

CHAPTER 4 USE OF DATA MARTS IN MANUFACTURING ORGANISATIONS WITH THIRD PARTY DISTRIBUTION

“The map is not the territory.”

- Alfred Korzybski

Two medium-sized manufacturing organisations developed data marts for a very similar purpose: to integrate and make accessible to managers management information based on data received from third party distributors. The aim of this chapter is to:

- To describe why and how manufacturing organisations using third party distribution used data marts to deliver sales and marketing management information in two industries, namely, fast moving consumer goods (FMCG) and pharmaceuticals.

The first case study is a data mart implementation for a FMCG organisation, specifically branded consumer goods, which took 4 months to complete. The second case study covers a data mart implementation for a pharmaceutical organisation, which took 6 months to complete. The disparity in timeframes is due to the increased complexity of requirements of the second organisation. The database design, i.e. the logical and physical data models are excluded from the case studies as these are outside the scope of this dissertation. Furthermore, please note that no reference is made to particular products since the purpose of this dissertation is not to address the selection of a particular vendor but rather to identify the type of access tool required based on the users' information requirements (vendor and tool selection follow once the appropriate tool(s) is identified.)

The structure of the discussion of each these case studies is:

- Overview of the external environment in which the manufacturing organisation functions by means of industry-specific issues in order to contextualise the case study, particularly since the case studies differ with respect to industry, and the nature of their respective competitive environments as stated in Chapter 1;
- Overview of the particular organisation, the internal environment, including the motivation for selecting a data mart as the choice of solution;
- Sales and marketing management information requirements;
- Data sources, both internal and external; and
- Qualitative assessment of the data mart solution in terms of the delivery of the required management information and the impact on the organisation by members of the user community.

The case studies will be compared and evaluated in the concluding chapter.

4.1. Case study 1: Branded Consumer Products Industry

4.1.1. Overview of the Branded Consumer Products Industry

The branded consumer products (BCP) industry encompasses a wide variety of organisations that compete intensely in a number of segments. The organisations in this industry distinguish themselves from other manufacturers of consumer goods by their ability to obtain premium pricing for their branded products hence the name *branded* consumer products. The industry can be divided into the following segments:

- Packaged foods;
- Meat, produce and other fresh foods;
- Alcoholic beverages;
- Non-alcoholic beverages;
- Apparel and accessories;
- Non-durable consumer packaged goods; and
- Durable consumer packaged goods.

In order to be successful, BCP organisations must perform well at the following processes (Arthur Andersen, 2000):

- Managing the brand;
- Understanding the market and customers; and
- Managing the supply chain.

4.1.1.1. Managing the Brand

Most of the leading organisations in the industry believe that the best way to sustain profitable growth is to maintain a portfolio of exceptional brand name products. Brands are built over time through advertising and promotion. Ettenberg (*Who's wearing the trousers?*, 2001), who focuses particularly on the importance of branding in an online environment, is of the opinion that marketing has not kept pace with the changes in other organisational functions, i.e. the internal environment, or the marketplace, the external environment. The rules of marketing continue to focus on the product and where to sell it, rather than the customer. The new approach to marketing needs to be on building a brand rather than a product—to sell a lifestyle or a personality, or to appeal to emotions—because brands are a conduit through which influence flows between organisations and customers and consumers. Increasingly it will be the consumers that dictate to organisations and ultimately decide their fate, rather than the other way round.

In a study of premium brands, Vishwanath and Mark (1997:123) found that although “[c]onventional wisdom holds that market share drives profitability” this view is not completely accurate. They found that market share alone does not account for the profitability of a brand. Instead “a brand’s profitability is driven by *both* market share *and* the nature of the category ... if a category is composed largely of premium brands, then most of the brands in the category are – or should be – profitable. If on the other hand, the category is composed mostly of value and private-label brands, then returns will be lower across the board” (Vishwanath and Mark, 1997:124).

In recent years, however, brand loyalty has been increasingly threatened by the consumer orientation toward shopping for value, along with the improving quality of private label or store branded goods. Retailers may also be more inclined to promote their private label over brand names, and be more experimental and less committed with new products; in fact, retailers’ own brands are increasingly “being used as a marketing tool and a point of leverage against branded manufacturers” (From mass to class, 2000:35). To warrant higher prices for premium brands, BCP manufacturers need to distinguish themselves in the consumer’s mind as having superiority by maintaining high-quality products and better packaging than retailers’ own brands. However, BCP organisations may not have access to retailers’ real-time, internal data placing them at a disadvantage in analysing the market.

In future, BCP manufacturing organisations will streamline their brand assortments, creating leaner but more powerful portfolios. As a result, the remaining brand assortments will be stronger and better funded; thus, marketing efficiency will increase as the effort will be concentrated on the best performers, and organisations can better invest in building customer relationships as funding will no longer be as fragmented. In order to build customer relationships BCP manufacturers require an understanding of the market in which they operate and the customers which they serve and/or target.

4.1.1.2. Understanding the Market and Customers

While many BCP manufacturers face similar challenges associated with managing their brand and understanding their consumers, many of the most critical issues that these organisations must contend with are driven by their retail customers. As retailers consolidate, develop and disappear, BCP manufacturers are required to continually cater to the demands of the increasingly powerful retailer customers (Vivier, 2001). An example of the effect that retailers have on manufacturers is illustrated by the following example: Procter & Gamble, a major US-based manufacturer, recently shifted their focus from end-consumers in order to “focus on managing explicit knowledge about key retailer chains [such as Wal-Mart, a well-known retailer in the United States] as customers” (Davenport *et al*, 2001:65) because of “their growing concentration and power” (Davenport *et al*, 2001:64).

Retailers are increasingly demanding value-added services such as specialised packaging, and specific promotional materials. Manufacturers are under intense pressure to execute precisely according to retailer requests or risk back charges and loss of prime shelf space. Manufacturers are also being forced to assume greater responsibility for the supply chain's inventory as retailers expect more frequent, smaller deliveries and vendor-managed inventory programmes. This, together with the other costs incurred such as, for example, sales force effort, is called trade spending (Randall, 1994:78).

Marketing to the retail and distributive trades, i.e., the promotion of products to sellers of products as opposed to the actual consumers of products, is called trade marketing. Spending on trade marketing continues to increase and manufacturers are frustrated by the inability to measure and manage its effective use. The trade payments that manufacturers make to retailers are often just hidden price concessions with only about half of the total payment earning something definite, such as shelf space. Manufacturers are rethinking the use of trade spending, trying to identify a way to ensure that price concessions reach consumers.

Manufacturers are trying to understand account-level profitability to ensure that trade spending is used effectively. According to Brooke and MacTavish (2001) many BCP organisations “spend an average of 13 percent of revenue on promotions and are questioning whether these promotions are effective.” Furthermore, the implementation of promotional management applications will allow organisations to “regain control of these [promotional] activities and maximize the return on trade spending” (Brooke and MacTavish, 2001). Accurate sales and demand forecasts will support more effective trade spending, which will reduce costs, and result in increased profitability. Although understanding the market and customers, particularly retail customers, is vital to success in the marketplace, the flow of products from manufacturer to retailer, or the supply chain, must also be managed efficiently.

4.1.1.3. Managing the Supply Chain

Organisations that obtain and maintain their competitive edge in the market will be those excelling at managing the supply chain, where products and services are provided to customers at the least total landed cost, in very short lead-times, with the highest quality and service rates. Thus, organisations will face more management and coordination issues, and will need to make effective use of their systems and software in order to manage strategic partnerships within a supply chain (Rogers, 2000:44-45). Furthermore, organisations will need to align fulfillment efficiently in order to meet demand and eliminate out-of-stock situations. Out-of-stock situations continue to rise because of poor demand and promotion forecasting, communication, and coordination between retailers and suppliers. This leads to lost revenue and lost market share by eroding consumer loyalty and forcing defections. Therefore, BCP manufacturers and retailers are looking to collaborative techniques to better forecast demand and minimise the occurrence of out-of-stock situations (Inventory management: leveraging the supply pipeline, 2000). BCP organisations

will continue to increase focus on integration and to increase responsiveness with respect to both suppliers and retailers, referred to as supply chain optimisation, by integrating with supply chain partners' back-end systems (Achabal *et al*, 2000: 430-454), .

All these efforts of better managing and integrating the supply chain creates the need for a closer and stronger relationships between BCP manufacturers and retailers, who will favour larger BCP manufacturers because they can invest more in the infrastructure required (Frederick, 2000:10). These relationships are particularly important due to the requirement for increased sharing of data (Mentzer *et al*, 2000: 549).

The common and central issue arising from these three processes is that retailers are becoming more powerful in the retailer-manufacturer relationship because the retailers control access to the consumer, and to the data captured during the interactions with these consumers. Instituting collaborative relationships and agreements with retailers will allow manufacturers to regain some control of the manufacturer-retailer relationship. This collaboration would also have several desirable results:

- Improved data maintenance and synchronisation;
- Improved promotion management; and
- Visibility to forecasting information processes.

4.1.2. Context of the Branded Consumer Products Organisation

A listed South African-based BCP organisation has several subsidiaries, one of which manufacture packaged foods that require refrigerated storage. The manufacturer has an agreement with a third party distributor, which provides chilled and frozen storage from 13 national depots, to warehouse and distribute finished goods. The organisation's major customer group is retailers, for example, supermarkets, hypermarkets, convenience stores, etc. Retailers obtain products either:

- Through the third party distributor; or
- Direct procurement from organisation's factory premises.

This flow of products from the BCP manufacturer down the supply chain is illustrated in Figure 19.

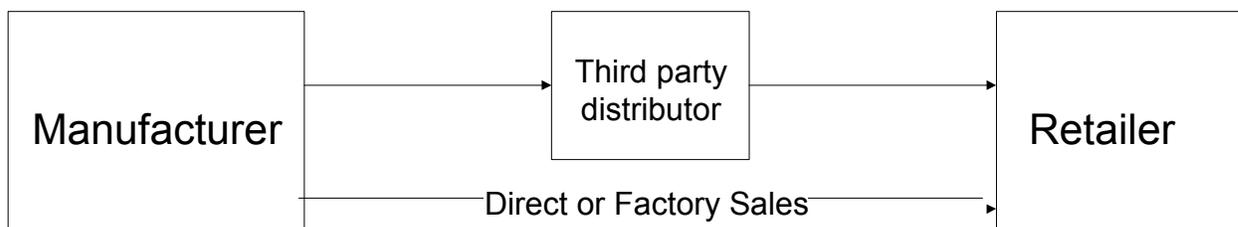


Figure 19: Flow of products from the Branded Consumer Products manufacturer

Orders are entered on the manufacturer's system where after orders are uploaded onto the distributor's system. Factory sales directly to customers without any involvement from the distributor are also recorded in the manufacturer system. The distributor is responsible for:

- Warehousing finished goods in chilled depots;
- Performing physical distribution;
- Producing invoices, goods received notes; and
- Maintaining master data for customers and products, together with pricing data.

Historically, this business unit was part of another, larger organisation. However, a part of this larger organization was sold to another organisation, which is now in direct competition with this business unit of the BCP manufacturer. Prior to this separation, a legacy single sales reporting system with data in a single database was used. By mutual agreement after the split the single reporting system continued to be used by both organisations. This is a rather unusual situation since both competitors have access to each other's sales data.

The BCP manufacturer decided to replace its portion of the sales reporting system with a stand-alone system in order to:

- Remove the data and reporting function off the system shared with its competitor and relocate the new system to the head office of the manufacturer located in another city; and
- Allow better access to the data. Users did not have direct access to data and had to request reports from one person who was frequently unable to respond in a timely manner due to the workload. This required user training in the reporting tool but also a change in mindset, as they were now responsible for satisfying their own reporting needs.

The organisation intended to expand the solution to include other strategic business units in the sales and marketing functional area and to expand to other functional areas. Given this requirement, the decision was made to build an independent data mart with a focus on the sales and marketing functional area, which was to be the first in a series of interdependent data marts which would then result in a distributed data warehouse. The particular sales and marketing data mart solution requirements are discussed in the next section.

4.1.3. Sales and Marketing Data Mart Solution Requirements

The requirements for the sales and marketing data mart were determined by means of interviews. The data gathered on the sales and marketing data mart solution requirements through these processes are discussed in this section as follows:

- User community;
- Management information requirements;
- Data mart access tool requirements; and
- Nature and sources of data used to populate the data mart.

4.1.3.1. User Community

The user community for the sales and marketing data mart consists of members of senior and middle management. The members of senior management that require sales and marketing-related management information are:

- Financial Director; and
- Sales and Marketing Director.

The members of middle management that require sales and marketing-related management information are:

- Regional Sales Managers; and
- National Account Managers.

A non-exhaustive list of the primary responsibilities, which require sales and marketing-related management information, is contained in Table 16 by position.

Position	Principal responsibilities, including but not limited to:
Financial Director	<ul style="list-style-type: none"> • Design, develop and implement financial strategy. • Report and analyse financial results. • Provide insight and recommendations to the Managing Director. • Report to the holding company.
Sales and Marketing Director	<ul style="list-style-type: none"> • Develop product lines that meet customer's needs. • Evaluate market trends to develop strategies to better the organisation's position in the marketplace. • Generate forecasts and develop overall product strategies to maximize market share and profit and loss position. • Deliver sales results to meet budgeted targets. • Meet all expense budgets. • Along with Financial Director, devise the annual and quarterly compensation programs for sales force. • Develop specific programs and assist sales force in implementing these programs.

	<ul style="list-style-type: none"> • Establish pricing guidelines on a product-by-product basis. • Develop successful business and profitability plans using accurate forecasting and market coverage. • Responsible for Regional Sales Managers' and National Account Managers' sales activities.
Regional Sales Managers	<ul style="list-style-type: none"> • Analyse regional market penetration and travel logistics and implement programs to achieve optimal territory coverage. • Co-ordinate and monitor sales representative pull through among targeted providers. • Provide accurate forecasts to Regional Sales Director of predicted revenue levels. • Investigate the accuracy and validity of account plans and assumptions presented by the sales force.
National Account Managers	<ul style="list-style-type: none"> • Meet and/or exceed sales goals for assigned regional. • Execute national account promotions. • Develop, recommend and implement consumer sales and marketing initiatives for accounts to market and price products within the industry. • Manage the relationship with key suppliers. • Co-ordinate trade marketing reviews with key accounts.

Table 16: Principal responsibilities by position in the BCP manufacturing organisation

In order to fulfil the responsibilities listed in Table 16, which are primarily focussed around decision-making and assessment of performance, accurate management information is required. The management information requirements resulting from these users are discussed in the following section.

4.1.3.2. Management Information Requirements

Based on interviews conducted with the senior members of the user community, the minimum user acceptance requirement for the sales and marketing data mart was the replication of the existing standard management reports (see *Appendix A: Management Reports required by the BCP Organisation* for a more detailed description of each report):

- Daily sales report by customer by product by region;
- Trade marketing – spend vs. sales by major customer;
- Sales by region and by product;
- Customer ranking by value and volume;
- Channel distribution analysis (direct or factory sales versus normal sales, i.e. through the third party distributor);
- Invoiced sales versus returns (credit notes) analysis;
- Product promotions, including location-targeted sales promotions planning;
- Retailer pricing and promotional reviews;
- Rebates analysis;
- Profitability analysis, both for customers and products; and
- Stock on hand by depot.

The following remarks are pertinent to the management information requirements:

- Users are accustomed to having standard reports available, that is, reports that are pre-defined in the system which they only need to open and/or run or even receiving paper-based reports on a regular basis. One of the main benefits of data mart access tools is that users are able to construct their own reports based on their information need at a particular time.
- The standard management reports prior to implementation of the data mart contained year-to-date and month-to-date figures with year-on-year comparisons as well as budget versus actual comparisons, also referred to as gap analyses.
- Reports were produced by manipulating data extracted from the legacy system in PC-based spreadsheets: additional data were captured manually in the spreadsheets that were not available in the existing reporting system; year-to-date figures were calculated as these were not available in the existing reporting system; and reports were formatted according to user specifications.

4.1.3.3. Data Mart Access Tool Requirements

Based on the management information reporting requirements, the data mart access tool requirement can be determined. This is detailed in Table 17.

Management Information Requirement	Stage of Use	Nature	Data Mart Access Tool
Daily Sales	Reporting	Deductive	Query and Reporting
Sales and Marketing	Reporting	Deductive	Query and Reporting
Trade Marketing	Reporting	Deductive	Query and Reporting
Sales by Region	Reporting	Deductive	Query and Reporting
Sales by Product by Region	Reporting	Deductive	Query and Reporting
Ranking of Top 30 Customers	Reporting	Deductive	Query and Reporting
Direct vs. Normal Sales	Reporting	Deductive	Query and Reporting
Sales vs. Returns	Reporting	Deductive	Query and Reporting
Promotional Review	Reporting	Deductive	Query and Reporting
Rebates	Reporting	Deductive	Query and Reporting
Customer Profitability	Reporting	Deductive	Query and Reporting
Product Profitability	Reporting	Deductive	Query and Reporting

Table 17: BCP manufacturer’s data mart access tool requirements

The sources of data used to meet these management information requirements are reviewed in the following section.

4.1.3.4. Sources of Data

Based on the management information requirements, the sources of data to be used to populate the data mart were determined. The sources listed are according to whether the data originate within or outside of the organisational boundaries.

Internal Data Sources

The internal sources of data are:

- Budgets, created and stored in spreadsheet format;
- Pricing data; and
- Orders.

External Data Sources

The distributor uses an in-house developed system for operational and financial purposes. The manufacturer also used a reporting system based on the same technology with data residing in a fixed length indexed file structure, i.e. not in a relational database. There were no relationships between these files, but the files are linked by means of look-ups in the indexes. These data files were updated daily after download via FTP of a data file generated by the distributor.

The BCP manufacturer downloads the following data in flat files from the distributor via FTP (see *Appendix B: Layout of files received by the BCP organisation from the third party distributor (3PL)*):

- Invoices issued on the previous day;
- Customer master data of additions and modifications;
- Product master data of additions and modifications;
- Stock levels in the respective depots;
- Distributor channels;
- Distributor customer groupings; and
- Audit or balancing figures of cumulative daily sales balances.

Of these files received, the external sources of data used to populate the data mart are:

- Invoices issued on the previous day;
- Customer master data of additions and modifications;
- Product master data of additions and modifications; and
- Stock levels in the respective depots.

The balancing report is used to ensure correct upload of data into the database. The manufacturer wanted to capture additional data particular to its operations on both the customer and product master data. This required a custom-developed application. The volume of sales transactions is approximately 600 to 800 transactions per day. The distributor-related files were not used, as these are specific to the third party distributors system. Although it is not common practice, the manufacturer does not match or reconcile

orders and invoices and/or credit notes; as a result the data mart does not use or supply data to the internal operational financial system.

Given the sources and requirements of the data mart, the flow of data to deliver management information through a data mart is depicted in Figure 20.

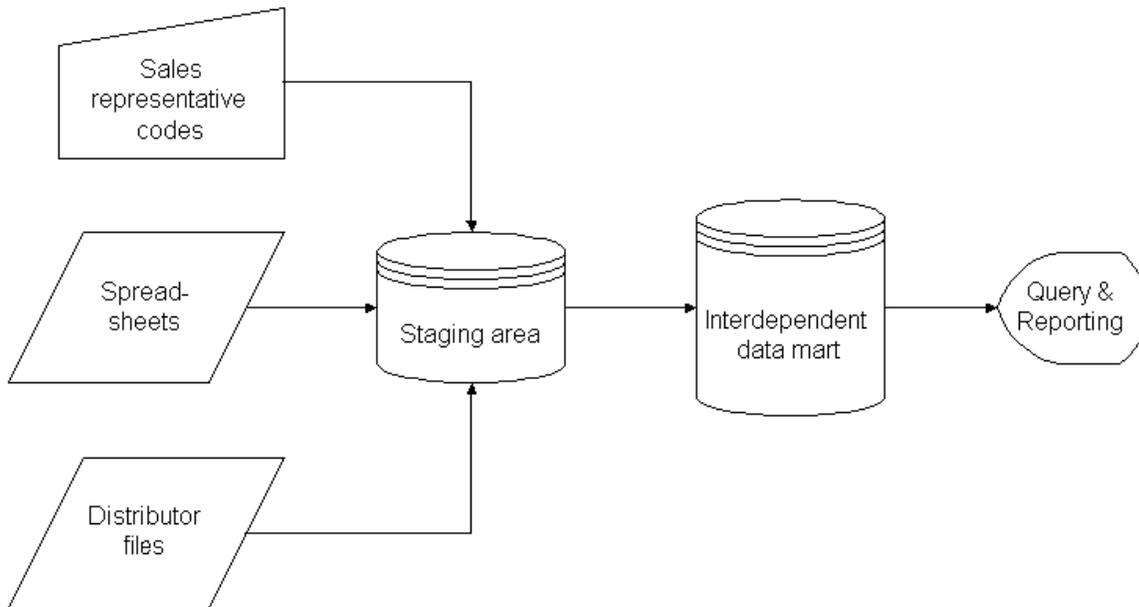


Figure 20: Data flow surrounding the data mart in the BCP case study

4.1.4. Assessment of the Use of the Sales and Marketing Data Mart

The assessment of the sales and marketing data mart after completion of the implementation as a management information delivery mechanism is that it led to significant improvements in the manufacturing organisation. Previously users had to request management information from a single person with access to a legacy system, which presented a significant bottleneck, as it was a time consuming process to communicate requirements and then time consuming to produce ad hoc reports. This has been eliminated with users preparing their own reports when required allowing more flexibility (Robson, 2000). However, users required significant training to become accustomed to using the system themselves to meet their information requirements.

The system has helped to improve information flow in the organisation. The BCP manufacturer has been able to increase its sales through improved targeted trade marketing and monitoring of the outcome. Sales improved as well as forecasting accuracy and sales representatives were better prepared for sales visits (McLachlan, 1999).

4.2. Case study 2: Pharmaceuticals Industry

4.2.1. Overview of the Pharmaceuticals Industry

The standard definition of the pharmaceuticals industry is the manufacture of drugs used to affect the body chemistry of both humans and animals. In practice, a wider definition includes (SSA, 2000):

- *Ethical pharmaceuticals* are named drugs based on chemical or biological technology that addresses a specific disease under patent. These drugs are normally prescribed by a doctor and are known as Prescription only Medicines (PoMs).
- *Generic drugs* are drugs as above whose patents have expired and which are chemically identical substances made by a variety of producers, for example, penicillin. These drugs are generally also PoMs.
- *Over-the-counter (OTC)* medicines often started as ethical pharmaceuticals. Over time they became recognized as safe for self-medication, for example, aspirin.
- *Nutritional supplements*, specifically vitamins and minerals, form a high-volume sector of the pharmaceutical industry. They are most commonly sold over the counter and are often combined with OTC active substances – for example, cold and flu remedies contain Vitamin C and paracetamol.
- *Medical devices* include drug delivery systems (inhalers, etc.), vision care products, high-volume consumables such as wound dressings, needles, sutures, and catheters. Sterilisation is often a crucial part of the production process.
- *Medical diagnostic equipment and re-agents* includes equipment for injecting blood products into the blood stream, and
- *Blood products and supplements* include plasma, saline and other types of drip, nutritional supplements injected directly into the bloodstream, and ancillary equipment.
- *Animal health drugs* market can be subdivided into agricultural and domestic pet sectors. For example, broiler chickens routinely are fed antibiotics throughout their lifetime.
- *Speciality chemicals* include chemicals manufactured for use in drugs, food additives, etc.

Pharmaceutical organisations are engaged in the discovery, development, manufacture, distribution and sales of products in one or more of these areas. The pharmaceuticals industry is facing major changes in its environment (Lurquin, 1996:6) resulting in a number of critical business issues currently facing organisations:

- High degree of regulatory influence;
- Product liability issues;

- Emerging customer and consumer power;
- Increasing cost pressures; and
- Patient privacy.

4.2.1.1. High Degree of Regulatory Influence

The pharmaceuticals industry is among the most heavily regulated of industries because of the potential for damage to the human body. Accordingly, the health care industry is forced to adopt a strategy of compliance with standards, such as Good Manufacturing Practices (GMP), Good Laboratory Practice (GLP) and Good Clinical Practice (GCP). For example, GMP mandates standards for activities, such as record keeping, Standard Operating Procedures (SOPs), lot traceability, and cleanliness. Organisations using enterprise systems must ensure that the software supports lot traceability, formulation integrity, inventory recording, amongst others. These standards are created and enforced on a national or regional basis. Non-compliance can lead to the withdrawal of licenses to manufacture a product.

Regulatory compliance to regulatory standards is a costly and increasingly requires organisations to divert valuable resources from their primary undertaking to compliance-related activities: “industry estimates indicate that up to 70% of laboratory resources ... are now devoted to compliance-related activities” (Zenie and Halpin, 2000:12). The strengthening of regulatory requirements both in terms of new products efficacy and manufacturing leading to escalation of costs as well as longer lead-time for change implementation.

The regulatory agencies worldwide have been placing more and more emphasis on computer systems’ validation over the past five years. The United States’ regulatory agency, the Food and Drug Administration or FDA (Food and Drug Administration, 2000:45), defines validation as follows:

“A documented program that provides a high degree of assurance that a specific process, method, or system will consistently produce a result meeting pre-determined acceptance criteria.”

Regulatory agencies now routinely demand documentary evidence that drug production software has been validated. Validating an enterprise system can be costly and add months to an implementation schedule. The ability to electronically acquire data at the source and store in a secure and compliant database will save time and costs over the manual review, and capture of data from paper-based sources into systems which commonly in practice today (Zenie and Halpin, 2000:14).

4.2.1.2. Product Liability

In the event of a product recall, it is critical for pharmaceutical organisations to easily and quickly obtain a complete history of all information regarding a particular lot of product. Not only is it important to find out

where a product has been shipped, i.e. the customer(s), but also to know the lots of the raw materials used in the production process. This is closely linked to the regulatory process. Apart from the regulatory and product liability issues, the pressure from the customer and consumer is exerting increased influence.

4.2.1.3. Emerging Customer and Consumer Power

In the past, the pharmaceutical organisation's main customers² were general practitioners (or GPs) who were responsible for the purchasing decisions although there are certain products where the purchaser may have been a hospital specialist. The possibility of generic and therapeutic substitution by a pharmacist, the growing power of medical aid and insurance organisations, prescribing committees and the awareness of patients themselves is now altering this. This change in the customers of the pharmaceutical manufacturers will have a major impact on the supply chains of pharmaceutical companies (Booth, 1996:6). As a result, many pharmaceutical organisations have increasingly been using direct consumer advertisements to market their drugs with the intention that consumers will ask their general practitioners or other medical services provider about a particular drug in order to build up brand preference with customers and consumers. Since most patients are reimbursed for the bulk of their drug purchases by third parties such as medical aids or managed healthcare organisations, price is not an issue to the consumer. However, these third parties are now applying pressure to lower the cost of drugs. Customers as patients are also entitled and increasingly aware of their right to privacy regarding their medical information which limits the possibility of utilising CRM by limiting the customer data legally available to organisations.

4.2.1.4. Increasing Cost Pressures

Health care in most countries is changing. Managed care continues a strong growth in addition to all the issues associated with government-provided care. In many cases, this means managed healthcare organisations is placing enormous pressure on pharmaceutical organisations to reduce costs and increasingly is considering generic substitutes and buying-group influence. In addition, developing countries' governmental health authorities are attempting to contain expenditure by demanding concessions from pharmaceutical manufacturers for certain drugs, particularly anti-retroviral drugs, either at cost price or free on moral grounds and with reference to human rights. (Kirkman, 2001). In addition, the advent of substitution with generics (see 4.2.1.3.) further threatens ethical pharmaceutical organisations' traditionally high levels of profitability.

Furthermore, the price of medicine is a function of distribution costs (Kirkman, 2001). Reducing costs by ensuring effective and efficient distribution translates either in price decreases for the customer or increased profit margins for the manufacturer or a combination of both.

² The term *customer* is used to refer to the more immediate purchaser, whether physician, pharmacist or hospital, and the term *consumer* is used to describe the end-user of the product.

4.2.1.5. Patient Privacy

By law pharmaceutical organisations are not allowed access to patient details with regard to prescribed drugs, as this would infringe on their right to privacy with regard to medical information. This issue has recently gained prominence amongst the public in South Africa due to the legal requirement for confidentiality of a person's HIV/AIDS status. As a result, this places a limitation on the possible CRM programs that pharmaceutical organisations can develop.

4.2.2. Context of the Pharmaceutical Organisation

The pharmaceutical organisation manufactures generic and OTC drugs. The organisation is a subsidiary of a multinational pharmaceuticals organisation, which manufactures ethical pharmaceuticals, nutritional supplements, medical devices, medical diagnostic equipment and re-agents, blood products and supplements, animal health drugs, and speciality chemicals.

The pharmaceutical organisation uses a distributor, which is jointly owned by 12 pharmaceutical manufacturing organisations, to warehouse and distribute finished goods in 5 national warehouses and handle all order entry-related activities. The distributor sells both directly to its customers, mostly hospitals, clinics, pharmacies and doctors in the private and public sector, and also to wholesalers who then sell to these and other customers. Customers can be located nationally or internationally. Whilst the distributor handles the majority of the sales, the manufacturer occasionally sells raw materials directly to customers or exports directly to customers due to the pricing of the distributor. This is depicted in Figure 21.

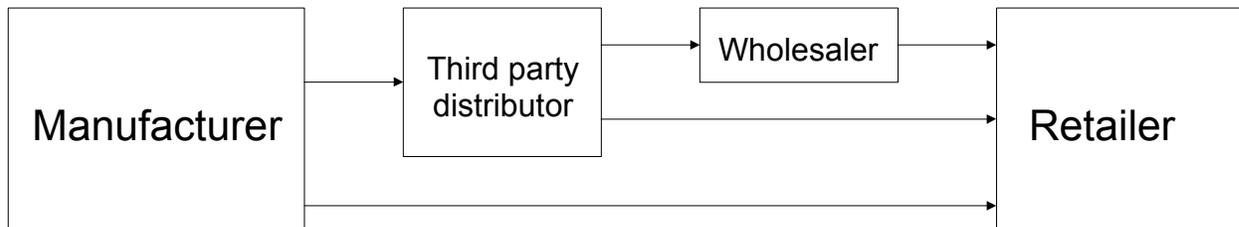


Figure 21: Flow of products from pharmaceutical manufacturer to the customer

The distributor is responsible for:

- Warehousing finished goods;
- Capturing of customer orders;
- Performing physical distribution;
- Producing invoices and goods received notes; and
- Maintaining master data for customers together with pricing data.

The organization implemented several financial and manufacturing modules of an enterprise resource planning (ERP) software package. An OLAP tool was used to provide reporting and analysis of sales data received from the distributor to the senior and middle management in the sales and marketing function. Whilst this particular tool allowed for online analytical processing, it did not meet all user requirements since it did not, for example, integrate other data sources such as costing data which allows for profitability to be analysed. In addition, the data structures were not appropriate for the data or for the query and analysis requirements of users which resulted in users frequently requesting reports from the third party distributor which was costly and time consuming.

Apart from the OLAP tool, other data sources included a magnitude of spreadsheets on a number of file servers in user directories (which were generally password protected). This presented a significant hurdle: not only in accessing the data, and understanding and interpreting the many interrelated spreadsheets with business rules implicitly contained in the formulas, but also convincing potential users that it was in the best interest of the organization to do so and should not be seen as a threat to their positions as 'gatekeepers' to information. In short, the organisation found itself in a situation similar to that of Elf Atochem which:

"... found itself hampered by the fragmentation of critical information systems ... Ordering systems were not integrated with production systems. Sales forecasts were not tied to budgeting systems or to performance measurement systems. ... As a result of the many incompatible systems, operating data were not flowing through the organization, and top management was not getting the information it needed to make sound and timely business decisions" (Davenport, 1998:128-129).

The organisation knew that it wanted to eventually build an enterprise-wide data warehouse. However, it was decided that sales and marketing was most urgently in need of information and most likely to deliver a "quick win". The organisation intended to include other functional areas, namely, finance, production planning and scheduling, as well as external market intelligence data in future. Therefore, a dependent sales and marketing data mart would be the first in a series of interdependent data marts resulting in a distributed data warehouse. The particular sales and marketing data mart solution requirements are discussed in the next section.

4.2.3. Sales and Marketing Data Mart Solution Requirements

The requirements for the sales and marketing data mart were determined by means of interviews. The data gathered on the sales and marketing data mart solution requirements through these processes are discussed in this section as follows:

- User community;
- Management information requirements;
- Data mart access tool requirements; and
- Nature and sources of data used to populate the data mart.

4.2.3.1. User Community

The user community for the sales and marketing data mart consisted of members of senior and middle management. The members of senior management that require sales and marketing-related management information:

- Managing Director;
- Financial and Operations Director;
- Marketing Director
- Sales Director; and
- New Business Development Director.

The members of middle management that require sales and marketing-related management information:

- Marketing Research Manager;
- Regional Sales Managers; and
- National Account Managers.

A non-exhaustive list of the primary responsibilities, which require sales and marketing-related management information, is contained in Table 18 by position.

Position	Principal responsibilities, including but not limited to:
Managing Director	<ul style="list-style-type: none"> • Responsible for full profit and loss.
Financial and Operations Director	<ul style="list-style-type: none"> • Report and analyse financial results. • Design, develop and implement financial strategy. • Adequately maintain inventory levels together with Sales and Marketing Directors. • Provide insight and recommendations to the Managing Director. • Report to the Board of Directors.
Marketing Director	<ul style="list-style-type: none"> • Evaluate market trends, reviewing competitor information and business ranking data to develop strategies to better the organisation's position in the marketplace. • Evaluate new business opportunities. • Collect market intelligence. • Generate forecasts (annual and five year) and develop overall product strategies to maximize market share and profit and loss position. • Understand customer segmentation and translate this into operating strategies and tactics appropriate to the revenue potential of each in order to drive overall revenues

	<ul style="list-style-type: none"> and gross margins for the organization. • Design, develop and implement an effective channel distribution strategy.
Sales Director	<ul style="list-style-type: none"> • Deliver sales results to meet budgeted targets. • Meet all expense budgets. • Along with Financial and Operations Director, devise the annual and quarterly compensation programs for sales force. • Develop specific programs and assist sales force in implementing these programs. • Establish pricing guidelines on a product-by-product basis. • Develop successful business and profitability plans using clear and sound analysis, including accurate forecasting and market coverage. • Participate in the selling activities to large and/or strategic accounts. • Work to eliminate or avoid conflict in the channels that the organisation uses to sell products, particularly to wholesalers. • Use appropriate analysis techniques to identify business problems and issues, including GAP analysis on sales performance, risk management and contingency planning. • Responsible for Regional Sales Managers' and National Account Managers' sales activities.
New Business Development Director	<ul style="list-style-type: none"> • Plan and execute new business development strategy for the firm. • Monitor success of new products in marketplace. • Establish branded generic products in the marketplace.
Marketing Research Manager	<ul style="list-style-type: none"> • Participate in the development of pricing and product positioning strategies. • Conduct industry-wide analyses and study market and drug utilisation trends. • Understand and implement forecasting and business planning processes. • Identify key business issues that impact short-term and long-range product and market forecasts. • Create product-specific long-range forecasts models and benchmarks. • Maintain up-to-date forecast models, reflecting current data and assumptions for sales and operations planning purposes. • Compile and analyse secondary marketing and sales data. • Collect competitive intelligence within targeted plans and customer business units. • Report to Sales and Marketing Directors.
Regional Sales Managers	<ul style="list-style-type: none"> • Analyse regional market penetration and travel logistics and implement programs to achieve optimal territory coverage. • Co-ordinate and monitor sales representative pull through among targeted providers. • Provide accurate forecasts to Regional Sales Director of predicted revenue levels. • Investigate the accuracy and validity of account plans and assumptions presented by the sales force. • Manage and operate fiscal budgets.
National Account Managers	<ul style="list-style-type: none"> • Meet and/or exceed sales goals for assigned regional. • Execute national account promotions. • Develop, recommend and implement consumer sales and marketing initiatives for accounts to market and price products within the industry. • Manage the relationship with key suppliers.

Table 18: Principal responsibilities by position in pharmaceutical manufacturing organisation

In order to fulfil the responsibilities listed in Table 18, which are primarily focussed around decision-making and assessment of performance, accurate management information is required. The management information requirements resulting from these users are discussed in the following section.

4.2.3.2. Management Information Requirements

Given that the user community had been exposed to the functionality of data mart access tools, they were able to articulate their management information requirements in the form of the type of information to be available and the business questions to be answered by the system rather than particular reports. This is a more appropriate means of communicating requirements for a data mart project.

The data mart should be able to provide answers to the following specific business questions of which a representative list is provided in Table 19.

Market-related questions	<ul style="list-style-type: none"> • Who are our strongest competitors? • Are we gaining or losing market share? • Are your competitors gaining or losing market share? Is it at your expense? • Which market segments should we target? • Where are our new markets located? • Where are we making profits / incurring losses? • What are the forecasted sales for the next 24 months? • Where are the potential sales improvements by market? • What is our market share today, last week, last month, a year ago? • What is our market share by product line, brand, or model? By sales territory? By channel? • If we lowered prices, would we increase market share?
Customer-related questions	<ul style="list-style-type: none"> • Who are our best customers? • Who are our worst customers? • How many customers have we lost and why? • Where are the potential sales improvements by customers? • What percent of my business is coming from old customers vs. new customers? • Who are my top 5 customers? 10? 20? • What percent of my business is coming from my top 5 customers? 10? 20? • Who are the top customers this year vs. top customers last year? • Who are the top 5 customers by region? By product? • Do existing customers buy more over time or less? • Can we measure the impact of your marketing promotions on profitability? • What percentage of deliveries to customers is on time as promised?
Product-related questions	<ul style="list-style-type: none"> • How well is each of our products doing? • What is the sales history of each product? • What is the life cycle of each product? • What is the actual and intended return on investment of each product? • What is the competition doing with similar products? • Do we have the right products matched with the right markets? • Where are the potential sales improvements by product line? • Display all products with sales 5 percent or more below budget and which represent more than 2 percent of total sales. • Display all products where sales were less than last year. • What is the 13-week moving average trend of sales?
Sales force-related questions	<ul style="list-style-type: none"> • Who are the best performing sales representatives? • How are they ranked based on performance? • How are they ranked based on percent actual performance to plan? • Is my top 5 performing sales representatives selling to old customers or new customers?

	<ul style="list-style-type: none"> • Who are the worst performing sales representatives? • What percent of customers that are new do my poorest performing sales reps sell to? • How many sales representatives do we need? • How many sales calls per market segment should we make? • What is the optimal compensation plan that will reward good sales performance and also maximize corporate objectives? • How do sales representatives who leave the organisation affect us? • In which territories can we expect the greatest sales improvements? • Who are the top 5 sales representatives selling to? • What if we added more sales representatives?
Analysis of profitability	<ul style="list-style-type: none"> • How much of our markets are the most profitable? • Which distribution channel is most profitable? • How has product mix changed over the past 52 weeks? • Is there a more profitable way to sell my products and services? • Are there some products we should stop selling immediately? • Is the third party distributor performing given the cost charged³?

Table 19: Representative list of business questions to be answered by data mart

Given the above business questions, the management information requirements can be categorised as:

- Internally focused marketing information, such as sales, costs, marketing performance indicators;
- Externally focused marketing information, such as industry trends and competitive intelligence;
- Historical marketing information, such as sales, profitability, market trends;
- Future-orientated marketing information, such as environmental scanning information;
- Quantitative marketing information, such as costs, profitability, market share; and
- Qualitative, often subjective marketing information, such as buyer behaviour, competitor strategy information.

All the above information needs to be available at different levels of aggregation or detail, for example, around time periods, (daily, monthly quarterly, annual) or around products or markets, i.e., sales data specific to product lines and market segments.

These business questions can be answered through specific management reports, which allow for user interaction. An overview of management reports is given in the sections below in order to evaluate the data mart access tool requirements in the next section.

³ The third party distributors calculates its distribution costs as a percentage of the invoiced value with differing percentages for the different distribution channels which are private, export or on tender to the state.

Sales-related management information

Sales-related reporting evaluates daily, month-to-date (MTD), and year-to-date (YTD) actual sales against the corresponding annually determined budget and the more regularly updated forecast. This is available by region, product line or product, by channel, or by representative. Since the sales are also compared to targets set for the sales force, it allows the organisation to assess the effectiveness of the sales force. The actual sales figures contained in this report are used for calculating commissions by means of a specified commission model.

Sales forecasts are included in the scope of the project as these forecasts are related to and based on historical sales performance. By comparing the budget, and sales forecasts, which is a vital input in production planning, forecasting accuracy can be measured. Improving the accuracy of forecasts is vital to ensure manufacturing co-operation and to enable engineering efficiency through a better understanding of the market and consumer needs. It is important to take non-availability of products due to manufacturing problems into account when measuring the accuracy of the sales forecast.

Marketing-related management information

Marketing-related management information incorporates sales-related management information since this is the measure of the success of the marketing effort. However, it also requires other information. By analysing the average selling prices (ASP) and unit forecasts (in solid dosage format SDF for comparative analysis)⁴ for the different products, the marketing function can review pricing policies and procedures, modify pricing agreements, and identify the more lucrative markets.

The effectiveness of promotions needs to be gauged. The pharmaceutical industry relies heavily on promotions, particularly seasonal promotions around particular products, for example, for winter colds and influenza. In addition, promotions are planned around the introduction of new products as well as being location-targeted sales promotions planning.

⁴ Pharmaceutical products are specified, and therefore sales are analysed, according to specific characteristics, which include:

- Trade or brand name, if applicable;
- Generic name, if applicable;
- Chemical name, which is normally the active ingredient(s);
- Pharmaceutical form, for example, syrup, tablets, etc.;
- Size;
- Dosage;
- Use; and
- Pharmacological classification.

New product development requires product-line analysis and new product introduction control, which is evaluated with respect to existing product lines in order to evaluate the market, the potential share of the market, pricing, distribution, profitability and ultimately the return on investment (ROI).^{5,6}

Inventory-related management information

Inventory-related management information focus on inventory levels and the expiry dates, which is particularly important in the pharmaceutical industry, and back order information, which provides insights into the flow-through of product. This allows manufacturing and distribution to eliminate back-order or over-production situations, and improve forecasts and customer service. The Rand value of the back order or out-of-stock situation translates to possible lost sales.

Distribution-related management information

Distribution-related management information aims to analyse the vendor pricing and performance as well as the optimal channel distribution (wholesalers versus retailers).

Profitability or margin-related management information

Since the organisation does not use activity-based costing (ABC) or management (ABM) direct and indirect expenses cannot readily be determined. As an estimate the direct operational expenses incurred by sales representatives during the sales process, for example, entertainment, hotel, travel and car, continuing medical education, cell phone, sponsorships, etc., is attributed to products based the product's sales based on list price over the 6 month period as a percentage contributed to the total. Specific expenses are derived from the sales value and must be calculated on a monthly prior to attributing the expenses. These expenses are:

- Sales representatives' commissions based on actual sales to each representative's assigned customer base.
- Rebates according to annual contractual agreements with one or more customers belonging to a specific customer rebate group.
- Distribution fee calculated by percentages specific to particular distribution channels, i.e. private, State tender and export.

Sales in SDF are calculated by multiplying the size with the quantity sold, for example, the number of tablets sold rather than the number of packets of tablets sold. Using SDFs when performing analysis allows for comparative analysis of product sales where different sizes of the same product line are sold.

⁵ Note that in order to evaluate the success of new products in the marketplace it is frequently necessary to rely on the sales force for customer information since they spend a significant amount of time with customers (Gordon *et al*, 1997:33).

⁶ The ROI in generics is less critical than in ethical pharmaceuticals where significant research and development is required to develop a formulation and is then protected by patent.

Profitability reports are then available to management by brand or product, by representative and/or by region for actual, budget and forecast. Profitability is not analysed by customers since the manufacturing organisation has more than 10,000 customers. Customers are evaluated using ranking reports with the best and worst performing customers in terms of sales value or unit volume. This is not a totally accurate reflection of the true value, i.e. the profitability or lack of, of the customers but is the best approximation.

The following remarks are pertinent to the management information requirements:

- An important regulatory requirement is the ability to recall batches which implies that batch/lot numbers must be stored as part of the sales transaction data in order to be able to trace customers who bought one or more products from a particular lot. The data mart must comply with this stipulation.
- Given the business questions that the user community want answered, there is a definite need for market or competitor intelligence. This cannot be satisfied with data obtained from the third party distributor as this is limited to the manufacturing organisation’s own performance. In order to measure the organisation’s competitive position in the market, competitive intelligence must be purchased externally to augment the already available data. Given this dire need, it was decided that the integration of competitive intelligence was to be a second phase of the sales and marketing data mart.
- Identification of potential accounts and opportunities is excluded as is customer care and satisfaction since this normally consists of qualitative information gathered by the sales force and communicated to middle and senior management through regular meetings.

4.2.3.3. Data Mart Access Tool Requirements

Based on the management information reporting requirements, the data mart access tool requirement can be determined. This is detailed in Table 20.

Management Information Requirement	Stage of Use	Nature	Data Mart Access Tool
Sales-related: <ul style="list-style-type: none"> • Sales report • Sales forecast 	Reporting Analysis	Deductive	Query and Reporting OLAP
Marketing-related: <ul style="list-style-type: none"> • ASP and unit forecasts • Promotions • New business development 	Reporting Analysis	Deductive	Query and Reporting OLAP
Inventory-related: <ul style="list-style-type: none"> • Stock on hand • Back orders 	Reporting	Deductive	Query and Reporting

Profitability or margin analysis	Reporting Analysis	Deductive	Query and Reporting OLAP
Rebates	Reporting	Deductive	Query and Reporting
Commissions	Reporting	Deductive	Query and Reporting
Distribution-related: • Costs	Reporting Analysis	Deductive	Query and Reporting OLAP

Table 20: Representative sample of pharmaceutical manufacturer’s data mart access tool requirements

The sources of data used to meet these management information requirements are reviewed in the following section.

4.2.3.4. Sources of Data

Based on the management information requirements, the sources of data to be used to populate the data mart were determined. The sources listed are according to whether the data originate within or outside of the organisational boundaries.

Internal Data Sources

The internal sources of data used to populate the data mart are:

- Budget data—historical data from a custom-developed database application, future budgeting to be performed within data mart environment;
- Expenses data—historical data from another custom developed MS Access application, incremental data from operational system (ERP);
- Costing data—historical and incremental data from an operational system (ERP).

External Data Sources

The pharmaceutical manufacturer downloads the following data in flat files from the distributor via FTP:

- Invoices issued on the previous day;
- Customer master data of additions and modifications;
- Inventory levels in the respective warehouses;
- Orders picked but not yet invoiced;
- Outstanding or backorders;
- Inventory transactions; and
- Balancing report consisting of cumulative month-to-date balances.

Of these files received, the external sources of data used to populate the data mart are:

- Invoices issued on the previous day;
- Customer master data of additions and modifications;
- Inventory levels in the respective warehouses;
- Orders picked but not yet invoiced; and
- Outstanding or backorders.

The balancing report is used to ensure correct upload of data into the database. The manufacturer wanted to capture additional data particular to its operations on both the customer and product master data. This required a custom-developed application. The volume of sales transactions is approximately 800 to 1000 transactions per day. The inventory transactions were omitted as inventory levels required monitoring only and did not require that inventory transactions be kept in any of the manufacturer's systems.

Traditionally, the operational system(s) serves only as a source for a data mart in the case of an independent or interdependent data mart or a data warehouse. Recently, however, an operational system can also be a target for a data mart or warehouse, receiving data from it. This is referred to as 'closing the loop' or a closed-loop approach. In the case of the pharmaceutical organisation the data mart was required not to be purely analytical but also to fulfil an operational role namely to be a data source for the operational financial system (ERP) with regard to sales and inventory levels consolidated by customer channels. Given the sources and requirements of the data mart, the flow of data to deliver management information through a data mart is depicted in Figure 22.

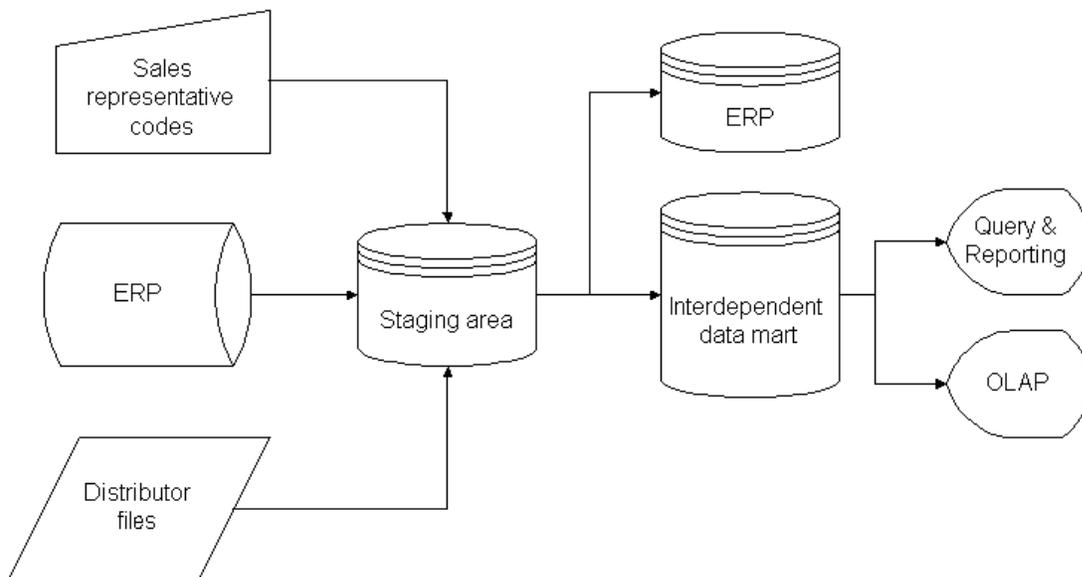


Figure 22: Data flow surrounding the data mart in the pharmaceutical case study

A facility to allow for the capture of data specific to the organisation for analysis is required, for example, the sales representatives responsible for specific customers needed to be captured since the operational source system is under the distributor's control – any changes to this system would have contractual implications.

4.2.4. Assessment of the Use of the Sales and Marketing Data Mart

The assessment of the sales and marketing data mart after completion of the implementation as a management information delivery mechanism is that it had a significant impact on the manufacturing organisation. Information that was previously too difficult to derive because of multiple source systems is now available on the users desktops. For example, analysing tender volume trends now takes only a few minutes where it used to take a few days compiling spreadsheets with data from different source systems. According to the Sales Director (Trevorrow, 2000) reams of paper reports and isolated spreadsheets have been eliminated. Information flows up and down the organisation much faster, increasing the speed and quality of key marketing and sales decisions. Most importantly, the organisation has seen a significant improvement in the accuracy of its sales forecasts. One comment was that by the nature of the system it continued to overemphasise quantitative data over qualitative data.

The increased visibility of data through direct access using the data mart access tools exposed the low quality of the data received from the third party distributor. Initially this was ascribed to the new system. However, once users were shown the source files from which the data was received it became clear that the service provided by the third party distributor with regard to data capture and provision was lacking. This is a frequent result of data warehouse or mart implementations (Kimball and Merz, 2000). As a result the results of analysis undertaken using the data mart were viewed with increased credibility given the ability of the data mart to process vast and complex data with speed and in detail.

According to the marketing director (Just, Reinholdt, 2000) senior management realised prior to commencement of the implementation that one of the main benefits of a data mart solution is that it enables managers to augment and expand their decision-making capabilities beyond previous levels by making information access both more efficient and more effective. Other organisational improvements as a result of the implementation included:

- Improved internal communication;
- Improved customer information;
- Organisational time saving; and
- Reduced paper work.

Technology costs to support ad hoc reporting and maintain multiple systems have been reduced. Costs incurred as a result of requesting reports from the third party distributor have also been eliminated. Overall, the organisation has improved the design and control of its marketing programs.

4.3. Chapter Conclusion

Sales and marketing data marts are used in manufacturing organisations in different industries (branded consumer goods and pharmaceuticals) as a management information delivery mechanism when the data source is located outside of the organisations' boundaries, for example, with third party distributors. The use of these data marts has improved information flow to the intended user community, which consists primarily of management. The users' requirements for access to the data marts centre on query and reporting and OLAP.