



**SIX SIGMA IN THE FINANCIAL MANAGEMENT PROCESSES
OF NANJING INSTITUTE OF GEOLOGY AND
MINERAL RESOURCES, CHINA**

A Thesis

Presented to

the Faculty of the Graduate School of Business
De La Salle University-Dasmariñas

In Partial Fulfillment

of the Requirements for the

Degree of Master of Business Administration

By

Cao Chunqian

August 2005

AUG 31 2005



Abstract

Title: Six Sigma in the Financial Management Processes of Nanjing Institute of Geology and Mineral Resources, China

Researcher: Cao Chunqian

Adviser: Prof. Marilou C. Jopillo

Year Completed: 2005

Type of Document: Masteral Thesis

No. of Pages: 123

Summary

The study sought to determine the Six Sigma performance level of financial management processes and its impact on financial management of Nanjing Institute of Geology and Mineral Resources, China. To meet this goal, the researcher developed the operational framework for the study based on the concept of Six Sigma and nonprofit financial management, which is: when Six Sigma is adopted in financial management, the performance of financial management processes can be measured by Six Sigma indicators, such as defects per opportunity (DPO), first pass yield (FPY), defects per million opportunities (DPMO), and sigma level. Descriptive and historical research methods, particularly Six Sigma scatter diagram, single factor ANOVA and benchmarking were employed in the study to analyze the performance of financial management processes.



The results of this study showed that: a) the number of defects of all financial management processes, except long-term debt management, was relatively high in 2002 and decreased significantly year-on-year in 2003 and 2004; b) the DPO and DPMO of all financial management processes, except long-term debt management, were relatively high in 2002 and decreased significantly year-on-year in 2003 and 2004; while the FPY and sigma level of all financial management processes, except long-term debt management, were relatively low in 2002 and increased significantly year-on-year in 2003 and 2004; c) for all financial management processes except long-term debt management, the sigma level illustrated an upward pattern in scatter diagram and ANOVA test showed significant improvement over the 3 years. d) the benchmarking indicated that most financial management processes, particularly capital budgeting and cash management, did not achieve the recognized average performance level of 4 sigma and their performance was far below world class performance level of 6 sigma; f) apart from defects deduction, Six Sigma saved manpower, shortened lead time in most financial management processes, and reduced expenses of financial department. Recommendations for financial department to take appropriate improvement and control methods to further reduce defects, train the employees on Six Sigma, redesign some low performance processes if necessary, and most of all cultivate Six Sigma culture in the organization to raise the efficiency of financial management and customer satisfaction.



Table of Contents

	Page
Title Page	i
List of Tables	v
List of Figures	vii
Chapter	
1. The Problem and Its Background	1
1.1 Introduction	1
1.2 Background of the Study	2
1.3 Theoretical Framework	4
1.4 Operational Framework	6
1.5 Statement of the Problems	7
1.6 Hypotheses	8
1.7 Significance of the Study	9
1.8 Scope and Limitation	11
1.9 Definition of Terms	11
2. Review of Related Literature and Studies	15
2.1 Related Literature	15
2.2 Related Studies	21
2.3 Assessment	28
3. Research Methodology	29
3.1 Research Design	29



3.2	Data Management	30
3.3	Data Treatment	31
4.	Presentation, Interpretation and Analysis of Data	35
4.1	Profile of Financial Management Process	35
4.2	Six Sigma Indicators	53
4.3	Six Sigma Scatter Diagram and ANOVA Test	67
4.4	Benchmarking for Financial Management Process	80
4.5	Impact on Financial Management	91
5.	Summary, Conclusions and Recommendations	96
5.1	Summary of Findings	96
5.2	Conclusions	98
5.3	Recommendations	101
Appendices	104
A.	Sigma Capability Conversion Table	105
B.	Breakdown of Defects in Cash Budgeting	106
C.	Breakdown of Defects in Capital Budgeting	107
D.	Breakdown of Defects in Cash Management	108
E.	Breakdown of Defects in Inventory Management	109
F.	Breakdown of Defects in Accounts Receivable Management	110
G.	Breakdown of Defects in Accounts Payable Management	111
H.	Breakdown of Defects in Fixed Assets Management	112
I.	Breakdown of Defects in Long-Term Debt Management	113



J. Breakdown of Defects in Financial Reporting	114
K. Microsoft Excel Output for Single Factor ANOVA Test of Cash Budgeting	115
L. Microsoft Excel Output for Single Factor ANOVA Test of Capital Budgeting	115
M. Microsoft Excel Output for Single Factor ANOVA Test of Cash Management	116
N. Microsoft Excel Output for Single Factor ANOVA Test of Inventory Management	116
O. Microsoft Excel Output for Single Factor ANOVA Test of Accounts Receivable Management	117
P. Microsoft Excel Output for Single Factor ANOVA Test of Accounts Payable Management	117
Q. Microsoft Excel Output for Single Factor ANOVA Test of Fixed Assets Management	118
R. Microsoft Excel Output for Single Factor ANOVA Test of Long-Term Debt Management	118
S. Microsoft Excel Output for Single Factor ANOVA Test of Financial Reporting	119
Bibliography	120



List of Tables

Table	Page
1. DPMO Conversion Table	32
2. Cash Budgeting Defects, Units and Opportunities	37
3. Capital Budgeting Defects, Units and Opportunities	39
4. Cash Management Defects, Units and Opportunities	41
5. Inventory Management Defects, Units and Opportunities	43
6. Accounts Receivable Management Defects, Units and Opportunities	45
7. Accounts Payable Management Defects, Units and Opportunities	47
8. Fixed Assets Management Defects, Units and Opportunities	49
9. Long-Term Debt Management Defects, Units and Opportunities	51
10. Financial Reporting Defects, Units and Opportunities	53
11. Cash Budgeting DPO, FPY, DPMO and Sigma Level	55
12. Capital Budgeting DPO, FPY, DPMO and Sigma Level	56
13. Cash Management DPO, FPY, DPMO and Sigma Level	58
14. Inventory Management DPO, FPY, DPMO and Sigma Level	59
15. Accounts Receivable Management DPO, FPY, DPMO and Sigma Level	61



16. Accounts Payable Management DPO, FPY, DPMO and Sigma Level	62
17. Fixed Assets Management DPO, FPY, DPMO and Sigma Level ...	64
18. Long-Term Debt Management DPO, FPY, DPMO and Sigma Level	65
19. Financial Reporting DPO, FPY, DPMO and Sigma Level	66
20. Benchmarking for Cash Budgeting	81
21. Benchmarking for Capital Budgeting	82
22. Benchmarking for Cash Management	83
23. Benchmarking for Inventory Management	84
24. Benchmarking for Accounts Receivable Management	85
25. Benchmarking for Accounts Payable Management	86
26. Benchmarking for Fixed Assets Management	87
27. Benchmarking for Long-Term Debt Management	88
28. Benchmarking for Financial Reporting	89
29. Average Number of Employees in Financial Management Process	92
30. Average Lead Time of Financial Management Process	93
31. Expenses of Financial Department	94
32. Summary Results of Hypotheses	100



List of Figures

Figure	Page
1. Shifted Six Sigma Process	5
2. Operational Framework	7
3. Scatter Diagram on Sigma Level of Cash Budgeting	68
4. Scatter Diagram on Sigma Level of Capital Budgeting	69
5. Scatter Diagram on Sigma Level of Cash Management	71
6. Scatter Diagram on Sigma Level of Inventory Management	72
7. Scatter Diagram on Sigma Level of Accounts Receivable Management	74
8. Scatter Diagram on Sigma Level of Accounts Payable Management	75
9. Scatter Diagram on Sigma Level of Fixed Assets Management	77
10. Scatter Diagram on Sigma Level of Long-Term Debt Management	78
11. Scatter Diagram on Sigma Level of Financial Reporting	80