firms with Central Effort	3.545	(n1=11)
Firms without Central Effort	4.250	(n2=12)

The above data suggest that on average both groups of firms supported the proposition. Qualitative data provided by the respondents supported this result. Seventeen respondents indicated that studies need to be directed and focused to meet the needs of customers as judged by existing information and customer satisfaction measures.

In summary, both groups of respondents agreed with the research proposition, although they indicated that they relied on existing measures of customer requirements rather than developing BMK-specific measures to guide their customer focused BMK activities. Based on this information, I consider the research proposition affirmed.

Key Activities At The Intermediate/Skilled Stage

One of the key events taking place at the intermediate/skilled stage is the initial attempt to perform a benchmarking study. Some of the key issues related to a study include project/topic selection, nature of the champion/project advocate, number of pilot projects that are attempted, overall cost, and the assessment process after the study is complete.

Project selection is often one of the hardest issues to tackle, according to the respondents. Six firms cited that ease of access to data influenced what they opted to benchmark, since the pilot study would be used as a showcase to encourage additional studies if the project was viewed as successful by management. In some cases, studies were chosen in areas that had the potential for large gains in improved services or reduced costs. For example, in manufacturing, cycle times, defect levels, and customer satisfaction were benchmarked. In procurement, issues such as order lead times and supplier reduction were cited. In two organizations, warehousing and maintenance costs were the respective focus of initial studies because of the dollar spending on each of these areas. Regardless of the process studied, fourteen respondents were clear that they were seeking tangible gains and a significant ROI from the efforts and not merely looking to perform an intellectual exercise.

Another common question surrounding initial benchmarking efforts is in regards to the champion or individual who is charged to drive the study. According to respondents in both groups of firms, the champion(s) for these initial projects fell into one of three groups:

- 1) The process owner (either designated by management or driving the study on their initiative) (8 respondents)
- 2) Upper management and a designated process owner in tandem (5 respondents)
- 3) A functional or quality manager (5 respondents)

Respondents in five firms indicated that they did pursue multiple studies at the onset, numbering anywhere from 2-5 projects. Some were internal, others external, across a wide range of disciplines.

In terms of the costs to undertake a study, it must be noted that estimating internal and external resource costs is not an easy task. Three respondents were unable to provide approximate cost estimates for their initial studies given that internal resource costs were not always as carefully tracked as external dollar spending. While several respondents indicated that the average study costs about US \$75,000 (based on their experience and the literature they had read), it can easily exceed this based on the scope of the study, ease of data acquisition, travel costs, and resources required to support the effort.

A few examples of estimated costs for initial BMK studies are cited below:

- A \$400 literature search.
- 2 pilots, 9 months duration, 4 sites, with 3-4 people per team at each site. Travel costs of US \$15K, \$70K worth of employee hours.
- 1 pilot, 1 year preparation time, 9 months to execute, estimated cost for project of just under US \$2M.
- 2 pilots, 1 internal and 1 external study, 6 months, no cost estimate.
- In 1 organization with in excess of 70 divisions, approximate cost to perform initial study in a division was US \$175K.
- A consortium of 12 companies in Canada spent approximately Cdn \$175K in a 9 month effort.

From this and other literature sources, firms should be prepared to spend on average, 9 months, and anywhere from US \$25-75K for a major benchmarking initiative.

Once the study had been completed, most firms performed a formal evaluation of the study for its specific merits and in many cases, for the overall value of benchmarking to the organization. In each case, the financial return on investment was a key criterion for assessing the value of a benchmarking effort, with some other intangible criteria (such as perceived future contributions of BMK, or importance/role of BMK for customers/suppliers) additionally factored in.

Developmental Model At The Intermediate/Skilled Stage:

A total of eight propositions were tested at this stage. In sum, central and non-central effort firms each supported six of the hypotheses. From these results, two patterns of development were derived from the data, with differences in two of the eight key success factors (See Figure 3B). Process owners in central effort firms shifted their efforts from the study of BMK theory/principles (beginner stage was focused on learning about and acceptance of BMK) to actual proactive use at the intermediate/skilled stage. Process owners in non-central effort firms were still generally uncommitted to BMK practices.

The other major difference was in the structural attributes of each group of firms. Central effort firms typically had a competency centre or central BMK office in place to coordinate and leverage BMK learning across the organization whereas non-central effort firms created ad-hoc infrastructures to support BMK initiatives.

In both cases, top management was willing to support one or more benchmarking studies, formal knowledge capture was begun, BMK was perceived as a valid quality improvement measure, and training was obtained for BMK team members. In addition, both groups of respondents indicated that the desired return on investment dictated the scope and nature of the initial study (large financial return was the aim of most initial studies) and that customer requirements were used to

Figure 3B

Developmental Model of Benchmarking Intermediate/Skilled Stage

Key Success Factors	Conduct BMK Study	Conduct BMK Study
	INTERMEDIATE /SKILLED (Firms Without Centralized BMK Efforts)	INTERMEDIATE /SKILLED (Firms With Centralized BMK Efforts)
	Management Willing To Support BMK Study	Management Willing To Support BMK Study
	Beginnings Of Knowledge Capture	Beginnings Of Knowledge Capture
	BMK Considered As Quality Improvement Measure	BMK Considered As Quality Improvement Measure
	Specific Training For Team Members	Specific Training For Team Members
	Process Owners Generally Uncommitted	With Mandate, Process Owners Commit To BMK
	Desired Return On Investment Dictates Scope	Desired Return On Investment Dictates Scope
	Study Given Set Budget/Resources No Standards Established	BMK Competency Center Or Central Office In Place
	Customer Requirements Set BMK Direction	Customer Requirements Set BMK Direction

set the direction for BMK activities, with these requirements already well understood in the opinions of most respondents.

PROPOSITION 3:

The knowledgeable/advanced stage of benchmarking development will be characterized as follows:

TMS3) Management will introduce policies and mechanisms to actively promote and facilitate benchmarking standardization.

Mean For Aggregate Sample	3.141	(n=23)
Firms with Central Effort	3.917	(n1=12)
Firms without Central Effort	2.364	(n2=11)

Benchmarking "standardization" in this context refers to the use of conventions or norms for BMK application and data collection across the organization. The above data suggest that on average, respondents in central effort firms supported the research proposition, while those in non-central effort firms did not. The qualitative information in general supported this result.

Seven respondents in central effort firms indicated that the development of standards for benchmarking (in terms of when BMK was appropriate for a particular scenario and formal guidelines for use) was viewed as the natural progression of development after gathering numerous process models, analysing the strengths and weaknesses of each, and integrating key elements to evolve an efficient BMK model for the organization. They indicated that this drive for

standardization was initiated by top management and driven by the central benchmarking office. It was also noted by three respondents that the drive for standardization began at the onset of benchmarking activity, thus earlier than as proposed in the model.

However, standardization was not always viewed as a good thing. Three of twelve respondents in this group viewed benchmarking as a localized activity and believed that the tailoring of BMK plans to each division/function was more appropriate than adapting an overall standard. In these cases it was the responsibility of the BMK manager or even a key process owner to establish BMK methods, not top management.

In non-central effort firms, six respondents indicated that their firms' benchmarking experience or activity was very limited, making the need (as well as the capability) to standardize questionable, while two respondents indicated that management was often unable or unwilling to define a standard that spanned the organization given the differences between functions, divisions, or product lines.

In summary, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Based on this, and supporting qualitative information, I conclude that respondents from central effort firms supported the research proposition, while respondents in non-central effort firms on average disaffirmed it.

KE3) Knowledge will be accumulated by designated benchmarking primes (support specialists).

Mean For Aggregate Sample	4.000	(n=22)
Firms with Central Effort	4.091	(n1=11)
Firms without Central Effort	3.909	(n2=11)

"Knowledge" in this context refers to benchmarking project data or any BMK-related models or results acquired from past experience or the literature. The above data suggest that on average, respondents in central effort firms supported the research hypothesis, while respondents in non-central effort firms provided only partial support for the proposition. The qualitative information in general supported this result and highlighted a few key differences between the groups.

Seven of eleven respondents in central effort firms indicated that documentation of BMK information was a formalized process, but that dissemination of information was selective to those individuals who would derive value from it. They strongly voiced the opinion that process owners who performed comprehensive and standardized local data collection made it easier for primes to consolidate information that could be used to create synergies across the organization.

Eight respondents from non-central effort firms indicated that knowledge was gathered and organized by the local process owner who ran the benchmarking effort. One of the problems that the majority of respondents did indicate with this

approach was that it was strictly a function of the process owner as to what data was collected. It often varied significantly by division and often only information relative to a specific project was captured, making it difficult to leverage benchmarking information across the organization. Therefore, differences that may be highlighted between the central and non-central effort groups of respondents include both the role of the process owner and the degree of standardization visible in the collection of BMK related data.

In conclusion, based on both the quantitative and qualitative data, respondents in central effort firms supported the research proposition. Respondents in non-central effort firms only partially supported the research proposition, since data were accumulated by designated individuals, but the individuals were local process owners, and not specialized BMK primes.

QM3) Key process metrics will be deployed.

Mean For Aggregate Sample	4.084	(n=24)
Firms with Central Effort	4.167	(n1=12)
Firms without Central Effort	4.000	(n2=12)

The above data suggest that on average, respondents in both groups supported the research proposition. Ten respondents indicated in their qualitative comments that the manufacturing function was more likely than other divisions to have a better set of well defined and consistently tracked metrics. This was due in part to existing practices that

support TQM initiatives and the ability to quantify manufacturing outputs with relative ease. They also indicated that new metrics were constantly being deployed given that metrics are often subject to change as processes become more efficient or when customer requirements shift. Therefore, based on the data, I conclude that the research proposition has been affirmed.

TS3) Facilitators assume an active role on benchmarking teams.

Mean For Aggregate Sample	3.773	(n=23)
Firms with Central Effort	4.000	(n1=12)
Firms without Central Effort	3.545	(n2=11)

The above data suggest that on average, respondents in central effort firms supported the research proposition, while respondents in non-central effort firms provided only partial support for the hypothesis. Respondents from firms with centralized BMK offices agreed on average with the research hypothesis. Facilitators (who were BMK primes) were used to maintain project momentum, provide opinions to team leaders, and to help maintain focus during initial benchmarking studies. In three cases, the role was not only to facilitate, but to manage the entire project.

Six respondents in non-central effort firms stated that it was the role of the local process owner rather than a central facilitator to actively lead the team and drive the study. Since the process owner (who was the local

facilitator) assumed an active role on BMK teams, respondents in this group tended to agree in principle with the research proposition. This accounts for the relatively high mean for the non-central effort group and does imply partial support for the research hypothesis. Therefore, a key difference that may be highlighted between the central and non-central effort groups of respondents is with regards to what type of individual (central BMK specialist or local process owner) assumed the role of facilitator.

In sum, based on both the quantitative and qualitative data, I conclude that respondents in central effort firms supported the research proposition. Respondents in non-central effort firms only partially supported the research proposition given that "facilitators" did assume an active role on BMK teams, but the individuals were local process owners and not specialized/centralized BMK primes.

PO3) Process owners will provide funding for benchmarking efforts.

Mean For Aggregate Sample	3.875	(n=24)
Firms with Central Effort	4.667	(n1=12)
Firms without Central Effort	3.083	(n2=12)

Respondents from firms with central BMK efforts agreed with the research proposition based on both quantitative and qualitative information. The standard practice as indicated by eleven of twelve respondents was that if the process owner wanted a study, they had to show they believed in it by

funding it (screening out non-value added efforts). In certain cases where the study provided long term strategic benefits, or significant cost savings potential, management would provide any additional funding and support required to undertake the benchmarking effort.

Based on qualitative data, respondents in non-central effort firms disagreed with the research proposition. In seven of twelve firms, process owners were generally uncommitted to BMK use and usually undertook studies as part of a management directive. In these cases, management would direct and fund the study.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Qualitative data backed up this difference; therefore, I conclude that respondents in central effort firms supported the research proposition, while respondents in non-central effort firms did not.

PE3) Studies that provide the potential for quantum improvement will be selected.

Mean For Aggregate Sample	4.209	(n=24)
Firms with Central Effort	4.417	(n1=12)
Firms without Central Effort	4.000	(n2=12)

A quantum improvement is a large, frame-breaking change that provides significant returns to the organization. This differs from the incremental changes typically sought in earlier stages of BMK development. The above data suggest

that on average, respondents in both groups supported the research proposition. Thirteen respondents stated that as a rule, quantum improvements were sought after in most projects, given that studies often required sizable investments of labour and capital regardless of the magnitude of improvement sought. They did note however that in some cases, the process owner would select studies that provided only gradual improvements in operations metrics such as cycle time or defect levels but these studies would still translate into sizable cost reductions. In sum, based on both quantitative and supporting qualitative data, I conclude that the research proposition has been affirmed.

SC3A) Specialized benchmarking roles will be created within divisions/functional areas where BMK is employed.

Mean For Aggregate Sample	3.314	(n=24)
Firms with Central Effort	3.960	(n1=12)
Firms without Central Effort	2.667	(n2=12)

Hypothesis SC2 (intermediate/skilled stage) tested for the existence of a BMK infrastructure. Proposition SC3A builds on that concept by testing whether or not specialized roles to support the infrastructure exist in any of the sample firms. The above data suggest that on average, respondents in central effort firms supported the research proposition, while those in non-central effort firms did not. The qualitative information in general supported this result.

Ten respondents from central effort firms indicated that primes/coordinators were designated by management in the push to introduce benchmarking to the organization. I did note that three of these ten respondents indicated that primes were designated at a point in time prior to the knowledgeable/advanced stage. This does not disconfirm the hypothesis because it demonstrates that BMK primes were designated. The only difference in these three firms was that the primes were chosen at a different point in time than was hypothesized. This discovery also indicates that some firms moved more quickly in creating these roles than others.

In some companies, the role was assumed as a part time function and the individual assuming this role performed the task of data collection as a series of consolidated duties. In these firms, the prime was typically the central office coordinator and provided BMK services for the entire organization.

Respondents in non-central effort firms indicated that it was the process owners who were designated to oversee data collection on the BMK projects they undertook. Seven respondents indicated that since there was no mandate to promote BMK use, there were no primes or designated roles to specifically support BMK efforts.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Qualitative data backed up this difference;

therefore, I conclude that respondents in central effort firms supported the research proposition, while respondents in non-central effort firms did not.

SC3B) Individuals assuming these roles will be charged with developing key process metrics, accumulating benchmarking knowledge, assisting in the selection of benchmarking studies that support organizational goals, and facilitating teams charged with undertaking these studies.

Mean For Aggregate Sample	3.356	(n=23)
Firms with Central Effort	3.545	(n1=11)
Firms without Central Effort	3.167	(n2=12)

The above data suggest that on average, respondents in central effort firms supported the research proposition, while respondents in non-central effort firms provided only partial support for the hypothesis. In firms with a central benchmarking effort, roles were created by management. Qualitative analysis indicated that individuals assuming these roles performed such duties as developing key process metrics, accumulating benchmarking knowledge, assisting in the selection of studies that supported organizational goals, and facilitation. However, respondents noted that it was difficult to generalize across the organization with respect to the role of the designated primes. This aids in interpreting the respondent scores above. Three respondents indicated they moderated their scores because in some cases,

only a few of the listed activities were undertaken by the prime. However, the qualitative data for this proposition indicates that eight respondents out of eleven agreed that one or more of the above functions was performed.

In firms with non-centralized BMK efforts, seven respondents indicated it was the role of the process owner to assume the duties listed above, including project selection, knowledge accumulation, and process metric development. Since the process owner (who assumed any BMK support role) did undertake these duties, respondents in this group tended to agree in principle with the research proposition. Respondents in this group also indicated they moderated their scores because in some cases, only a few of the listed activities were undertaken by the process owner. Qualitative data for this group indicates that eight of twelve respondents observed that one or more of the listed functions was performed.

In sum, based on both the quantitative and qualitative data, I conclude that respondents in central effort firms supported the research proposition. Respondents in non-central effort firms only partially supported the research proposition given that a few of the activities noted in the proposition were undertaken, but by process owners rather than designated BMK support roles.

8C3C) Dedicated funding for benchmarking will exist within divisions/functional areas where BMK is employed.

Mean For Aggregate Sample	2.250	(n=24)
Firms with Central Effort	2.417	(n1=12)
Firms without Central Effort	2.083	(n2=12)

The above data suggest that on average, respondents in both groups disaffirmed the research proposition, a supposition backed by the qualitative data.

Eight respondents from central effort firms indicated that funding for BMK projects/studies came from the operating budgets (general pool of funds as opposed to funds earmarked specifically for BMK efforts) of those process owners that commissioned a study. However, top management did provide specific funding for the competency centre which served the organization as a whole.

Nine respondents in non-central effort firms indicated that as a rule specific BMK funding was not available. Any BMK related efforts had to be allocated from TQM or operating budgets in an ad-hoc manner. Therefore, based on both the quantitative and qualitative data I conclude that the research proposition has been disaffirmed.

RC3) Benchmarking efforts will be wholly driven by customer requirements.

Mean For Aggregate Sample	3.405	(n=23)
Firms with Central Effort	3.727	(n1=11)
Firms without Central Effort	3.083	(n2=12)

The above data suggest that on average, respondents in both groups supported the research proposition. Qualitatively, fourteen respondents indicated that the customer indirectly influences the direction of the study (through defined critical success factors), but never actually sets it. Customer needs help establish the direction for business activities. Studies were often commissioned by top management or process owners to best support these customer defined strategic or operational goals. As a result, customers indirectly drove BMK efforts. Based on additional qualitative data, both groups of firms supported the research proposition, but indicated that direct customer involvement was neither sought nor desired.

In sum, based on both the quantitative and qualitative data, I shall consider the proposition affirmed.

Key Activities At The Knowledgeable/Advanced Stage

At the knowledgeable/advanced stage, one of the key activities is the standardization of benchmarking practices across a functional area, division, or potentially the entire organization (efforts only visible in central effort firms). Respondents were queried as to what they perceived as common

barriers/facilitators to benchmarking use and standardization once it begins to take hold within the organization. Several of the barriers include:

- Process owner faces time and resource constraints, no time to explore new ideas
- Impatience with the benchmarking process, process owner wanted immediate answers, not willing to wait 9 months
- "Not invented here" syndrome
- Concerns over unrealistic management expectations, and repercussions if BMK did not provide significant gains
- Failure of senior management to sell BMK as a useful quality tool, or to integrate BMK with existing corporate quality efforts

To alleviate these problems, a number of facilitators were identified by the respondents and have provided varied levels of success.

- Creation of centralized office to spur momentum of BMK use and to provide internal expertise to guide process owners in terms of project selection and management
- A mandate and associated resource commitment from management to integrate BMK practices into operations
- A dialogue between process owners and top management to establish realistic BMK expectations (potential improvements, cost savings, returns to operations)

- Education programs (as part of quality training) to position BMK as one of several available quality management tools

Developmental Model At The Knowledgeable/Advanced Stage:

A total of ten propositions were tested at this stage. In sum, central effort firms supported nine of the hypotheses, while non-central effort firms confirmed five, with partial support for an additional hypothesis. From these results, two patterns of development were derived with differences in five of the eight key success factors (See Figure 3C). Central effort firms indicated that management did pave the way for standardization of methodologies if it was appropriate for the organization, since standardization was not always viewed as a good thing. Top management involvement in standardization varied significantly among non-central effort firms, but in general BMK standards were not requested nor advocated by them.

With respect to knowledge and expertise, respondents in firms with a central BMK effort indicated leveraging across the organization was not easy, but was possible to do since information was channelled through them and storage mechanisms centrally controlled. In non-central effort firms, all expertise tended to reside with the process owners who undertook studies, making it difficult to leverage BMK learning across the organization.

Figure 3C

Developmental Model of Benchmarking

Knowledgeable/Advanced Stage

Key Success Factors	Success Through Division	Success Through Division
	KNOWLEDGEABLE /ADVANCED (Firms Without Centralized BMK Efforts)	KNOWLEDGEABLE /ADVANCED (Firms With Centralized BMK Efforts)
	<i>BMK Standards Not Set, Management Involvement Varies</i>	<i>Management Paves Way For Standardization Of BMK If Warranted</i>
	<i>No Primes, Knowledge Accumulated By Process Owners</i>	<i>Primes Designated, Accumulate Knowledge For Organization</i>
	<i>Key Metrics Developed, But Many Still Being Deployed</i>	<i>Key Metrics Developed, But Many Still Being Deployed</i>
	<i>Process Owner Responsible For Guiding Team</i>	<i>Teams Given Facilitator Assistance (If Needed/Desired)</i>
	<i>Process Owner Seeks Management Funding for BMK Efforts</i>	<i>Process Owner Provides Funding For BMK Studies</i>
	<i>Quantum Improvement Is Sought</i>	<i>Quantum Improvement Is Sought</i>
STRUCTURAL CHARACTERISTICS	<i>No Dedicated Resources Or Roles To Support BMK</i>	<i>Central BMK Office Coordinates BMK Resources</i>
	<i>Customer Requirements Refined and Set Direction For BMK</i>	<i>Customer Requirements Refined And Set Direction For BMK</i>

In terms of the level of process owner involvement and team skills in central effort firms, process owners funded and led BMK teams on their own initiative but were able to tap facilitator expertise if needed. In non-central effort firms, process owners were responsible for guiding their own teams.

Funding was also a key difference between the two groups. Process owners in central effort firms funded their own studies in a proactive manner, whereas process owners in non-central effort firms sought additional management funding and support when undertaking a study.

Finally, process owners in central effort firms were able to rely on designated BMK support specialists and the central office for BMK assistance given the organization had a well developed BMK infrastructure at this stage. Process owners in non-central effort firms did not have this option given there was no central office or other type of infrastructure to support BMK initiatives.

In each case, both groups of firms generally agreed that key metrics were still being developed and deployed, that quantum improvement was a key criterion in selecting BMK studies, and that customer requirements were refined to set the direction for BMK activities.

PROPOSITION 4:

The proficient stage of benchmarking development will be characterized as follows:

TMS4) Management will pave the way for benchmarking standardization across the organization as well as for benchmarking process improvement.

Mean For Aggregate Sample	3.619	(n=21)
Firms with Central Effort	3.500	(n1=12)
Firms without Central Effort	3.780	(n2=9)

While hypothesis TMS3 tested for the development of standards in specific divisions or functional areas, TMS4 examines the standardization of BMK across the entire organization, as well as efforts to fine tune the manner in which BMK is conducted. The above data suggest that on average, both groups of firms support the research proposition. Respondents from central effort firms provided a number of perspectives. Four respondents agreed with the research proposition, stating that revamping the BMK process (outside of some "fine-tuning") was not a priority, and that diffusing the practice to a deeper level within the organization (increased diffusion and comprehension of the practice of BMK) was still the major goal. These respondents indicated that a standardized BMK technique was not critical or even desirable given the nature of the organization. In other words, these four respondents indicated greater emphasis was placed on refinement of BMK methods to best suit

individual applications rather than on the development of a standardized BMK process for the organization. This view provides partial support of the hypothesis because, in principle, these firms were fine-tuning (improving) their BMK processes to provide a better match with the organization.

A different perspective was held by seven other respondents in this group, who indicated that the mandate to benchmark brought common methods together from a number of divisions which were integrated to form a working model for the organization. This view supports the research proposition.

Respondents from non-central effort firms also tended to affirm the research proposition. Seven of nine respondents in this group indicated that at this stage, the existing benchmarking process (often a generic user process model taken from the literature) was refined (in the divisions/functions in which BMK was employed) to achieve a better match with existing TQM programs and user needs. To clarify this point, these seven respondents recognized that BMK was not always formally standardized across divisions (hypothesis TMS3), but indicated that improvements were being made in BMK user process models to improve the impact of BMK in the divisions or functional areas where it was employed.

In sum, based on qualitative data, the majority of respondents in both groups of firms supported the research proposition.

KE4) Benchmarking knowledge will be disseminated across the organisation by specialized benchmarking coordinators.

Mean For Aggregate Sample	4.182	(n=22)
Firms with Central Effort	4.667	(n1=12)
Firms without Central Effort	3.600	(n2=10)

There were significant quantitative and qualitative differences between the two groups of firms with respect to the research proposition. Respondents from central effort firms consistently agreed with the research proposition. Ten of twelve respondents indicated that bulletins, internal publications, promotional seminars, and a corporate benchmarking database were used to spread benchmarking knowledge. Nine respondents in this group also indicated that knowledge dissemination was a function of the central office (staffed by BMK coordinators) and was viewed as a mechanism to leverage significant learning across the organization.

Respondents from non-central effort firms partially agreed with the research proposition. Seven of ten respondents indicated that because BMK was a localized effort, there were no formal mechanisms to coordinate and disseminate information across the organization. However, these respondents indicated that some BMK results and ideas were informally distributed between process owners within the organization, which does provide support to part of the research proposition.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Qualitative data backed up this difference, demonstrating that respondents in central effort firms supported the research proposition, while respondents in non-central effort firms only partially affirmed it, given that knowledge was disseminated to the organization but by process owners as opposed to BMK coordinators.

QM4) Key metrics will be tracked automatically.

Mean For Aggregate Sample	3.857	(n=21)
Firms with Central Effort	3.917	(n1=12)
Firms without Central Effort	3.780	(n2=9)

Automatic tracking in this context refers to the routine and consistent monitoring of key business metrics. Quantitative and qualitative data suggest that both groups of firms supported the research hypothesis. Although seventeen respondents indicated that key metrics were often tracked before BMK was introduced to support overall quality practices, increased focus was placed at the proficient stage on implementing procedures and mechanisms to routinely track them in a timely and consistent manner. These respondents also indicated that part of the challenge in implementing automatic tracking of metrics was to limit the coverage to only a few key measures, so that the process owner would not be overwhelmed by data related to his/her operations. This implies that information provided through automated reports

must be carefully filtered if it is to provide maximum value-added to the process owner.

In sum, both the quantitative and qualitative data indicate that both subgroups supported the research proposition.

TS4) Benchmarking teams will operate autonomously.

Mean For Aggregate Sample	3.158	(n=19)
Firms with Central Effort	3.667	(n1=12)
Firms without Central Effort	2.290	(n2=7)

Autonomously in this context refers to the ability of teams to act in a self-directed manner, without additional aid from internal or external sources. The above data suggest that on average, respondents in central effort firms supported the research proposition while those in non-central effort firms did not. The qualitative information in general supported this result. Nine of twelve respondents from firms with central benchmarking efforts indicated that teams were usually able to operate without facilitator assistance, especially after running at least one study with a facilitator as guide. They indicated that on average, the ability to operate with or without assistance varied with the level of expertise of the process owner and the complexity of the task.

The ability of teams in non-central effort firms to operate without facilitator assistance varied considerably. Two of seven respondents believed that teams could operate independently because benchmarking was simply another type of

quality practice, with activities and steps not unlike those currently undertaken by the organization. The remaining five respondents indicated that without facilitator involvement, even well directed teams lost momentum.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Qualitative data backed up this difference, and based on this information, I conclude that the central effort group affirmed the proposition, while respondents in non-central effort firms did not.

PO4) Process owners will initiate and lead benchmark studies.

Mean For Aggregate Sample	3.857	(n=21)
Firms with Central Effort	4.320	(n1=12)
Firms without Central Effort	3.440	(n2=9)

The above data suggest that both groups of firms supported the research hypothesis although qualitative information suggests a different picture. Ten respondents in central effort BMK firms supported the research proposition given that in their view, process owners lead their own benchmarking teams in the overwhelming majority of cases. Although there was some variation by division or function, most process owners were driven to improve their operations since they were the prime stakeholders and were held accountable for their performance.

Two respondents from non-central effort firms agreed that in some divisions, the process owner led benchmarking teams. Six respondents disagreed however, stating that process owners in their organizations usually did not take the initiative to benchmark. These respondents indicated that a few forward thinking process owners did initiate and lead BMK studies (which accounts for the higher mean score), but that this initiative was not consistent across the organization. Since the proficient stage is focusing on BMK practices across the organization, this information tends to disaffirm the research hypothesis. On average, process owners were usually provided with support from an internal or external source of expertise if they were required to perform benchmarking.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). Qualitative data backed up this difference, demonstrating that respondents in central effort firms supported the research proposition, while respondents in non-central effort firms did not.

PE4) Firms at this stage will strive to establish new performance levels that leapfrog current best-in-class firms.

Mean For Aggregate Sample	4.381	(n=21)
Firms with Central Effort	4.667	(n1=12)
Firms without Central Effort	4.000	(n2=9)

The above data suggest that both groups of firms supported the research hypothesis. Eighteen respondents indicated that at this stage of development, the firm tended to strive for the best-in-class performance in whatever areas they benchmarked. Eleven of the eighteen respondents also indicated that the selection of such projects is at the discretion of the local process owner, or middle management, with an emphasis on increasing the performance of the overall organization. It was noted by five respondents that there were exceptions to the rule. In some cases, best-in-class performance was not required, depending on the magnitude of change involved. Often, multimillion dollar savings were a sound enough rationale to pursue a large scale study. In the general case however, firms in both groups affirmed the research proposition.

SC4) Benchmarking infrastructures will exist across divisions/functions.

Mean For Aggregate Sample	3.045	(n=22)
Firms with Central Effort	3.583	(n1=12)
Firms without Central Effort	2.400	(n2=10)

The above data suggest that on average, respondents in central effort firms supported the research proposition, while those in non-central effort firms did not. The qualitative information in general supported this result.

Eight respondents from central effort firms indicated that a permanent BMK infrastructure was created that

encompassed several divisions in a cross-functional approach to leverage organizational competences and form synergies. In these firms, the hub of the infrastructure was the central office, which allocated benchmarking resources to divisions as required, where the resources were mostly expertise provided to define, plan and manage benchmarking studies. Three of twelve respondents however indicated that the BMK infrastructure was currently focused to support the manufacturing and development divisions and that BMK saw limited use outside of these domains.

Respondents from non-central effort firms in general disagreed with the research proposition, stating that multiple support structures spanning divisions were not needed. Eight of ten respondents stated that benchmarking was simply not understood/practised sufficiently to warrant dedicated infrastructures either across divisions or functions.

In conclusion, a t-test demonstrated a significant statistical difference in the sample means of the two groups (See Appendix D). The qualitative data above backs this difference, demonstrating that respondents in central effort firms supported the research proposition, while respondents in non-central effort firms did not.

RC4) Customers take a proactive role in initiating benchmarking studies.

Mean For Aggregate Sample	2.762	(n=21)
Firms with Central Effort	2.727	(n1=11)
Firms without Central Effort	2.800	(n2=10)

The above data suggest that neither group of firms supported the research hypothesis. The qualitative data in general supported this result. Fourteen respondents indicated, as in previous stages, that customer requirements were always considered when benchmarking was performed, but that it was the responsibility of the process owner to set the overall direction and project plan for the study. Therefore, while customer requirements were used to focus BMK efforts, direct customer involvement at any stage of BMK development was negligible. On the basis of this information, I shall consider the research proposition disaffirmed.

Key Activities At The Proficient Stage

For firms that have reached the proficient level of benchmarking development, a number of directions for improvement were identified by the respondents. Several efforts are currently under way, or in the planning process.

- Nine respondents indicate that benchmarking, though well developed in the manufacturing/development arena, needed to be expanded beyond it to other functional areas within the organization including finance, purchasing, sales, marketing, and human resources.

- Five respondents indicated that although BMK was well practised in their organizations, they felt that widespread use in any given division or function was still far from evident, and that increased diffusion of the practice to all organizational members was warranted.
- In terms of BMK application (at the level of a given function or process under analysis) the scope of BMK studies needed to be expanded beyond "better practices" and instead, reflect best global practices. A number of firms also noted the growing trend towards reengineering practices, and the linkages that needed to be developed between their benchmarking and reengineering efforts so as to draw synergies.
- At the organizational level, better communication is required between functional areas/divisions, to leverage organizational competencies and support both operational and strategic BMK related efforts in a superior manner.

A final thought comes from a number of forward thinking respondents. They echoed sentiments that benchmarking is beginning to move beyond the boundaries of individual organizations, becoming a means by which firms in the entire value chain may increase their levels of communication. Eventually in this scenario, data interchange between firms in the value chain and related consortiums will be in real time, dramatically increasing the level and pace of competition.

Developmental Model At Proficient Stage:

A total of eight propositions were tested at this stage. In sum, central effort firms supported seven of the hypotheses, while non-central effort firms confirmed three, with partial support for an additional hypothesis. From these results, two patterns of development were derived from the data, with differences in five of the eight key success factors (See Figure 3D). Firms with a central BMK effort indicated that management advocated a revamping of BMK methods to provide better organizational fit. In some cases, retooling the BMK process was not a priority, and instead, increased diffusion of the practice throughout the organization was the key goal.

In terms of top management support, non-central effort firms typically did not have any formal (or management sanctioned) benchmarking standards established at the proficient level and the level of management involvement varied from indifference to moderate interest in BMK development.

Firms with a central BMK effort were better able to leverage BMK learning across the organization, though it is admittedly difficult to do this in a timely and cost effective manner. In non-central effort firms, BMK was a decentralized activity and all expertise (and capability to diffuse knowledge) resided with the process owner.

Figure 3D

Developmental Model of Benchmarking

Proficient Stage

Key Success Factors	Diffusion Of Practice Throughout Organization	Diffusion Of Practice Throughout Organization
	PROFICIENT (Firms Without Centralized BMK Efforts)	PROFICIENT (Firms With Centralized BMK Efforts)
	<i>BMK Still Developing, Management Involvement Varies</i>	<i>Management Paves Way For Reengineering and Diffusion of BMK</i>
	<i>BMK Decentralized, Knowledge Disseminated By Process Owner</i>	<i>BMK Primes Disseminate Knowledge to Organization</i>
	<i>Key Metrics Tracked, But Improvement in Methods Warranted</i>	<i>Key Metrics Tracked, But Improvement in Methods Warranted</i>
	<i>Teams Often Unable To BMK Without Assistance</i>	<i>Teams Able To Operate Autonomously</i>
	<i>Process Owner Does Not Take The Initiative To BMK</i>	<i>Process Owner Initiates and Leads BMK Studies</i>
	<i>New Best In Class in Most Cases</i>	<i>New Best In Class in Most Cases</i>
	<i>Minimal BMK Linkages Between Divisions Or Functions</i>	<i>Central Office Creates BMK Links Between Divisions and Functions</i>
	<i>Customer Requirements Refined, Set New Directions for BMK</i>	<i>Customer Requirements Refined, Set New Directions For BMK</i>

Process owners in central effort firms initiated and led BMK studies in the majority of cases, operating autonomously for the most part. In non-central effort firms, few process owners took the initiative to benchmark and were often ill equipped to do so when required to (teams were unable to operate without assistance).

The existence of a central office in central effort BMK firms permitted the leveraging of information across the organization since the office was able to build strong links between divisions/functions. The office thus served as a focal point for BMK activity in the organization, using the captured knowledge to create synergies across organizational units. In non-central effort firms it was difficult, if not impossible, to draw organizational synergies from BMK efforts given the decentralized activities of process owners.

Both groups of firms showed similar patterns of development with respect to quality maturity, performance expectations, and the link to the customer.

CHAPTER 6

ANSWER TO RESEARCH QUESTION, MANAGERIAL IMPLICATIONS, AND LIMITATIONS OF THE STUDY

The objective of this thesis is to deliver a model and guide for the introduction of benchmarking into organizations based on an examination of the development of benchmarking practices.

The specific research question addressed in this thesis is:

What are the stages of benchmarking development within organisations and how do variables that characterize effective benchmarking and organisational support for effective benchmarking change over time ?

A total of 35 research propositions were tested. Respondents in central effort firms supported 28 of 35 of the propositions (See Table 2A) while respondents in non-central effort firms supported in whole or in part, 23 of 35 propositions (See Table 2B).

TABLE 2A
SUMMARY OF PROPOSITIONS FOR CENTRAL EFFORT FIRMS

Proposition	Mean Score For Group	Qualitative Data Support	Hypothesis Supported
TMS1	2.083	Yes	Yes
TMS2	4.667	Yes	Yes
TMS3	3.917	Yes	Yes
TMS4	3.500	Yes	Yes
KE1	4.500	Yes	Yes
KE2	4.000	Yes	Yes
KE3	4.091	Yes	Yes
KE4	4.667	Yes	Yes
QM1	2.833	No	No
QM2	4.250	Yes	Yes
QM3	4.167	Yes	Yes
QM4	3.917	Yes	Yes
TS1A	3.583	Yes	Yes
TS1B	3.500	Yes	Yes
TS2	3.917	Yes	Yes
TS3	4.000	Yes	Yes
TS4	3.667	Yes	Yes
PO1	2.833	No	No
PO2	2.583	No	No
PO3	4.667	Yes	Yes
PO4	4.320	Yes	Yes
PE1	3.364	Yes	Yes
PE2	2.167	No	No
PE3	4.417	Yes	Yes
PE4	4.667	Yes	Yes
SC1	3.583	No	No

SC2	4.167	Yes	Yes
SC3A	3.960	Yes	Yes
SC3B	3.545	Yes	Yes
SC3C	2.417	No	No
SC4	3.583	Yes	Yes
RC1	3.333	Yes	Yes
RC2	3.545	Yes	Yes
RC3	3.727	Yes	Yes
RC4	2.727	No	No

TABLE 2B
SUMMARY OF PROPOSITIONS FOR NON-CENTRAL EFFORT FIRMS

Proposition	Mean Score For Group	Qualitative Data Support	Hypothesis Supported
TMS1	3.333	Yes	Yes
TMS2	4.417	Yes	Yes
TMS3	2.364	No	No
TMS4	3.780	Yes	Yes
KE1	4.727	Yes	Yes
KE2	3.833	Yes	Yes
KE3	3.909	Partial	Partially
KE4	3.600	Partial	Partially
QM1	2.417	No	No
QM2	4.083	Yes	Yes
QM3	4.000	Yes	Yes
QM4	3.780	Yes	Yes
TS1A	3.333	Yes	Yes
TS1B	3.333	Yes	Yes
TS2	3.727	Yes	Yes
TS3	3.545	Partial	Partially
TS4	2.290	No	No
PO1	2.417	No	No
PO2	3.417	Yes	Yes
PO3	3.083	No	No
PO4	3.440	No	No
PE1	3.667	Yes	Yes
PE2	2.333	No	No
PE3	4.000	Yes	Yes
PE4	4.000	Yes	Yes
SC1	4.000	Yes	Yes

SC2	2.250	No	No
SC3A	2.667	No	No
SC3B	3.167	Partial	Partially
SC3C	2.083	No	No
SC4	2.400	No	No
RC1	3.250	Yes	Yes
RC2	4.250	Yes	Yes
RC3	3.083	Yes	Yes
RC4	2.800	No	No

Section 6.1 provides answers to the research question.

6.1 ANSWER TO RESEARCH QUESTION

Stages Of Development And Key Success Factors

The data support two different models of BMK development. Figures 4A and 4B illustrate refined models of benchmarking development. Participants in the study indicated that they were in agreement with the framework of the proposed model, and were able to classify their firm's development into four general stages: a beginner stage, an intermediate/skilled stage, a knowledgeable/advanced stage, and a proficient stage. This suggests that BMK development is similar to other evolutionary processes, some of which were discussed in the literature review (innovation models, organizational evolution models).

Respondents were also able to associate with each of the eight hypothesized key success factors used in the study to characterize development: top management support, BMK knowledge and expertise, quality maturity, team skills, process owner involvement, performance expectations, structural characteristics, and the link to the customer. This suggests that the eight KSF's used to characterize BMK development are good constructs to measure BMK as an evolutionary process.

Revised Model for Central Effort Firms

Figure 4A represents the revised developmental model of benchmarking for central effort firms. At the beginner stage,

Figure 4A

Developmental Model of Benchmarking Revised Model for Central Effort Firms

Stages

Key Success Factors	Stages				Diffusion of Practice Throughout Organization
	Awareness And Learning	Conduct BMK Study	Success Through Division		
	BEGINNER	INTERMEDIATE/ SKILLED	KNOWLEDGEABLE / ADVANCED	PROFICIENT	
TOP MANAGEMENT SUPPORT	Management Provides Direction And Focus For BMK	Management Willing To Support BMK Study	Management Paves Way For Standardization Of BMK If Warranted	Management Paves Way For Reengineering And Diffusion Of BMK	
BENCHMARKING KNOWLEDGE AND EXPERTISE	Limited	Beginnings Of Knowledge Capture	Primes Designated, Accumulate Knowledge For Organization	BMK Primes Disseminate Knowledge To Organization	
QUALITY MATURITY	Organization Wide Links To TQM Efforts Being Forged	BMK Considered As Quality Improvement Measure	Key Metrics Developed, But Many Still Being Deployed	Key Metrics Tracked, But Improvement In Methods Warranted	
TEAM SKILLS	Adequate Process, Functional, Communication And PM Expertise	Specific Training For Team Members	Teams Given Facilitator Assistance (If Needed/Desired)	Teams Able To Operate Autonomously	
PROCESS OWNER INVOLVEMENT	High Commitment Across Orgn. Through Mandate To BMK	With Mandate, Process Owners Commit To BMK	Process Owner Provides Funding For BMK Studies	Process Owner Initiates And Leads BMK Studies	
PERFORMANCE EXPECTATIONS	Plan For Long Term Frame Breaking Change	Desired Return On Investment Dictates Scope	Quantum Improvement Is Sought	New Best In Class In Most Cases	
STRUCTURAL CHARACTERITICS	Beginnings Of Specialized Roles And Competency Centres	BMK Competency Centre Or Central Office In Place	Central BMK Office Coordinates BMK Resources	Central Office Creates BMK Links Between Divisions and Functions	
LINK TO CUSTOMER	Direct Customer Involvement Negligible	Customer Requirements Set BMK Direction	Customer Requirements Refined and Set Direction For BMK	Customer Requirements Refined, Set New Directions For BMK

Figure 4B

Developmental Model of Benchmarking Revised Model for Non-Central Effort Firms

Stages

Key Success Factors	Awareness And Learning	Conduct BMK Study	Success Through Division	Diffusion of Practice Throughout Organization
	BEGINNER	INTERMEDIATE/ SKILLED	KNOWLEDGEABLE / ADVANCED	PROFICIENT
TOP MANAGEMENT SUPPORT	Management Funds Learning	Management Willing To Support BMK Study	BMK Standards Not Set, Management Involvement Varies	BMK Still Developing, Management Involvement Varies
BENCHMARKING KNOWLEDGE AND EXPERTISE	Limited	Beginnings Of Knowledge Capture	No Primes, Knowledge Accumulated By Process Owners	BMK Decentralized, Knowledge Disseminated By Process Owner
QUALITY MATURITY	Locally Linked To TQM Efforts By Process Owners	BMK Considered As Quality Improvement Measure	Key Metrics Developed, But Many Still Being Deployed	Key Metrics Tracked, But Improvement In Methods Warranted
TEAM SKILLS	Adequate Process, Functional, Communication And PM Expertise	Specific Training For Team Members	Process Owner Responsible For Guiding Team	Teams Often Unable To BMK Without Assistance
PROCESS OWNER INVOLVEMENT	Small Proportion of P.O. Committed to Initial Studies	Process Owners Generally Uncommitted	Process Owner Seeks Management Funding For BMK Efforts	Process Owner Does Not Take The Initiative To BMK
PERFORMANCE EXPECTATIONS	Reduce Competitive Gap	Desired Return On Investment Dictates Scope	Quantum Improvement Is Sought	New Best In Class In Most Cases
STRUCTURAL CHARACTERISTICS	Limited Budget, No Specialized Roles, No Standardization	Study Given Set Budget/Resources No Standards Established	No Dedicated Resources Or Roles To Support BMK	Minimal BMK Linkages Between Divisions And Functions
LINK TO CUSTOMER	Direct Customer Involvement Negligible	Customer Requirements Set BMK Direction	Customer Requirements Refined and Set Direction For BMK	Customer Requirements Refined, Set New Directions For BMK

management provides both direction and focus for BMK. Efforts to promote long term BMK capability are becoming apparent since benchmarking is being linked to existing TQM efforts, process owners are committed through a mandate to benchmark, plans for long term frame breaking change are under consideration, and specialized roles and a competency centre are being created. Benchmarking knowledge is limited, but team skills are adequate to perform any initial BMK related exercises. Finally, while customer requirements do provide some direction to BMK efforts, direct customer involvement at this stage is negligible.

At the intermediate/skilled stage, management supports an initial BMK study. BMK knowledge is formally captured, and BMK is becoming integrated as a quality tool. With the corporate mandate to benchmark, process owners are committed to its use, and training is obtained for those organizational members who will be required to BMK key processes. The choice of BMK targets will be influenced by the desired return on investment and a rudimentary BMK competency centre will be in place to leverage organizational BMK efforts. The role of the customer changes, as additional customer requirements are used to focus BMK efforts, though customer involvement is mostly indirect through existing satisfaction surveys.

At the knowledgeable/advanced stage, management is paving the way for organization wide BMK standards in terms of application and data collection methods. Management

designates BMK primes or facilitators who are charged with accumulating knowledge on BMK practices and metrics for the organization, supporting BMK teams conducting studies, as well as helping to define metrics to be used to gauge internal operations. At this stage, process owners fund their own BMK studies, and seek quantum level improvements in their operations. The efforts of individual process owners are in turn leveraged by the efforts of the central BMK office, which acts as a mechanism to coordinate resources and BMK learning across the organization.

At the proficient stage, management advocates the reengineering and diffusion of BMK across the entire organization. This stage is characterized by efficient coordination between local process owners, benchmarking teams, BMK primes, and other central office staff which permits focused BMK efforts, and linkages across organizational units that can be leveraged across the organization to provide long term strategic benefits.

Revised Model for Non-Central Effort Firms

Figure 4B represents the revised developmental model of benchmarking for central effort firms. At the beginner stage, management limits its involvement in BMK to providing funding for learning about the process. Efforts to promote long term BMK capability are limited and only a few forward thinking process owners will actively pursue BMK as a quality practice. Except for a few forward thinking individuals, process owner

commitment is limited given that there is no mandate to benchmark. BMK is perceived as a means to reduce the competitive gap, but the potential scope of that impact is not recognized given a lack of understanding of BMK practices. The limited budget provided by management also hinders the ability to develop any kind of BMK support infrastructure. In this group of firms benchmarking knowledge is limited, but team skills are adequate to perform any initial BMK related exercises. And in a manner similar to central effort firms, while customer requirements do provide some direction to BMK efforts, direct customer involvement at this stage is negligible.

At the intermediate/skilled stage, management supports an initial BMK study. BMK knowledge is formally captured and BMK is becoming integrated by some process owners as a quality tool. In general, process owners are not committed to BMK use, but training is obtained for those organizational members who choose to BMK. Although a study will be funded at this stage by top management, no additional funds will be allocated to develop a BMK infrastructure, which hinders the ability to coordinate resources, or leverage knowledge obtained from BMK efforts. The role of the customer does change as additional customer requirements are used to focus BMK efforts, though customer involvement is still mostly indirect through existing satisfaction surveys.

At the knowledgeable/advanced stage, management involvement varied. This limits the potential of firms to develop organization wide BMK standards in terms of application and data collection methods, and makes it difficult to leverage information in a timely and concise manner. It is the role of the local process owner to accumulate knowledge on BMK practices and metrics for the organization, support their own BMK teams when conducting studies, as well as to define metrics to be used to gauge internal operations. At this stage, process owners typically seek management funding for their studies, although it is difficult to leverage their efforts given the lack of a centralized competency centre to coordinate BMK learning across the organization.

At the proficient stage, BMK practices are still developing and top management is often still uncommitted to setting a specific direction for BMK. While BMK may be employed in an efficient and effective manner by local process owners, it is difficult to coordinate and leverage their efforts across the organizations. The lack of any central office or mechanism to establish linkages across divisions or functional areas typically limits the impact of BMK efforts to operational gains and prevents the development of synergies that can be used to foster long term strategic benefits.

Similarities and Differences Between Groups in Key Success Factors Over Time

Top Management Support: The level of top management support varied between central and non-central effort firms right from the beginner stage. In central effort firms, there was a strong mandate from management to utilize BMK across the organization, and top management implemented measures and established competency centres to guide long term BMK efforts that could be used to foster organizational synergies. Top management in non-central effort firms provided varying levels of support, but mostly limited it to funding for learning about BMK practices. Top management in both groups of firms supported initial studies at the intermediate/skilled stage, but at the knowledgeable/advanced stage, differences were again apparent. Respondents in central effort firms saw management that pushed for standardization of BMK across the organization where appropriate; in addition management encouraged new ideas for direction and revamping of BMK methods at the proficient stage. Respondents in non-central effort firms stated that by the knowledgeable/advanced stage, standards had not been established and management commitment and involvement was still unclear.

Benchmarking Knowledge And Expertise: Both groups of firms had limited BMK knowledge at the onset of BMK introduction. At the intermediate/skilled stage, both groups of firms had designated individuals to begin capturing BMK specific

knowledge which would be leveraged across the organization. The difference between the two groups of firms was with respect to who gathered the knowledge. In central effort firms, a central coordinator worked with local process owners to collect and refine BMK data. In non-central effort firms, it was strictly the responsibility of the local process owner. The largest difference was demonstrated at the proficient stage, where organizations with a central BMK effort and centralized coordinators were able to leverage the data across the organization in a timely and efficient manner. In non-central effort firms, dissemination was a more informal and difficult task, given that BMK was a localized activity, and the absence of standards for BMK data collection and distribution.

Quality Maturity: Changes in this KSF were incremental in nature over the four stages, with each stage focusing on improved linkage of BMK to quality initiatives. On average, firms in both groups moved from theory to practice in developing ties between BMK and other quality initiatives. At the knowledgeable/advanced stage, key BMK metrics were developed, and many had been deployed. By the proficient stage, key metrics were being tracked, although they were constantly being updated and refined to provide data comparable to industry standards.

Team Skills: Differences between the two groups of firms were negligible at the beginner stage. Each firm had a base pool

of talent that provided them with individuals who were adequately skilled in terms of process, functional, communication, and project management knowledge. In proceeding stages, additional training was acquired for individuals who were responsible to perform benchmarking. In the latter stages of development, greater distinctions between the two groups were apparent. Respondents in central effort firms indicated that teams were able to tap internal BMK expertise if they required it, and were able to operate autonomously of facilitator aid by the proficient stage. Respondents in non-central effort firms indicated it was the role of the local process owner to guide the team, and in many cases, process owners were unable to undertake BMK studies without assistance, given their lack of experience, ability to tap expertise, and weak organizational BMK standards.

Process Owner Involvement: There were significant differences with respect to the level of process owner involvement between the two groups of firms. At the beginner stage, respondents in central effort firms indicated that process owners were learning about benchmarking and preparing for its use given a senior management mandate to introduce BMK processes. Respondents in non-central effort firms indicated that a few forward thinking process owners were preparing for use, but that was not consistent across the organization, or even within divisions. After initial studies, process owners in central effort firms were proactive in funding studies and

took control of the entire BMK process at the proficient stage. Process owners in non-central effort firms at the knowledgeable/advanced stage were still not motivated or committed to BMK and sought additional resources from management if they were required to undertake a BMK study. This pattern was consistent through to the proficient stage, where process owner involvement in non-central effort firms was still generally inconsistent across the organization.

Performance Expectations: There were differences at the beginner stage between the two groups of firms, with respondents in central effort firms taking a longer term and larger scale view of the levels of change benchmarking could bring to their organizations. Once initial studies had been completed and BMK results were available, both groups of firms targeted large scale or quantum improvements from their BMK efforts. At the proficient stage, firms were consistently looking for quantum level cost savings, quality improvement, or cycle time reductions that would establish their organizations as best in class.

Structural Characteristics: In central effort firms, an infrastructure to support benchmarking activities was developed at the onset. The infrastructure was composed of a central BMK office which was funded by management, as well as dedicated BMK primes/coordinators who assumed these roles to serve the organization. As benchmarking developed within the organizations, the role of the central office expanded to

include data collection, training, project screening, facilitation, and information dissemination. At the latter stages, the central office and primes were able to act as a coordination mechanism to channel BMK efforts and leverage the results to create synergies within the organization.

In non-central effort firms, management did not designate any specialized roles or dedicated funding to support a central BMK office. In this model of development, BMK was a decentralized activity at the discretion of the process owner. As development progressed, any BMK infrastructures were ad hoc in nature and disbanded upon completion of the BMK study, leaving only informal linkages between divisions and functions.

Link To Customer: At the beginner stage, both groups of firms indicated that direct customer involvement in BMK was negligible, given that it was a new practice for the organization. Over the latter two stages, there was only minimal change in this pattern. Customer influence in both groups of firms in setting BMK strategy and direction was still indirect and based mostly on existing data and satisfaction surveys that were refined to meet changing customer preferences.

6.2 MANAGERIAL IMPLICATIONS

While the research unearthed two patterns of BMK development (which had both distinct and overlapping components), it is important to clarify that neither model of

development is superior or inferior to the other unless put into context. Each model serves a role in positioning BMK within the organization. For some companies, BMK was a well managed, well leveraged effort by design, as it was selected as a competitive tool by top management. In other firms, BMK was not seen as a key strategy, and as a result, less effort was placed on managing its use and development, which results in a much more decentralized but often equally effective process for the purposes of the particular organization. Therefore, an important consideration managers must address is what role, if any, will BMK assume in their organization.

I have demonstrated that the research data present two models of BMK development. One model represents a pattern of evolution consistent with firms that want to employ benchmarking across the organization as a tool to support and augment longer term strategic efforts. The second model represents a pattern of evolution consistent with firms who employ BMK only in select divisions/processes within the organization as a tool to address shorter term operational or strategic efforts. Each model has different requirements in terms of the support and effort required by management, with distinct long term implications.

A number of participants in this study were from companies that are considered (by industry publications and expert opinion) leading-edge benchmarkers. I noted through a literature search and discussions with these individuals that

their firms intentionally selected BMK as a key quality improvement strategy. After in-depth analysis, I noted that each of the companies (seven in total) demonstrated patterns of BMK development that are consistent with the central effort model. The results of the research also indicate that organizations that intend to make benchmarking a key improvement strategy must manage specific key success factors at the right times. Based on both quantitative and qualitative data, a series of traits common to these firms may be highlighted.

- Top management involvement at the initial stage to provide direction and focus for BMK efforts and at the knowledgeable/advanced stage when BMK process definition and organization wide standardization is required.
- Process owner buy-in across the organization from the onset and across all stages of benchmarking. This is obtained by demonstrated top management commitment to the practice (statement of support backed up by funding for education, training, and the development of a BMK support mechanisms).
- A top management funded BMK infrastructure that is responsible for guiding BMK efforts within the organization. Elements of the infrastructure include dedicated BMK specialists and a central office which serve to consolidate and leverage BMK information to create organizational synergies.

The research also indicates some key steps for managers that do not wish to make BMK a key improvement strategy, but nonetheless want to introduce it to limited areas of the organization. In this scenario, the research indicates that a high level of top management support (the same as for firms wishing to employ BMK in the strategic sense) to specific process owners or key divisions provides the greatest impact on BMK development and success. Specifically, senior management must be willing to support and often direct the localized efforts of selected process owners who manage operations that are key to the firm's competitive strategy. This support may be in the form of funding for external BMK expertise or additional internal resource allocation for BMK efforts, as well as a statement of commitment to both uncover and implement new practices within the organization. While this approach works well in the short run and can be used to address important operational concerns, it is important to note that the lack of formal mechanisms to leverage BMK knowledge across the organization is a drawback of the non-central effort model, and limits the long term strategic value of the practice.

A lot of emphasis has been placed on the ability of this study to provide information and guidelines to managers contemplating BMK use. The models also serve another purpose, in that they can be used as roadmaps to guide existing BMK efforts in firms that are still positioning the practice

within their organizations. While the models are not intended to be rigid paradigms for improvement, they can assist managers in keeping their BMK efforts on track, by highlighting some of the key issues and tradeoffs that must be addressed as BMK develops within the organization.

Benchmarking is a powerful instrument to improve quality and performance levels, but it is important to note that it may not be the right tool for every instance. Recognizing when benchmarking should not be used is just as important as understanding when it can provide a significant way to leverage organizational practices. The majority of respondents indicated that benchmarking needs to be positioned as one of several quality tools that may or may not be appropriate to a given situation. In many cases:

- The funds and time required to perform a benchmark are not available.
- The return on investment is not significant enough to warrant the allocation of scarce resources.
- Benchmarking does not provide a significant edge in information quality/quantity over less costly reverse engineering or competitive analysis.
- Information required to benchmark against is difficult to obtain.
- In many cases, the organization simply is not ready to benchmark.

This suggests that in order to derive maximum value from BMK as a quality tool, top management and benchmarking specialists within the company must position BMK as one of several quality tools and allow an informed process owner to exercise judgment in selecting the most appropriate mechanism by which to address a performance or quality issue.

6.3 RESEARCH IMPLICATIONS

In sum, this research highlights many of the key considerations managers must address in planning BMK use within their organizations. The models derived from the data bring to light several of these issues and can provide value to firms as a roadmap to guide BMK efforts. These models represent refined hypotheses that can be further tested to draw additional insight on the process of benchmarking development.

This research was based on existing literature from several domains. The results of this study have demonstrated the value of the generalized models and constructs that were used from the innovation, organizational learning, and evolutionary process literature.

The stages of BMK evolution were very similar in nature to the stages of the generic innovation process (evaluation, initiation, implementation and routinization), which promotes the use of this specific model of innovation as a baseline guide to developing models of evolution in related disciplines or domains.

The research also demonstrated close ties between the constructs (knowledge acquisition, information distribution, information interpretation, and organizational memory) underlying both successful organizational learning and benchmarking. Benchmarking, as an organizational learning process relies upon information discovery, retention, and dissemination if that information is to leverage the entire organization. Learning is a key requirement that underlies the benchmarking models derived from the research because each model is continuous and relies upon a progression and build up of information/knowledge (ie: intermediate/skilled stage relies upon learning that occurs in the beginner stage) in order to advance from one stage to the next in the developmental benchmarking model.

The two evolutionary process models that were used for the research were from the domains of software development, and organizational evolution. This study provided a domain specific example of development that had close parallels to each model. On the organizational level, there was a greater focus on formalization and routinization of tasks, as well as greater coordination between organizational subunits as development progressed. At the process level, BMK capability was enhanced in much the same way as the SEI model, by introducing formalized mechanisms to provide for standardized methods for the assessment of customer requirements, design of appropriate solutions, and to test the value of these

solutions to ensure they address the needs of the end user or customer.

While the interest in BMK has grown significantly over the past few years, there is still little empirical research available on the practice. There are a number of areas in which BMK research could be performed.

A logical direction for future research is to examine why firms would choose BMK as a key strategy, or, conversely, why some firms prefer to use BMK as a short-term strategy. This type of study could prove valuable if characteristics can be identified that suggest certain types of firms are better suited than others to derive benefits from its use. Additional lines of research that can be derived from this paradigm include:

- Do firms evolve from a non-central effort model to a central effort one ?
- Do firms consciously decide to limit BMK to a non-central effort model, or do they miss opportunities to become more centralized in their efforts ?

My research suggests that the answer to the first question is "no". As far as a conscious decision to limit BMK, I would argue many firms I spoke with were satisfied with their current efforts, but gave no indication if they would change to a more central model if given the opportunity. This limits any conclusions I might infer on this point. It is important to note that these conclusions are based only on

preliminary data, with a small sample size. Additional research on these issues is therefore warranted in order to derive more conclusive insight.

Second, the two developmental models resulting from this research were intended to provide a broad overview of the process of BMK development. While some detail was provided on key managerial considerations and differences in the models, it was beyond the scope of this research to explore each stage beyond what I consider a basic framework of evolution. Additional research is required to provide more detailed information on the patterns of BMK development demonstrated in the models. An area of interest would be to examine what additional factors might influence BMK development. This research dealt with the impact of a mandate, or a centralized BMK effort to characterize two different patterns of development. Additional work could be directed to examine the impacts of firm size, industry characteristics, or organizational structure on BMK development.

Third, research needs to be conducted on the specific subsets of the model that impacted heavily on BMK development and use, ie: top management and process owner interactions or the specific ways in which BMK support infrastructures are supported and managed. Detailed case studies would facilitate learning how to manage these two complex issues while providing information on the organizational context (political, economic and competitive pressures) that

indirectly impacts on any process of change.

Fourth, research needs to be done to characterize phases of evolution beyond the proficient stage. Many of the participants in this research were from firms recognized as being leading-edge benchmarkers and indicated a few of the directions they were taking ie: diffusing benchmarking throughout the value chain and use of real time BMK data. However, insight on these areas is very limited, and would be of value to firms currently working to expand BMK processes within their organizations.

Finally, research needs to be undertaken on the linkages of benchmarking with new quality methods. While the literature does indicate that benchmarking serves a role in the "quality toolbox" of many organizations, the ways in which benchmarking leverages and is integrated with newer quality initiatives such as reengineering is unclear. For example, several leading edge benchmarking firms are beginning to merge their reengineering and benchmarking through a consolidation of practices and data and expect significant gains from this effort. This suggests that detailed research examining this process could provide great insight in developing quality synergies across organizational boundaries.

6.4 BENEFITS OF THE STUDY

The results of the study are aimed at upper level management, benchmarking primes/specialists, and process owners in firms currently utilizing or contemplating the use

of benchmarking in their organizations. The findings of the research provide clear indicators of how benchmarking processes evolve in select organizations, highlight key factors contributing to effective benchmarking use, and allow firms to assess their current benchmarking activities in order to establish new directions for improvement. This provides management with guidelines on whether to actively support and provide resources for the adoption of benchmarking practices where appropriate in their organizations.

6.5 LIMITATIONS OF THE STUDY

Since the study required that the evolution of the benchmarking process be observed over a period of time, respondents might have had difficulty reflecting upon past events. There is also the problem that respondents might not have been with the company since inception of the benchmarking program. This can create discontinuities in tracing evolutionary progress.

The manner in which the propositions were framed for this research led to a few problems. A number of propositions contained multiple components and this caused some interpretation problems in that a respondent might agree with one part of the hypothesis and disagree with another.

In addition, some respondents indicated that their views might not be representative of each instance of benchmarking development within their firms. In other words, in some organizations, multiple models of development could be

present.

A final consideration is the data provided by respondents for the latter stages of development. BMK proficiency is a subjective term and it is conceivable that respondents provided answers to sections of the model that neither they nor their organizations have reached, which could compromise the developmental model.

As noted above, the research is a non-probability design, based on a small sample making it difficult to draw statistical inference generalizable to the parent population.

REFERENCES

- Ackoff, Russell L., "Management misinformation systems.", *Management Science*, 14, 1967 pp. B147-B156.
- Alderfer, Clayton P., "Change Processes in Organizations.", in Handbook of Industrial and Organizational Psychology. Marvin D. Dunnette (ed.) Rand McNally, Chicago, Il., 1976, pp. 1591-1638.
- American Productivity and Quality Centre, Houston, Texas, Visitors Day Handouts, July 28, 1992.
- Argyris, C., Reasoning, Learning and Action: Individual and Organizational. San Francisco, Jossey-Bass, Inc., 1982.
- Bemowski, Karen, "The Benchmarking Bandwagon.", *Quality Progress*, January 1991, pp. 19-24.
- Bennett, David, Business Development Manager, Digital Equipment Corporation. From a presentation September 23, 1993, Ottawa, Ontario.
- Bogan, Christopher, and Michael English, Benchmarking for Best Practices: Winning Through Innovative Adaptation. McGraw Hill, New York, New York, 1994.
- Camp, Robert C., Benchmarking: The Search for Industry Best Practices That Lead to Superior Performance. ASQC Quality Press, Milwaukee, WI, 1989.
- Campbell, D.T., "Variation and selective retention in sociocultural evolution", *General Systems*, 14:69-85, 1969.
- Clark, Jon, Ian McLoughlin, Howard Rose, and Robin King, The Process of Technological Change: New Technology and Social Choice in the Workplace. Cambridge University Press, 1988.
- Colquhoun, Eric, "Benchmarking By Numbers.", *Sales and Marketing Management*, November 1992, pp. 9-12.
- Crino, Richard, Corporate Benchmarking Manager, Digital Equipment Corporation. From a discussion July 20, 1993, Ottawa, Ontario.
- Daft, Richard L., A Dual-Core Model of Organizational Innovation, *Academy of Management Journal*, Volume 21 No. 2, 1978, pp. 193-210.
- Digital Equipment Corporation, Notes from a Seminar on Benchmarking Practices, and "Introduction to Benchmarking", March 1992.

- Evans-Correia, Kate, "How Xerox made its comeback.", *Purchasing*, January 17, 1991, pp. 134-139.
- Garvin, David A., Managing Quality: The Strategic and Competitive Edge. The Free Press, New York, NY, 1988.
- Garvin, David A., "Building a Learning Organization." *Harvard Business Review*, July-August 1993, pp. 78-91.
- Gerwin, Donald and Harvey Kolodny, Management of Advanced Manufacturing Technology: Strategy, Organization, and Innovation. John Wiley and Sons, New York, 1992.
- Gorry G. Anthony, and Michael S. Scott Morton, "A framework for management information systems.", *Sloan Management Review*, 13, 1971 pp. 55-70.
- Grayson, C. Jackson, "Benchmarking: Learn or Die.", *Continuous Journey*, APQC Publications, 1992.
- Greiner, Larry E., "Evolution and Revolution as Organizations Grow.", *Harvard Business Review*, July-August 1972, pp. 37-46.
- Gunn, Thomas G., 21st Century Manufacturing: Creating Winning Business Performance, HarperCollins Publishers, 1992.
- Hage, Jerald, Theories of Organizations, John Wiley, New York, 1980.
- Hage, Jerald and Michael Aiken, Social Change in Complex Organizations, Random House Inc., 1970.
- Hage, Jerald and Robert Dewar, "Elite values versus organizational structure in predicting innovation.", *Administrative Science Quarterly*, 18, 1973, pp. 279-290.
- Hall, Richard H., Organizations: Structure and Process. Third Edition, Prentice-Hall Inc., 1982.
- Hammer, Michael, and James Champy, Reengineering The Corporation: A Manifesto For Business Revolution, HarperBusiness, 1993.
- Hatz, Joe, Manager of Benchmarking, Bell Northern Research. From a discussion November 25, 1993, Ottawa, Ontario.
- Hebden, J.E., "The importance of organizational variables in the computerization of management information systems.", *Journal of Management Studies*, 8, 1971 pp. 179-198.

Huber, George P., "Organizational Learning: The Contributing Processes And The Literatures." *Organization Science*, Volume 2, No. 1, February 1991 pp. 88-116.

Humphrey, Watts S., "Characterizing the Software Process: A Maturity Framework.", *IEEE Software*, March 1988, pp. 73-79.

Kaiser Associates, Beating The Competition: A Practical Guide To Benchmarking. Kaiser Associates Inc.

Kelley, George, "Seducing the elites: the politics of decision making and innovation in organizational networks.", *Academy of Management Review*, 1 (3), 1976 pp. 66-74.

Kimberly, John R., "Managerial Innovation", in Handbook of Organizational Design. P.C. Nystrom and W.H. Starbuck (Eds.) Oxford University Press, New York, N.Y., 1981, pp. 84-104.

McKelvey, Bill, Organizational Systematics., University of California Press, Los Angeles, California. 1981.

Maturi, Richard J., "Benchmarking: The Search for Quality", *The Financial Manager*, March/April 1990, pp. 26-31.

Mittelstaedt, Robert E., "Benchmarking: How to Learn from Best-In-Class Practices", *National Productivity Review*, Summer 1992.

Mohr, Lawrence B., "Innovation Theory: An Assessment from the Vantage Point of New Electronic Technology in Organizations", in New Technology as Organizational Innovation: The Development and Diffusion of Microelectronics. J.M. Pennings and A. Buitendam (Eds.) Ballinger Books, Cambridge, Mass., 1987, pp. 13-31.

Pryor, Lawrence S., "Benchmarking: A Self-Improvement Strategy", *Journal of Business Strategy*, November-December 1989, pp. 28-32.

Pryor, Lawrence S. and Steven J. Katz., "How Benchmarking Goes Wrong (And How To Do It Right)", *Planning Review*, January-February 1993.

Quinn, James V., "What to do until the (EDP) doctor comes !", *Management Advisor*, 10 (3), 1973 pp. 25-29.

Spendolini, Michael J., The Benchmarking Book. Amacon, New York, N.Y., 1992.

Stata, Ray, "Organizational Learning- The Key To Management Innovation", *Sloan Management Review*, Spring 1989.

Thor, Carl, President, International Consulting, The Cumberland Group. From a seminar conducted January 17, 1994, Ottawa, Ontario.

Tornatzky, Louis G. and Mitchell Fleisher, The Processes of Technological Innovation, Lexington Books, Lexington, Massachusetts, 1990.

Walton, Richard E., "The diffusion of new work structures: explaining why success didn't take.", *Organizational Dynamics* 3 (3), 1975 pp. 3-22.

Watson, Gregory H., Strategic Benchmarking: How To Rate Your Company's Performance Against The World's Best. John Wiley and Sons Inc, 1993

Zaltman, Gerald, Robert Duncan and Jonny Holbek, Innovations and Organizations. John Wiley and Sons, New York, NY, 1973.

**APPENDIX A
QUANTITATIVE
BENCHMARKING QUESTIONNAIRE**

The following questionnaire is designed to elicit your opinions on how benchmarking as a practice evolved within your organization.

For each scaled question, please circle the response that best represents your organization's experiences in benchmarking. Space has been provided below each scaled question so that you may add comments regarding your answers.

In the case of a scaled question, if an event in the development of benchmarking occurred at a point other than as suggested, please indicate when it did occur in the space provided under that question.

ie: If a benchmarking team received training after their first BMK study, and not before as suggested by the question, indicate when training was provided.

All questionnaire responses will be kept confidential, and all participant firms will be provided copies of the final research if so desired.

Thanking you in advance

Greg Burke
Graduate Student
Master of Management Studies Program
Carleton University

Telephone (613) 828-0219

BACKGROUND INFORMATION

Company: _____

Address of Company: _____

Primary Business: _____

Number of Years Company Involved with Benchmarking (BMK):

Is There a Divisional Budget for BMK? If so, how much ? :

Interviewee: _____

Title/Position: _____

Personal BMK Experience (Describe):

Number of Years with Company: _____

Department: _____

Telephone Number for Contact: _____

Date of Interview: _____

With respect to your firm when it was aware of BMK and was learning about its use, please indicate your opinion of the following statements:

1. Top management involvement was limited at the onset to providing resources for BMK learning and education

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

2. If funding was limited to learning and education, what did management hope to accomplish ?
- _____
- _____

3. The benchmarking knowledge and expertise of individuals within the firm was limited

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

4. Benchmarking was not linked to existing quality improvement efforts

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

5. Individuals within the firm possessed the process, functional, and communications skills required for successful benchmarking

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

6. Middle management possessed the project management skills needed to perform successful benchmarking

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

7. Process owner (person responsible for development and control of a given operation) involvement/commitment to benchmarking was negligible or non-existent

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

8. Benchmarking was perceived by top management mainly as another means of reducing competitive gaps

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

9. There was no dedicated infrastructure (funding, personnel, resources) to support benchmarking within the organization

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

10. The role of the customer in setting the direction for benchmarking activities was negligible or non-existent

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

With respect to when your firm passed the learning stage and prepared for and conducted a benchmarking study, please indicate your opinion of the following statements:

11. After initial learning, top management was willing to support a benchmarking study

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

12. Designated individuals (BMK primes) began to capture and organize benchmarking knowledge

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

13. Benchmarking was perceived by top management as a valid quality improvement tool for the organization

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

14. Individuals charged with undertaking benchmarking studies were provided training to supplement their skill base

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

15. Process owners were aware of the potential gains through benchmarking, but were uncommitted to using it

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

16. Benchmarking projects were selected mainly on the basis of cost

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

17. An infrastructure to support benchmarking was created

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

18. Benchmarking studies were selected based on customer requirements as perceived by individuals/teams charged with undertaking the studies

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

With respect to when your firm completed a number of benchmarking studies that were viewed as successful within the championing or test division, please indicate your opinion of the following statements:

19. At this stage, management paved the way for benchmarking standardization

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

20. Management designated benchmarking primes

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

If primes were not designated then go to question 22

21. Benchmarking primes have begun to document and assimilate benchmarking learning

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

22. Metrics for most key processes have been deployed

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

23. Benchmarking facilitators were active participants in benchmarking studies

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

24. Process owners provided funding for benchmarking studies

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

25. Benchmarking studies were undertaken on the basis of obtaining quantum (significant return) improvement

6	5	4	3	2	1
No	Agree	Agree	Neutral	Disagree	Disagree
Opinion		Somewhat		Somewhat	

26. Specialized roles existed within the division/functional area in which benchmarking was employed

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

27. Dedicated funding existed within the division/functional area in which benchmarking was employed

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

28. The customer set the direction for benchmarking studies

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

With respect to when your firm diffused benchmarking practices beyond the division and throughout the organization, please indicate your opinion of the following statements:

29. Management paved the way for reengineering the benchmarking process (ie: improving how benchmarking was performed to achieve better organizational fit)

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

30. Benchmarking coordinators disseminated information on benchmarking use to organizational members

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

31. Key process metrics were continuously tracked

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

32. Individuals/teams charged with undertaking benchmarking studies were able to operate without facilitator assistance

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

33. Process owners championed and lead benchmarking efforts

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

34. Benchmarking studies were selected in order to push the organization to best-in-class performance

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

35. Multiple benchmarking infrastructures existed across divisions

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

36. Benchmarking studies were customer initiated

6	5	4	3	2	1
No Opinion	Agree	Agree Somewhat	Neutral	Disagree Somewhat	Disagree

Thank you for your time and effort

**APPENDIX B
QUALITATIVE
BENCHMARKING QUESTIONNAIRE**

All questionnaire responses will be kept confidential, and all participant firms will be provided copies of the final research if so desired.

Thanking you in advance

Greg Burke
Graduate Student
Master of Management Studies Program
Carleton University

BENCHMARKING QUESTIONNAIRE

BACKGROUND INFORMATION

Company: _____

Address of Company: _____

Primary Business: _____

Number of Years Company Involved with Benchmarking (BMK): _____

Is There a Divisional Budget for bMK? If so, how much ? : _____

Interviewee: _____

Title/Position: _____

Personal BMK Experience (Describe): _____

Number of Years with Company: _____

Department: _____

Telephone Number for Contact: _____

Date of Interview: _____

1. Does your company define benchmarking ? How ?

2. How did your company get introduced to benchmarking as a practice?

3. Did the introduction come from inside or outside of the company ?

4. Was the interest in benchmarking proactive (opportunity driven) or reactive (crisis driven) ?

5. Was the interest in benchmarking triggered by a specific event ?

6. What steps have been taken (or sources tapped) to develop a deeper understanding of benchmarking ? (check all that apply)

seminars ☐ reading about it ☐ interest groups ☐
training ☐ importing experience ☐ consultant expertise ☐
your company's experience ☐ other (specify) _____

7. What was the level of senior management involvement when benchmarking was first introduced to the firm ? (check all that apply)

minimal support and interest ☐
funding for learning ☐ active involvement ☐
designating a benchmarking coordinator ☐ creation of infrastructure ☐
creating a pool of funds to support benchmarking studies ☐
mandate to integrate BMK into operations ☐
other (specify) _____

8. Describe the general scope and characteristics of the initial benchmarking study you observed

9. Was it an internal or external study ?

10. Who championed the study ?

11. Who funded the study ?

12. Who led the study, and why ?

13. How was the topic selected ?

14. What strategies, if any, were used to select the topic ?

15. What intrafirm political factors, if any, influenced the topic selection ?

16. Was the study a single pilot or were multiple pilot projects used ?

17. Was there an assessment done on the outcomes of the initial study, or on the feasibility of benchmarking to the organization ?

If Yes to the above :

18. What was the evaluation procedure ?

19. What criteria were used ?

20. Who performed the assessment ?

21. Did management designate any individuals as dedicated benchmarking facilitators/coordinators ? If so, when did this occur ?

22. Who was charged with developing benchmarking definitions/standards for the division ?

APPENDIX C
DESCRIPTIVE STATISTICS

TABLE C1 Descriptive Statistics Of Aggregate Sample

n= 24

Scale **5= Agree**
 4= Agree Somewhat
 3= Neutral
 2= Disagree Somewhat
 1= Disagree

Variable Name	Description	Mean Agreement With Research Proposition	Median Response of Research Proposition	Mode Response With Research Proposition
TMS1	Top Management Support at Beginner Stage	2.708	2.000	2.000
TMS2	Top Management Support at Skilled Stage	4.542	4.000	4.000
TMS3	Top Management Support at Advanced Stage	3.141	5.000	5.000
TMS4	Top Management Support at Proficient Stage	3.619	4.000	4.000
KE1	BMK Knowledge and Expertise at Beginner Stage	4.613	5.000	5.000

3 of/de 3

PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

PRECISIONSM RESOLUTION TARGETS

23. Who was responsible for guiding benchmarking efforts as they moved from the pilot project to the rest of the division ?

24. What barriers/facilitators existed in developing benchmarking within the organization over the various stages (learning, initial/pilot study, use across division etc.) ?

25. What circumstances would preclude benchmarking from being utilized for a given situation ? ie: Why did your company reject benchmarking in certain cases ? What did they chose to do instead of benchmarking ?

26. In your opinion, what stages of benchmarking development lie beyond benchmarking proficiency (benchmarking use across the organization), ie: what is the next step in the chain ?

Thank you for your time and effort

APPENDIX C
DESCRIPTIVE STATISTICS

TABLE C1 Descriptive Statistics Of Aggregate Sample

n= 24

Scale **5= Agree**
 4= Agree Somewhat
 3= Neutral
 2= Disagree Somewhat
 1= Disagree

Variable Name	Description	Mean Agreement With Research Proposition	Median Response of Research Proposition	Mode Response With Research Proposition
TMS1	Top Management Support at Beginner Stage	2.708	2.000	2.000
TMS2	Top Management Support at Skilled Stage	4.542	4.000	4.000
TMS3	Top Management Support at Advanced Stage	3.141	5.000	5.000
TMS4	Top Management Support at Proficient Stage	3.619	4.000	4.000
KE1	BMK Knowledge and Expertise at Beginner Stage	4.613	5.000	5.000

KE2	BMK Knowledge and Expertise at Skilled Stage	3.917	4.000	5.000
KE3	BMK Knowledge and Expertise at Advanced Stage	4.000	4.000	4.000
KE4	BMK Knowledge and Expertise at Proficient Stage	4.182	4.000	4.000
QM1	Quality Maturity at Beginner Stage	2.625	2.500	1.000
QM2	Quality Maturity at Skilled Stage	4.167	5.000	5.000
QM3	Quality Maturity at Advanced Stage	4.084	4.000	5.000
QM4	Quality Maturity at Proficient Stage	3.857	4.000	5.000
TS1A and TS1B	Team Skills at Beginner Stage	TS1A 3.458 TS1B 3.417	TS1A 4.000 TS1B 4.000	TS1A 5.000 TS1B 4.000
TS2	Team Skills at Skilled Stage	3.822	4.000	4.000
TS3	Team Skills at Advanced Stage	3.773	4.000	4.000

TS4	Team Skills at Proficient Stage	3.158	3.000	4.000
PO1	Process Owner Involvement at Beginner Stage	2.625	2.500	1.000
PO2	Process Owner Involvement at Skilled Stage	3.000	3.000	4.000
PO3	Process Owner Involvement at Advanced Stage	3.875	5.000	5.000
PO4	Process Owner Involvement at Proficient Stage	3.857	4.000	4.000
PE1	Performance Expecta- tions at Beginner Stage	3.516	4.000	4.000
PE2	Performance Expecta- tions at Skilled Stage	2.250	2.000	1.000
PE3	Performance Expecta- tions at Advanced Stage	4.209	4.000	4.000
PE4	Performance Expecta- tions at Proficient Stage	4.381	5.000	5.000

SC1	Structural Characteristics at Beginner Stage	3.792	4.000	5.000
SC2	Structural Characteristics at Skilled Stage	3.209	3.500	5.000
SC3A, SC3B and SC3C	Structural Characteristics at Advanced Stage	SC3A 3.314 SC3B 3.356 SC3C 2.250	SC3A 4.000 SC3B 4.000 SC3C 2.000	SC3A 4.000 SC3B 4.000 SC3C 1.000
SC4	Structural Characteristics at Proficient Stage	3.045	4.000	1.000
RC1	Link to Customer at Beginner Stage	3.292	3.500	5.000
RC2	Link to Customer at Skilled Stage	3.898	4.000	5.000
RC3	Link to Customer at Advanced Stage	3.405	4.000	4.000
RC4	Link to Customer at Proficient Stage	2.762	2.000	4.000

**TABLE C2 Descriptive Statistics Of Firms With A Mandate To Benchmark
Or A Central Benchmarking Office
n=12**

Scale 5= Agree
 4= Agree Somewhat
 3= Neutral
 2= Disagree Somewhat
 1= Disagree

Variable Name	Description	Mean Agreement With Research Proposition	Median Response of Research Proposition	Mode Response With Research Proposition
TMS1	Top Management Support at Beginner Stage	2.083	2.000	1.000
TMS2	Top Management Support at Skilled Stage	4.667	5.000	5.000
TMS3	Top Management Support at Advanced Stage	3.917	4.000	5.000
TMS4	Top Management Support at Proficient Stage	3.500	4.000	4.000
KE1	BMK Knowledge and Expertise at Beginner Stage	4.500	4.500	4.000
KE2	BMK Knowledge and Expertise at Skilled Stage	4.000	4.500	5.000

KE3	BMK Knowledge and Expertise at Advanced Stage	4.091	4.000	4.000
KE4	BMK Knowledge and Expertise at Proficient Stage	4.667	5.000	5.000
QM1	Quality Maturity at Beginner Stage	2.833	3.500	4.000
QM2	Quality Maturity at Skilled Stage	4.250	4.500	5.000
QM3	Quality Maturity at Advanced Stage	4.167	4.500	5.000
QM4	Quality Maturity at Proficient Stage	3.917	4.000	5.000
TS1A and TS1B	Team Skills at Beginner Stage	TS1A 3.583 TS1B 3.500	TS1A 3.500 TS1B 4.000	TS1A 5.000 TS1B 5.000
TS2	Team Skills at Skilled Stage	3.917	4.000	4.000
TS3	Team Skills at Advanced Stage	4.000	4.000	4.000
TS4	Team Skills at Proficient Stage	3.667	4.000	4.000

PO1	Process Owner Involvement at Beginner Stage	2.833	2.500	1.000
PO2	Process Owner Involvement at Skilled Stage	2.583	2.000	1.000
FO3	Process Owner Involvement at Advanced Stage	4.667	5.000	5.000
PO4	Process Owner Involvement at Proficient Stage	4.320	4.000	4.000
PE1	Performance Expectations at Beginner Stage	3.364	4.000	4.000
PE2	Performance Expectations at Skilled Stage	2.167	1.500	1.000
PE3	Performance Expectations at Advanced Stage	4.417	4.500	5.000
PE4	Performance Expectations at Proficient Stage	4.667	5.000	5.000
SC1	Structural Characteristics at Beginner Stage	3.583	4.000	4.000

SC2	Structural Characteristics at Skilled Stage	4.167	5.000	5.000
SC3A, SC3B and SC3C	Structural Characteristics at Advanced Stage	SC3A 3.960 SC3B 3.545 SC3C 2.417	SC3A 4.000 SC3B 4.000 SC3C 2.000	SC3A 4.000 SC3B 5.000 SC3C 1.000
SC4	Structural Characteristics at Proficient Stage	3.583	4.000	4.000
RC1	Link to Customer at Beginner Stage	3.333	3.500	5.000
RC2	Link to Customer at Skilled Stage	3.545	4.000	4.000
RC3	Link to Customer at Advanced Stage	3.727	4.000	4.000
RC4	Link to Customer at Proficient Stage	2.727	2.000	2.000

TABLE C3 Descriptive Statistics Of Firms Without A Mandate To Benchmark Or A Central Benchmarking Office

n=12

Scale 5= Agree
 4= Agree Somewhat
 3= Neutral
 2= Disagree Somewhat
 1= Disagree

Variable Name	Description	Mean Agreement With Research Proposition	Median Response of Research Proposition	Mode Response With Research Proposition
TMS1	Top Management Support at Beginner Stage	3.333	3.500	4.000
TMS2	Top Management Support at Skilled Stage	4.417	5.000	5.000
TMS3	Top Management Support at Advanced Stage	2.364	2.000	1.000
TMS4	Top Management Support at Proficient Stage	3.780	4.000	4.000
KE1	BMK Knowledge and Expertise at Beginner Stage	4.727	5.000	5.000
KE2	BMK Knowledge and Expertise at Skilled Stage	3.833	4.000	4.000

KE3	BMK Knowledge and Expertise at Advanced Stage	3.909	4.000	4.000
KE4	BMK Knowledge and Expertise at Proficient Stage	3.600	4.000	4.000
QM1	Quality Maturity at Beginner Stage	2.417	2.000	1.000
QM2	Quality Maturity at Skilled Stage	4.083	5.000	5.000
QM3	Quality Maturity at Advanced Stage	4.000	4.000	5.000
QM4	Quality Maturity at Proficient Stage	3.780	4.000	5.000
TS1A and TS1B	Team Skills at Beginner Stage	TS1A 3.333 TS1B 3.333	TS1A 4.000 TS1B 3.500	TS1A 2.000 TS1B 4.000
TS2	Team Skills at Skilled Stage	3.727	4.000	4.000
TS3	Team Skills at Advanced Stage	3.545	4.000	4.000
TS4	Team Skills at Proficient Stage	2.290	2.000	1.000

PO1	Process Owner Involvement at Beginner Stage	2.417	2.500	1.000
PO2	Process Owner Involvement at Skilled Stage	3.417	3.500	4.000
PO3	Process Owner Involvement at Advanced Stage	3.083	3.500	1.000
PO4	Process Owner Involvement at Proficient Stage	3.440	4.000	4.000
PE1	Performance Expectations at Beginner Stage	3.667	4.000	3.000
PE2	Performance Expectations at Skilled Stage	2.333	2.000	1.000
PE3	Performance Expectations at Advanced Stage	4.000	4.000	4.000
PE4	Performance Expectations at Proficient Stage	4.000	4.000	4.000
SC1	Structural Characteristics at Beginner Stage	4.000	4.000	5.000

SC2	Structural Characteristics at Skilled Stage	2.250	1.000	1.000
SC3A, SC3B and SC3C	Structural Characteristics at Advanced Stage	SC3A 2.667 SC3B 3.167 SC3C 2.083	SC3A 3.000 SC3B 3.500 SC3C 2.000	SC3A 1.000 SC3B 4.000 SC3C 1.000
SC4	Structural Characteristics at Proficient Stage	2.400	2.000	1.000
RC1	Link to Customer at Beginner Stage	3.250	3.500	4.000
RC2	Link to Customer at Skilled Stage	4.250	4.500	5.000
RC3	Link to Customer at Advanced Stage	3.083	3.000	4.000
RC4	Link to Customer at Proficient Stage	2.800	3.000	4.000

APPENDIX D
TEST FOR DIFFERENCES IN MEANS

TABLE D1 t-Test Between Two Sample Means
95% Confidence Interval

Variable	Calculated T	T critical
TMS1	2.374 * ¹	2.074
TMS2	0.745	2.074
TMS3	2.830 *	2.080
TMS4	0.642	2.093
KE1	1.110	2.080
KE2	0.625	2.074
KE3	0.405	2.086
KE4	2.696 *	2.086
QM1	0.660	2.074
QM2	0.335	2.074
QM3	0.345	2.074
QM4	0.240	2.093
TS1A	0.408	2.074
TS1B	0.289	2.074
TS2	0.297	2.080
TS3	0.739	2.080
TS4	2.172 *	2.110
PO1	0.634	2.074
PO2	1.502	2.074
PO3	2.592 *	2.074
PO4	2.147 *	2.093
PE1	0.565	2.080
PE2	0.264	2.074
PE3	1.195	2.074
PE4	1.921	2.093
SC1	0.707	2.080
SC2	2.825 *	2.074

SC3A	2.103 *	2.074
SC3B	0.585	2.080
SC3C	0.625	2.074
SC4	2.110 *	2.086
RC1	0.123	2.074
RC2	1.364	2.090
RC3	1.149	2.080
RC4	0.117	2.093

* Denotes Statistical Difference Between The Two Groups

¹ Significance of TMS1 is unsupportable given respondent misinterpretation of question.

END

0 1 - 0 6 - 9 5

FIN