

**DATA MARTS AS MANAGEMENT INFORMATION
DELIVERY MECHANISMS: Utilisation in Manufacturing
Organisations with Third Party Distribution**

by

Shana Rachel Ponelis

Submitted in fulfilment
of the requirements for the degree

Magister Informationis Scientiae specializing
in INFORMATION SCIENCE

in the

Department of Information Science
Faculty of Humanities
University of Pretoria
Pretoria

Supervisor: Prof. J. J. Britz

November 2002

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the National Research Foundation.

DATA MARTS AS MANAGEMENT INFORMATION DELIVERY
MECHANISMS: Utilisation in Manufacturing Organisations with Third
Party Distribution

A study by
Shana Rachel Ponelis

Supervisor: Prof. J. J. Britz
Department: Information Science
Degree: Magister Informationis Scientiae specializing in
INFORMATION SCIENCE

ABSTRACT: Customer knowledge plays a vital part in organisations today, particularly in sales and marketing processes, where customers can either be channel partners or final consumers. Managing customer data and/or information across business units, departments, and functions is vital. Frequently, channel partners gather and capture data about downstream customers and consumers that organisations further upstream in the channel require to be incorporated into their information systems in order to allow for management information delivery to their users. In this study, the focus is placed on manufacturing organisations using third party distribution since the flow of information between channel partner organisations in a supply chain (in contrast to the flow of products) provides an important link between organisations and increasingly represents a source of competitive advantage in the marketplace. The purpose of this study is to determine whether there is a significant difference in the use of sales and marketing data marts as management information delivery mechanisms in manufacturing organisations in different industries, particularly the pharmaceuticals and branded consumer products. The case studies presented in this dissertation indicates that there are significant differences between the use of sales and marketing data marts in different manufacturing industries, which can be ascribed to the industry, both directly and indirectly.

OPSOMMING: Aangesien kennis rakende kliënte, waar die kliënte of kanaal medewerkers of uiteindelijke verbruikers is, 'n kritiese rol in vandag se organisasies speel, veral in bepaalde bemarking en verkope prosesse, is die bestuur van data en/of inligting oor die grense van besigheidseenhede, departemente, en funksies krities. Dikwels, samel medewerkers data oor kliënte in wat ook deur ander organisasies in die kanaal benodig word en wat dan in hierdie organisasies se inligtingstelsels geïnkorporeer moet word om sodoende bestuursinligting aan interne gebruikers te kan lewer. In hierdie

konteks val die fokus op vervaardigingsorganisasies wat van derde party verspreiding gebruik maak aangesien die vloei van inligting tussen kanaal medewerker organisasies in 'n aanvoerketting (in kontras met die vloei van produkte) 'n belangrike skakel tussen organisasies vorm en toenemend 'n bron van kompeterende voordeel in die mark vorm. Die doel van hierdie ondersoek is om te bepaal of daar 'n betekenisvolle verskil is in die gebruik van bemarking en verkope "data marts" as bestuursinligting aan die betrokke gebruikersgemeenskap te voorsien in vervaardigingsorganisasies in verskillende industrieë, in besonder in die farmaseutiese en die handelsmerkverbruikersgoedere industrieë, wat toe te skryf is aan die industrie, beide direk en indirek.

KEYWORDS: manufacturing, pharmaceuticals, branded consumer products, sales, marketing, management information requirements, data communications, information systems, information dissemination, data mart, data warehouse, online analytical processing (OLAP), query and reporting, sales forecasting, third party distribution, supply chain

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION	12
1.1. BACKGROUND	12
1.2. PROBLEM STATEMENT, DEMARCATION AND METHODOLOGY	12
1.2.1. <i>Problem Statement</i>	12
1.2.2. <i>Relevance of Study</i>	14
1.2.3. <i>Research Methodology</i>	14
1.2.3.1. Literature Study.....	14
1.2.3.2. Qualitative Case Study Research	15
1.2.4. <i>Demarcation of Study</i>	15
1.2.5. <i>Assumptions</i>	16
1.3. TERMINOLOGY.....	16
1.3.1.1. Management.....	16
1.3.1.2. Data and Information	17
1.3.1.3. Management Information.....	17
1.3.1.4. Supply Chain and Supply Chain Management.....	18
1.3.1.5. Third Party Distribution	19
1.4. DIVISION OF CHAPTERS	19
CHAPTER 2 THE ROLE OF INFORMATION IN ORGANISATIONS’ SALES AND MARKETING STRATEGIES.....	21
2.1. THE FOCUS IS ON THE CUSTOMER.....	21
2.1.1. <i>Changing Nature of Knowledge Gathered About the Customer</i>	22
2.1.2. <i>Customer-Organisation Relationship is a Form of Intellectual Capital</i>	23
2.1.3. <i>Move from Mass Production to Mass Customisation</i>	24
2.2. SALES AND MARKETING IN ORGANISATIONS	25
2.2.1. <i>Perform Market Segmentation</i>	27
2.2.2. <i>Develop a Pricing Strategy</i>	28
2.2.3. <i>Select Channels of Distribution</i>	30
2.2.4. <i>Develop Sales Forecast(s)</i>	32
2.3. MANAGEMENT INFORMATION AND DATA SOURCE REQUIREMENTS	35
2.4. DATA FLOW FROM CUSTOMER-FACING CHANNEL PARTNER FIRMS	37
2.5. CHAPTER CONCLUSION.....	40
CHAPTER 3 DATA MARTS AS MANAGEMENT INFORMATION DELIVERY MECHANISMS	41

3.1. DEFINITIONS OF DATA WAREHOUSES AND DATA MARTS	41
3.1.1. <i>Data Warehouse</i>	43
3.1.2. <i>Data Marts</i>	46
3.1.2.1. Dependent Data Mart	47
3.1.2.2. Independent Data Mart.....	48
3.1.2.3. Interdependent Data Mart	50
3.1.3. <i>Relationship between Data Warehouse and Data Mart</i>	53
3.2. ADVANCED ANALYTICAL TOOLS TO ACCESS DATA MARTS.....	54
3.2.1. <i>Query and Reporting</i>	56
3.2.2. <i>Online Analytical Processing</i>	56
3.2.3. <i>Data Mining</i>	57
3.3. NATURE OF USAGE	59
3.4. USING DATA PROVIDED BY CHANNEL PARTNERS	64
3.5. CHAPTER CONCLUSION.....	65
CHAPTER 4 USE OF DATA MARTS IN MANUFACTURING ORGANISATIONS WITH THIRD PARTY DISTRIBUTION	67
4.1. CASE STUDY 1: BRANDED CONSUMER PRODUCTS INDUSTRY	68
4.1.1. <i>Overview of the Branded Consumer Products Industry</i>	68
4.1.1.1. Managing the Brand.....	68
4.1.1.2. Understanding the Market and Customers	69
4.1.1.3. Managing the Supply Chain.....	70
4.1.2. <i>Context of the Branded Consumer Products Organisation</i>	71
4.1.3. <i>Sales and Marketing Data Mart Solution Requirements</i>	73
4.1.3.1. User Community	73
4.1.3.2. Management Information Requirements.....	74
4.1.3.3. Data Mart Access Tool Requirements.....	75
4.1.3.4. Sources of Data	75
4.1.4. <i>Assessment of the Use of the Sales and Marketing Data Mart</i>	77
4.2. CASE STUDY 2: PHARMACEUTICALS INDUSTRY	78
4.2.1. <i>Overview of the Pharmaceuticals Industry</i>	78
4.2.1.1. High Degree of Regulatory Influence	79
4.2.1.2. Product Liability	79
4.2.1.3. Emerging Customer and Consumer Power	80
4.2.1.4. Increasing Cost Pressures.....	80
4.2.1.5. Patient Privacy	81
4.2.2. <i>Context of the Pharmaceutical Organisation</i>	81
4.2.3. <i>Sales and Marketing Data Mart Solution Requirements</i>	82

4.2.3.1. User Community	83
4.2.3.2. Management Information Requirements	85
4.2.3.3. Data Mart Access Tool Requirements.....	89
4.2.3.4. Sources of Data	90
4.2.4. <i>Assessment of the Use of the Sales and Marketing Data Mart</i>	92
4.3. CHAPTER CONCLUSION.....	93
CHAPTER 5 COMPARATIVE ANALYSIS AND CONCLUSION	94
5.1. COMPARATIVE ANALYSIS OF CASE STUDIES	94
5.1.1. <i>User Community</i>	94
5.1.2. <i>Management Information Requirements</i>	95
5.1.3. <i>Data Mart Access Tool Requirements</i>	96
5.1.4. <i>Sources of Data</i>	97
5.1.5. <i>Assessment of the Use of the Data Marts</i>	99
5.2. CONCLUSION	100
5.3. SUGGESTIONS FOR FUTURE RESEARCH.....	101
BIBLIOGRAPHY	102
APPENDIX A: MANAGEMENT REPORTS REQUIRED BY THE BCP ORGANISATION	109
APPENDIX B: LAYOUT OF FILES RECEIVED BY THE BCP ORGANISATION FROM THE THIRD PARTY DISTRIBUTOR (3PL)	115

LIST OF TABLES

TABLE 1: ABBREVIATIONS USED	11
TABLE 2: COMPARISON OF DIRECT AND INDIRECT DISTRIBUTION CHANNELS	31
TABLE 3: TYPICAL MANAGEMENT INFORMATION REQUIREMENTS BY GENERIC SALES AND MARKETING PROCESSES.....	35
TABLE 4: DATA SOURCES REQUIRED TO MEET INFORMATION REQUIREMENTS BY GENERIC SALES AND MARKETING PROCESSES	37
TABLE 5: STRATEGIC SALES AND MARKETING MANAGEMENT INFORMATION REQUIREMENTS (XU, 1999:268)	37
TABLE 6: COMPARISON BETWEEN TRANSACTION PROCESSING SYSTEMS AND DATA WAREHOUSES ((DAPHNESOFT, 2001:76), (LEVINE AND SIEGEL, 2001:42), (RUDIN, 1998:45))	44
TABLE 7: COMPARISON OF DATA WAREHOUSE AND TYPES OF DATA MARTS.....	52
TABLE 8: COMPARISON OF CLASSES OF DATA MART ACCESS TOOLS WITH CONSOLIDATION	55
TABLE 9: EXAMPLES OF OLAP TOOL FUNCTIONALITY.....	57
TABLE 10: EXAMPLES OF DATA MINING TOOL FUNCTIONALITY.....	58
TABLE 11: MAPPING OF STAGES OF DATA MART USE (SWIFT, 2000) AGAINST CLASS OF ACCESS TOOL	59
TABLE 12: CATEGORIES OF END-USER APPLICATION CLASSIFICATIONS.....	59
TABLE 13: EXAMPLES OF INFORMATION REQUIREMENTS BY ACCESS TOOL AND FUNCTIONAL AREAS (BASED ON ALTER, 1999:163).....	60
TABLE 14:SUMMARY OF STRATEGIC USES OF DATA WAREHOUSING IN SELECTED INDUSTRIES (TURBAN ET AL, 2001:440), (SHARMA, 1997:18)	60
TABLE 15: APPLICATIONS FOR WHICH DATA WAREHOUSES AND/OR DATA MARTS ARE USED (PALO ALTO MANAGEMENT GROUP, 2001:278)	61
TABLE 16: PRINCIPAL RESPONSIBILITIES BY POSITION IN THE BCP MANUFACTURING ORGANISATION.....	74
TABLE 17: BCP MANUFACTURER’S DATA MART ACCESS TOOL REQUIREMENTS.....	75
TABLE 18: PRINCIPAL RESPONSIBILITIES BY POSITION IN PHARMACEUTICAL MANUFACTURING ORGANISATION	84
TABLE 19: REPRESENTATIVE LIST OF BUSINESS QUESTIONS TO BE ANSWERED BY DATA MART	86
TABLE 20: REPRESENTATIVE SAMPLE OF PHARMACEUTICAL MANUFACTURER’S DATA MART ACCESS TOOL REQUIREMENTS.....	90
TABLE 21: COMPARISON OF USER COMMUNITY FOR RESPECTIVE SALES AND MARKETING DATA MARTS BY MANAGEMENT LEVEL.....	95
TABLE 22: SUMMARISED OVERVIEW OF APPLICATIONS OF SALES AND MARKETING DATA MARTS IN CASE STUDY ORGANISATIONS	96
TABLE 23: DIFFERENCES IN DATA MART ACCESS TOOL REQUIREMENTS BETWEEN THE ORGANISATIONS.....	96
TABLE 24: ORGANISATIONS' PROGRESS ON THE STAGES OF DATA MART USE	97

TABLE 25: COMPARISON OF DATA AND DATA SOURCES FOR THE DATA MARTS FROM THE ORGANISATIONS’
VIEWPOINT..... 98

TABLE 26: BENEFITS DERIVED FROM THE IMPLEMENTATION OF DATA MARTS IN CASE STUDY ORGANISATIONS
..... 99

TABLE 27: SUMMARY OF COMPARATIVE ANALYSIS BETWEEN CASE STUDY DATA MARTS 100

LIST OF FIGURES

FIGURE 1: CONCEPTUAL DEMARCATION OF STUDY	16
FIGURE 2: USE OF MANAGEMENT INFORMATION IN ORGANISATIONS (O'BRIEN, 1999).....	18
FIGURE 3: CHANGE IN SOURCE OF AN ORGANISATION'S KNOWLEDGE OF CUSTOMERS OVER TIME	22
FIGURE 4: STRUCTURE OF AN ORGANISATION'S MARKETING EFFORT (BASED ON BALLOU (1987:33))	25
FIGURE 5: LINK BETWEEN DEMAND CREATION AND FULFILMENT	26
FIGURE 6: CONCEPTUAL VIEW OF INFORMATION AND PRODUCT FLOW BETWEEN SUPPLY CHAIN CHANNEL PARTNERS	32
FIGURE 7: FLOW OF INFORMATION WITHIN AND OUTSIDE THE BOUNDARIES OF AN ORGANISATION (BUTCHER, 1998:7).....	38
FIGURE 8: SCHEMATIC REPRESENTATION OF DATA FLOW IN A DATA WAREHOUSE ENVIRONMENT	46
FIGURE 9: DATA FLOW WHEN USING A DEPENDENT DATA MART	48
FIGURE 10: DATA FLOW WHEN USING INDEPENDENT DATA MARTS	49
FIGURE 11: DATA FLOW WHEN USING INTERDEPENDENT DATA MARTS	51
FIGURE 12: INTERDEPENDENT DATA MARTS RESULTING IN A DISTRIBUTED DATA WAREHOUSE	52
FIGURE 13: RELATION OF A DATA MART TO A DATA WAREHOUSE	54
FIGURE 14: ARCHITECTURE OF DATA WAREHOUSE, INDEPENDENT OR INTERDEPENDENT DATA MART (GRAY AND WATSON, 1998:17).....	55
FIGURE 15: HIGH-LEVEL SPECTRUM OF FUNCTIONALITY ADDRESSED BY QUERY AND REPORTING, AND OLAP TOOLS	58
FIGURE 16: DATA FLOW BETWEEN ORGANISATIONS' OPERATIONAL SYSTEMS	64
FIGURE 17: DATA FLOW BETWEEN ORGANISATIONS' ANALYTICAL SYSTEMS	65
FIGURE 18: DATA FLOW FROM ONE ORGANISATION'S OPERATIONAL SYSTEM TO ANOTHER'S ANALYTICAL SYSTEM.....	66
FIGURE 19: FLOW OF PRODUCTS FROM THE BRANDED CONSUMER PRODUCTS MANUFACTURER.....	71
FIGURE 20: DATA FLOW SURROUNDING THE DATA MART IN THE BCP CASE STUDY	77
FIGURE 21: FLOW OF PRODUCTS FROM PHARMACEUTICAL MANUFACTURER TO THE CUSTOMER.....	81
FIGURE 22: DATA FLOW SURROUNDING THE DATA MART IN THE PHARMACEUTICAL CASE STUDY	91

ABBREVIATIONS

The abbreviations listed in Table 1 are used in this study.

Abbreviation	Expansion and/or Description
3PL	Third party logistics
ABC	Activity-based costing
ABM	Activity-based management
AIDS	Acquired immune deficiency syndrome
ASP	Average Selling Price
BCP	Branded Consumer Products
DSS	Decision support system
EDI	Electronic data interchange
EIP	Enterprise information portal
EIS	Executive information system
ERP	Enterprise Resource Planning, generally referred to as ERP software which is used as enterprise-wide software for operational purposes
FDA	Food and Drug Administration
FTP	File Transfer Protocol, a protocol used for file transfers between information systems
GCP	Good Clinical Practice
GLP	Good Laboratory Practice
GMP	Good Manufacturing Practices
HIV	Human Immunodeficiency Virus
MIS	Management information system
MTD	Month-to-date
ODS	Operational data store
OLAP	Online analytical processing
OTC	Over the counter, generally medicines bought by consumers without requiring a prescription from a medical practioner
PoM	Prescription only Medicine
ROI	Return on investment
SDF	Solid Dosage Format
SOP	Standard Operating Procedures
SQL	Structured query language, used to interrogate relational databases
YTD	Year-to-date

Table 1: Abbreviations used