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# An evaluation of supply chain management in the implementation of South Africa's anti-retro viral programme

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**2011-11-14**
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# An evaluation of supply chain management in the implementation of South Africa's anti-retro viral programme

**Josef Adriaan Coetzee**

**A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration**

Johannesburg, 2010

# ABSTRACT

In 2009, Statistics South Africa estimated that there were approximately 1,6 million people in South Africa who were in need of anti-retroviral therapy. Already aware of the gravity of the situation, Government reaffirmed its commitment to tackling the challenge head-on in March 2007 through its Strategic Plan for dealing with HIV/AIDS between 2007 and 2011. The plan involved free testing and ARV treatment to HIV positive patients who meet certain minimum criteria.

As can be expected, the implementation of a programme of this magnitude will face some serious challenges at an operational level and the efficiency of the supply chain would be critical to its success. In that context, the purpose of this research was to examine the impact of the public sector supply chain management framework on the implementation of South Africa's antiretroviral treatment programme.

A number of weaknesses were identified in the framework that governs supply chain management in the public sector and the study set out to investigate (a) to what extent these weaknesses were mirrored in the supply chain management practices of the Department of Health and (b) what impact the supply chain management practices in the Department of Health has on the implementation of South Africa's ARV treatment programme.

Qualitative data was collected from the Medical Supplies Depot, five hospitals, three regional pharmacies and four clinics that covered all the regions in Gauteng province. A total of 15 semi structured interviews were conducted and the data was analysed.

The results revealed that the weaknesses that were identified in the public sector supply chain management framework are mirrored closely in the Department of Health's supply chain management practices. It was also clear from the results that within the Department of Health, supply chain management practices such as making policies in isolation; lack of integration and collaboration across the supply chain; limited use of technology; inaccurate forecasting of ARV demand; inefficient

staff utilization; and lack of customer service management have a significant negative impact on the implementation of the ARV treatment programme.

Based on the outcome of the study, recommendations are made with regards to reviewing and updating the public sector supply chain management framework; taking operational limitations into consideration in policy making; managing supply chain costs; taking a different strategic approach to stock management; making more efficient use of technology; taking a different strategic approach to managing the ARV budget; and taking a different strategic approach to staff utilisation.

# DECLARATION

I, Josef Adriaan Coetzee, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Josef Adriaan Coetzee

Signed at Underberg, Kwazulu Natal

On the 23rd day of November 2010

# DEDICATION

To my mother who passed away on 8 May 2010.

# ACKNOWLEDGEMENTS

Putting my career on hold while completing my post graduate degree on a full time basis was a big decision and required many sacrifices along the way. I was extremely fortunate to have a wonderful wife who encouraged and supported me without reservation and a son who, at age 5, understood that daddy could only play for ten minutes at a time because he had to study. Debbie and Matthew, thank you!

Dit was slegs vir my moontlik om voltyds te studeer as gevolg van die finansieele ondersteuning van my baie spesiale ouers, Joseph and Rina Coetzee en die vrygewigheid en vriendelikheid van my broer en skoonsuster, Riaan and Ursula Coetzee wat hulle huis vir my en my gesin oopgemaak het gedurende hierdie tyd. Ek waardeer julle ondersteuning opreg. Dankie ook vir my neef Pierre Coetzee vir die hulp en insette.

I was also fortunate to have the invaluable support and guidance of my research supervisor, Trevor Lake. His low-key approach helped to keep me on track without adding to the pressure and his ideas stimulated my thinking and enriched my learning experience. Thanks Trevor. I would also like to thank John Luiz for his inputs and suggestions that got me unstuck on a few occasions and Antony Soicher for his suggestions during the panel review. I also valued the friendly and professional assistance of Jennifer Kroll at the Wits Business School library who introduced me to the world of on-line research databases and pointed me in the right direction on numerous occasions.

I appreciate the time that Ashwin Hurribunce of IQ Business Group spent in discussions with me in the early stages of my research. His input was invaluable in refining my research topic and structuring the research questions. Thanks Ashwin.

Finally, I would like to thank Sue le Roux from the Gauteng Department of Health for her efficient assistance in arranging the approval of the study and Zuleika Rhemtula who offered invaluable assistance in arranging access to the right

respondents and provided me with documentation and information that I would never have found on my own. Also a word of thanks to all the respondents for honestly and openly sharing their knowledge and experience.

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# CHAPTER 1

# INTRODUCTION

## 1.1 Purpose of the study

The purpose of this research is to examine the impact of the public sector supply chain management framework on the implementation of South Africa's antiretroviral treatment programme.

## 1.2 Context of the study

### 1.2.1 *The challenge of HIV / AIDS*

Infection with the *Human Immunodeficiency Virus* (HIV) leads to a disease of the human immune system called *Acquired Immune Deficiency Syndrome* (AIDS) (Weiss 1993). This condition progressively reduces the effectiveness of infected patients' immune systems and leaves them susceptible to opportunistic infections.

Millions of infected individuals and their dependants live with the burden of this debilitating disease on a daily basis in South Africa while the knock-on effects caused by the high infection rate impact heavily on broader society, business and our country's economy. Figures released by the World Health Organization (2008) show that South Africa has the highest HIV infection rate in the world.

### 1.2.2 *Government response to HIV/AIDS in South Africa*

Already aware of the gravity of the situation, Government reaffirmed its commitment to tackling the challenge head-on in March 2007 through its Strategic Plan for dealing with HIV/AIDS between 2007 and 2011 (Republic of South Africa 2007: 12). Its primary aims are to:

- "Reduce the number of HIV infections by 50%

- Reduce the impact of HIV and AIDS on individuals, families, communities and society by expanding access to appropriate treatment, care and support to 80% of all people diagnosed with HIV"

Financial sustainability was stated as one of the key principles in the strategic plan (Republic of South Africa 2007: 55) and outlined as follows: "No credible, evidence based, costed HIV and AIDS and STI sector plan should go unfunded. There should be predictable and sustainable financial resources for the implementation of all interventions. Additional resources from donor agencies shall be harmonised to align with policies, priorities and to fund programme and financial gaps."

The proposed ARV budget (Republic of South Africa 2007: 111) in support of the strategic plan is presented in Table 2.

**Table 1 Summarised cost for ARV therapy using low cost scenarios (million Rands, 2005/06 prices)**

| Intervention | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| Antiretroviral treatment for adults | 1,588 | 2,296 | 3,115 | 4,036 | 5,014 |
| Antiretroviral treatment for children | 245 | 359 | 488 | 634 | 791 |

### 1.2.3 *Implementation of ARV treatment programme in Gauteng*

Government's ARV treatment programme is implemented by the Department of Health and the bulk of the responsibility has been delegated to provincial level. As can be seen in Figure 1, the Gauteng Department of Health divided the province into five regions: Johannesburg Metro, East Rand, West Rand, Tshwane and Sedibeng.

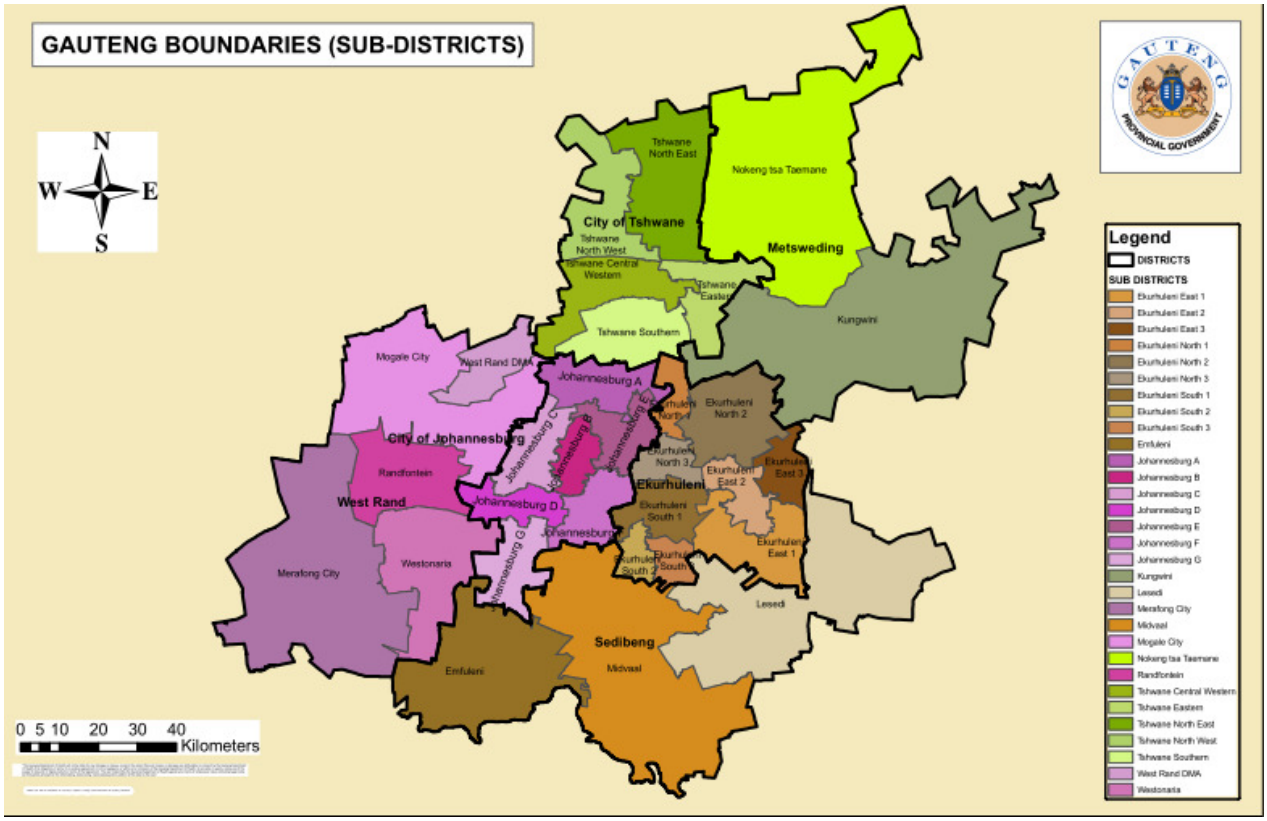



**Figure 1 Gauteng regional health facilities**

As illustrated in Figure 2, the ARV supply chain in Gauteng consists of manufacturers, the Medical Supplies Depot (MSD), regional pharmacies, hospitals, clinics and patients. ARVs are procured on tender and this process requires collaboration between the National Department of Health and the National Department of Finance.

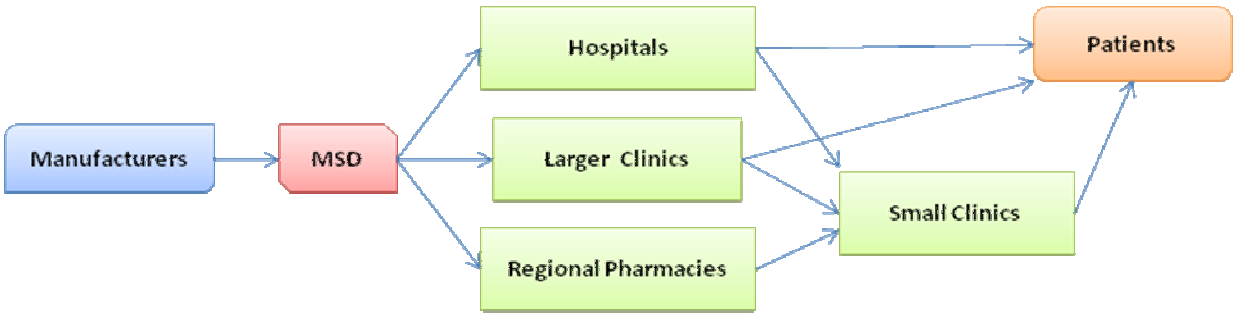



**Figure 2 The ARV supply chain in Gauteng**

### 1.2.4 *Progress towards goals stated in HIV / AIDS strategy*

While progress towards the stated goals has been made, there are concerns about the efficiency of the program roll-out:

- The Mail and Guardian (Ntutu 2009) reported that despite the Free State health department's claims that ARV's are widely available in the province, patients are being sent from pillar to post, clinics are severely understaffed and shortage of funds is a major obstacle.

- In June 2009, the Business Day (Johwa 2009) reported that Mark Heywood, deputy chairman of the South African National Aids Council, said that the government will have a shortage of R1bn for ARV's during the financial year and warned that this could result in a reoccurrence of ARV shortages such as those experienced previously in Free State.

- The Witness (Ngobese 2009) reported a crisis at Edendale Hospital in Kwa-Zulu Natal where huge demand for ARV therapy could not be satisfied due to staff shortages and insufficient space at the hospital pharmacy.

From the above, it is appears that staff shortages and lack of funding are two challenges that impact negatively on the roll out of the National Strategic Plan for HIV/AIDS.

However, in a City Press article published in February 2010 (Lombard 2010), bad planning, mismanagement and incompetence are cited as contributing factors to stock outs of medicines at hospitals and clinics. In the article, Democratic Alliance health spokesperson Jack Bloom is quoted as saying: "If institutions of international repute like Chris Hani-Baragwanath and Charlotte Maxeke have stock-out problems, it points to much deeper, systemic problems."

This suggests that operational inefficiencies may well be part of the problem and since producing and delivering ARV's to the end-users involves a vast number of processes and individuals across various organizations, it falls directly within the ambit supply chain management.

### 1.2.5 *The supply chain as delivery mechanism*

Although the concept of SCM originated in the private sector, it is also the mechanism through which products and services are delivered to the public by government departments. In this instance, the network of organizations that are involved in manufacturing and distributing ARV's to the end-users constitute a supply chain as defined by Cavinato (2002).

In recognition of the fact that activities and processes associated with the supply chain consume a significant amount of Government's resources and therefore contribute to the total cost of providing products and services to the public, a SCM framework for the public sector (see Section 2.4) was developed by the Department of Finance. This supply chain framework is significant in that it defines the scope of supply chain management in the public sector as a whole and therefore impacts on its effectiveness. In particular, it impacts on the way in which the Department of Health manages its supply chain and, by extension, the overall cost and efficiency with which ARV's are provided to end-users.

### 1.2.6 *Challenges for management*

The challenge from a management point of view is to ensure that ARVs are delivered to patients in the most reliable, efficient and cost-effective way. This is not an easy task because many different factors come into play.

## 1.3 Problem statement

The perception exists that staff shortages and insufficient funding are major obstacles to the efficient implementation of South Africa's antiretroviral (ARV) treatment programme. While this may be true, it is possible that these factors may just be symptoms of a deeper underlying cause: inefficient supply chain management. It is in this context that the impact of the public sector SCM framework and current supply chain management practices are evaluated in this study.

## 1.4 Significance of the study

This study fills a gap in that there has been no research on the impact and efficiency of the supply chain through which South Africa's ARV treatment programme is delivered.

It is significant because it highlights the links between the theoretical supply chain management framework, the way in which supply chain management is put into operation in the Department of Health and the impact that it has on the effective and efficient delivery of ARV's to HIV-positive patients. It was found that a number of the weaknesses in the public sector's supply chain framework are mirrored in the Gauteng Department of Health's supply chain practices and restricts the efficiency with which the ARV treatment programme is implemented in the province.

The results of this study are useful because:

- It alerts government and organizational policy makers to significant weaknesses in the current supply chain framework and illustrates how these could impact on programme delivery.
- The importance of managing the supply chain through which programmes are delivered is highlighted to government policy makers and managers.
- It highlights the fact that there is a large body of knowledge available that individuals and organizations in each link of the supply chain can tap into to help them implement programmes more efficiently and at lower overall cost.
- The results and recommendations of this study are of particular value to managers and staff who are responsible for the implementation of South Africa's ARV treatment programme. It also has broader value to managers, practitioners and consultants involved in designing future improvements in the public sector's supply chain framework and to the Minister of Finance in evaluating those proposed improvements.

## 1.5 Delimitations of the study

- It is acknowledged that there are many factors that may impact on the efficient delivery of ARV's to HIV/AIDS patients, e.g. financial constraints, staff shortages, etc. While all these factors are important, the focus of this study was limited to the impact of supply chain management.

- The scope of this study was limited to the part of the supply chain that is under the Department of Health's direct control.

## 1.6 Assumptions

- *The way in which the supply chain is managed will have a significant impact on the efficiency of the implementation of government's ARV programme.* This assumption was critical because it underpins the practical value of the research. Supply chain management came into existence when people recognised the efficiency and cost gains that could be made through collaborative efforts across organizations (Tracey 1998; Russell 2007) and the assumption therefore appeared to be reasonable.

- *It would be possible to collect the required data even though people in the public health sector may not be familiar with supply chain terminology.* This was an important assumption because without relevant data, the study would have lacked validity. It was a reasonable assumption because the researcher was aware of this possibility and took it into account when designing the research instrument and conducting the interviews.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

The literature review starts with an overview of key HIV/AIDS statistics and the impact of HIV/AIDS and benefits of ARV therapy are discussed. The focus then shifts to the way in which SCM is currently understood by leading practitioners and academics. The evolution of the SCM concept is discussed and a consensus definition of SCM is presented. Next, the scope, key principles and goals of SCM are explored followed by sections on the potential benefits of SCM, drivers of SCM performance and SCM metrics. Finally, a theoretical framework of SCM that was developed by Lambert is presented and compared with the public sector SCM framework that is currently in use.

## 2.2 HIV / AIDS in South Africa

In 2009, Statistics South Africa (2009) estimated that:

- 5,2 million people in South Africa (10,6% of the total population) are HIV positive
- 268 900 South Africans died of AIDS
- 1,91 million children are AIDS orphans
- There were 354 000 new HIV infections among adults aged 15+ and 59 000 new infections among children
- 1,6 million people are in need of antiretroviral therapy (ART)

### 2.2.1 *Impact of HIV / AIDS*

Being HIV positive and suffering from AIDS impact people on a physical, psychological, social and financial level. It also impacts directly and indirectly on those around them.

People suffering from AIDS are unable to work and their consequent loss of income often leaves them and their dependents in a desperate position. HIV positive mothers can pass on their infection to their babies and many children become orphans as their parents succumb to AIDS related illness.

The HIV/AIDS epidemic also has micro- and macroeconomic impact for South Africa. Booysen, Geldenhuys and Marinkov (2003) identified five primary channels through which HIV/AIDS impact on the economy:

- Lower demand in the economy due to a decline in total labour supply and total population caused by HIV/AIDS-related mortality
- Lower labour- and total factor productivity due to HIV/AIDS-related mortality
- Higher direct and indirect costs and losses in productivity in the private sector due to morbidity and mortality amongst employees
- Losses in household income due to AIDS-related illness and retrenchments of bread winners as well as changes in household expenditure due to higher medical and funeral expenses
- Higher Government expenditure due to a higher demand for health services, escalating costs in ARV treatment and higher direct and indirect costs and losses in productivity in the public sector due to morbidity and mortality amongst employees

The most important costs to employers are illustrated in Figure 1.

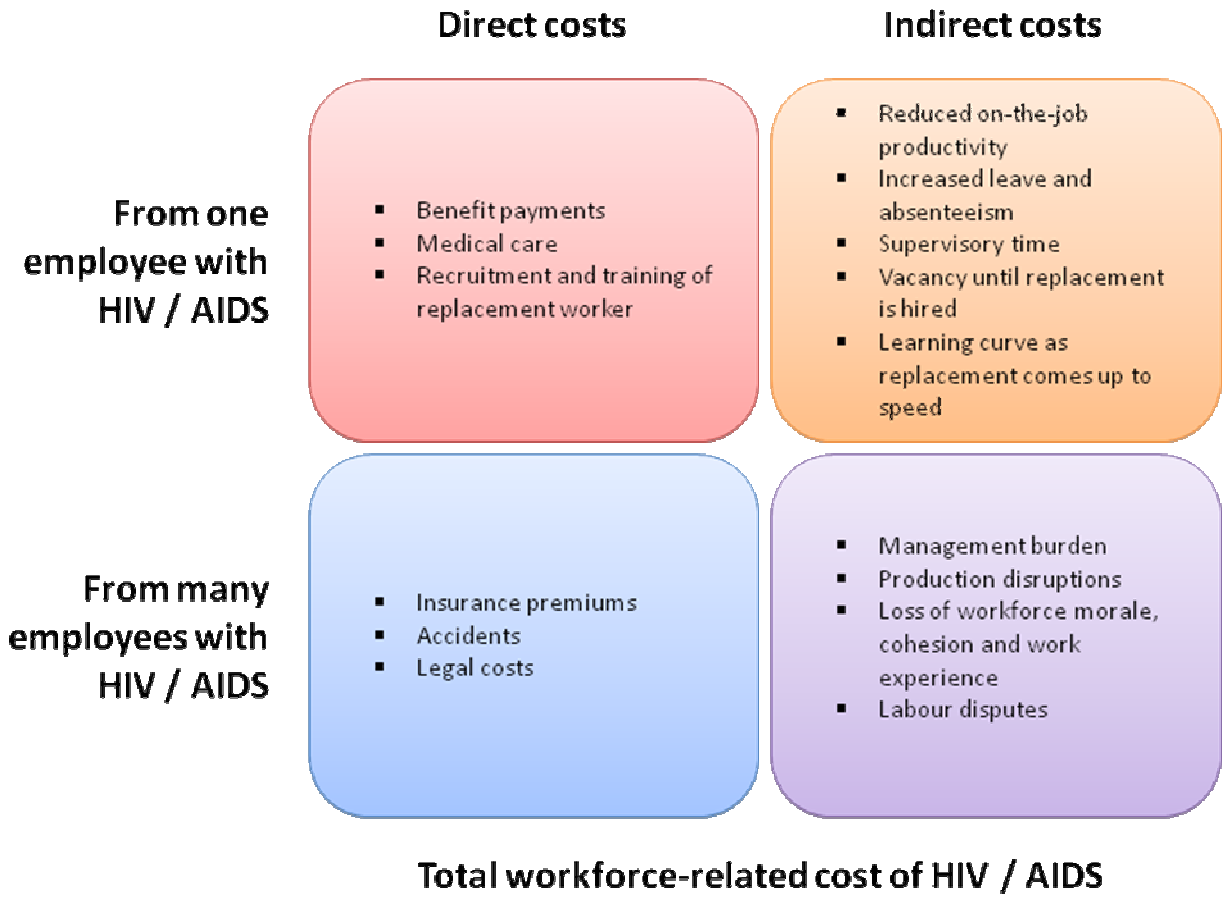



**Figure 3 Origin of direct and indirect costs of HIV / AIDS to employers (Rosen, Simon, Vincent, MacLeod, Fox and Thea 2003)**

### 2.2.2 *Benefits of ARV's*

There is currently no cure for HIV/AIDS. However, there are a variety of effective ARV's and treatment regimens that can reduce the amount of HIV in an infected person's body to a level where their immune system can recover and effectively fight off disease. Once their health is restored, continued ARV treatment can inhibit the virus to the extent that it is unable to weaken the immune system, making it possible for people infected HIV to live productively for many years.

Immediate and indiscriminate ARV therapy for HIV positive patients can also greatly reduce the spread of HIV (Granich, Gilks, Dye, Cock and Williams 2009).

However, if treatment is interrupted, the HIV can become drug resistant rendering first-line therapy ineffective. Patients then have to be migrated to a second-line regimen that

is both more complicated and significantly more expensive. It is therefore imperative to keep patients on treatment programmes once they start.

Even though it has serious cost implications, effective ARV treatment can counteract most of the negative effects that were highlighted in the previous section.

## 2.3 Understanding supply chain management

### 2.3.1 *Evolution of SCM*

Management thinking evolved over a period of time. The concept of supply chain management (SCM) emerged as part of this evolution and was based on the work of Keith Oliver who advocated the idea of breaking down functional silos between production, marketing and distribution and J. B. Houlihan who brought attention to the potential benefits of sharing information and coordinating decisions up and down the supply chain (Russell 2007). Table 3 provides a summary of important milestones in the development of management thinking and places SCM in this context.

**Table 2 Evolution of management thought (Russell 2007)**

| Years | Events |
|---|---|
| 1911 | Management emerges as a formal discipline of study and practice |
| 1920's – 1950's | Writings on operations, worker productivity, and output metrics |
| 1950's | Modern era of finance is launched |
| 1960's | Modern thought in marketing management and practices formulated |
| 1970's | Accelerating trend by business to adopt principles of military logistics to distribution systems |
| 1980's | Contemporary approaches to human resource management emerge<br>Quality revolution |
| 1990's | Explosive growth in logistics research and logistics emphasis in organizations |
| 2000's | Supply chain management revolution |

Li, Rao, Ragu-Nathan and Ragu-Nathan (2005) ascribe the emergence of SCM to the fact that global competition to get the right product or service to the right place at the right time at the lowest cost intensified during the 1990's and this caused organizations to broaden their focus to the whole supply chain.

Tracey, Fite and Sutton (2004) identifies compartmentalised decision making, restricted flow of information, a command-and-control management style and competition between organizations' internal functional areas and with their supplier and customers as antecedent conditions to the emergence of SCM.

### 2.3.2 *Definition of supply chain management*

In the 1980's and 1990's, many people were under the impression that SCM was nothing more than a fancy term for logistics management. Over time, practitioners reached consensus that logistics is part of SCM, but that SCM is a much wider concept.

A consensus definition for SCM was developed by Stock and Boyer: "The management of a network of relationships within a firm and between independent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer, with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction" (Stock and Boyer 2009).

The above definition was used as working definition in this study.

### 2.3.3 *The scope of supply chain management*

The scope of SCM includes all activities and business processes that are required from product design through to final delivery to the end customer across multiple sequentially-connected organizations (Morgan 1996; Ahlstedt and Hameri 2004; Russell 2007).

SCM cuts across traditional functional silos including forecasting, purchasing, manufacturing, distribution and sales and marketing (Chan 2003). In addition it also

drives the coordination of processes and activities across finance and information technology (Stock 2009).

A key element of SCM is the management of relationships across the supply chain (Lambert 2004). Specifically, it integrates supply and demand management within and across organizations through collaboration with suppliers, intermediaries, third-party service providers and customers (Stock 2009).

### 2.3.4 *Key principles of supply chain management*

SCM is built on a few key principles:

- Tracey et al. (2004) highlights the importance of successfully coordinating all functional areas within one's own organization as a prerequisite for further successful integration up and down the supply chain.

- Collaboration should be of mutual benefit to supply chain partners and the ultimate benefit of the customer (Lambert 2004; Tracey et al. 2004; Li et al. 2005; Russell 2007).

- Information should be shared among supply chain partners and planning should be done in collaboration with each other (Chan 2003; Ahlstedt and Hameri 2004; Li et al. 2005; Russell 2007).

- According to Zaklad, McKnight, Kosansky and Piermarini (2004) the whole is more than just the sum of its parts and it is therefore essential to take a systems approach to supply chain improvement to ensure maximum gains.

- Risk should be shared among supply chain partners (Chan 2003; Lambert 2004; Russell 2007)

### 2.3.5 *Goals of supply chain management*

According to Lambert (2004) the goal of SCM should be to improve the entire supply chain's profitability instead of just focussing on individual organizations in isolation. This,

according to the author, should be done by encouraging actions that benefit the entire supply chain and sharing risks and rewards.

Tracey et al. (2004) states that SCM aims to provide superior value to customers by integrating all aspects of the supply chain's resources. The opposite side of the coin is to deploy an integrated supply chain as an effective competitive weapon (Li et al. 2005).

### 2.3.6 *Potential benefits of supply chain management*

Tracey (1998) verified that a positive relationship exists between effective SCM and overall organizational performance.

Russell (2007) believes that orchestrating and coordinating all activities up and down the supply chain will offer benefits such as synchronizing supply and demand at all levels; sharing of information and technologies to increase innovation and to shorten product development cycles; reducing order cycle time; replacing stocks with flows; effectively and efficiently responding to customer demands; reducing costs and increasing customer satisfaction.

Chan (2003) associates effective SCM with reduced costs; improved resource utilization; appropriate stock levels; reduced lead times; improved customer response times; on-time deliveries; higher levels of innovation; greater input, process and output flexibility; higher levels of trust and increased customer satisfaction.

Ahlstedt and Hameri (2004) propose that effective SCM can reduce the impact of the demand distortion phenomenon (also called the "bullwhip" effect) by ensuring that demand information is available to inform the various upstream decision making processes.

### 2.3.7 *Drivers of supply chain performance*

Lambert (2004) argues that managing relationships is the foundation for successful integration of the supply chain.

According to Zaklad (2004) there are three important drivers of supply chain performance: business processes, social systems and enabling technology. Efforts to create and sustain supply chain excellence should, according to the author, treat the supply chain as a single integrated system and pay attention to all three drivers.

In addition, Nelson, Moody and Stegner (2001) maintains that in a successful supply chain top management recognises the importance of supply chain management, benchmarking is used and best practices are institutionalised, organizational culture promotes the sharing of knowledge and the supply chain is viewed in its totality across various links in the chain.

### 2.3.8 *Supply chain performance metrics*

Chan (2003) describes various quantitative and qualitative metrics that can be used in supply chain management. The author categorises quantitative metrics under cost and resource utilization while qualitative metrics are categorised under quality, flexibility, visibility, trust and innovativeness.

## 2.4 A theoretical framework for SCM

Lambert (2004) developed a comprehensive framework of the supply chain management process that illustrates the relationships between (a) the flow of products through various organizations that make up the supply chain, (b) the functional areas within organizations that are involved in the internal supply chain, (c) the eight key processes that support the supply chain and (d) the flow of information into and out of the supply chain. The framework is presented in Figure 2.

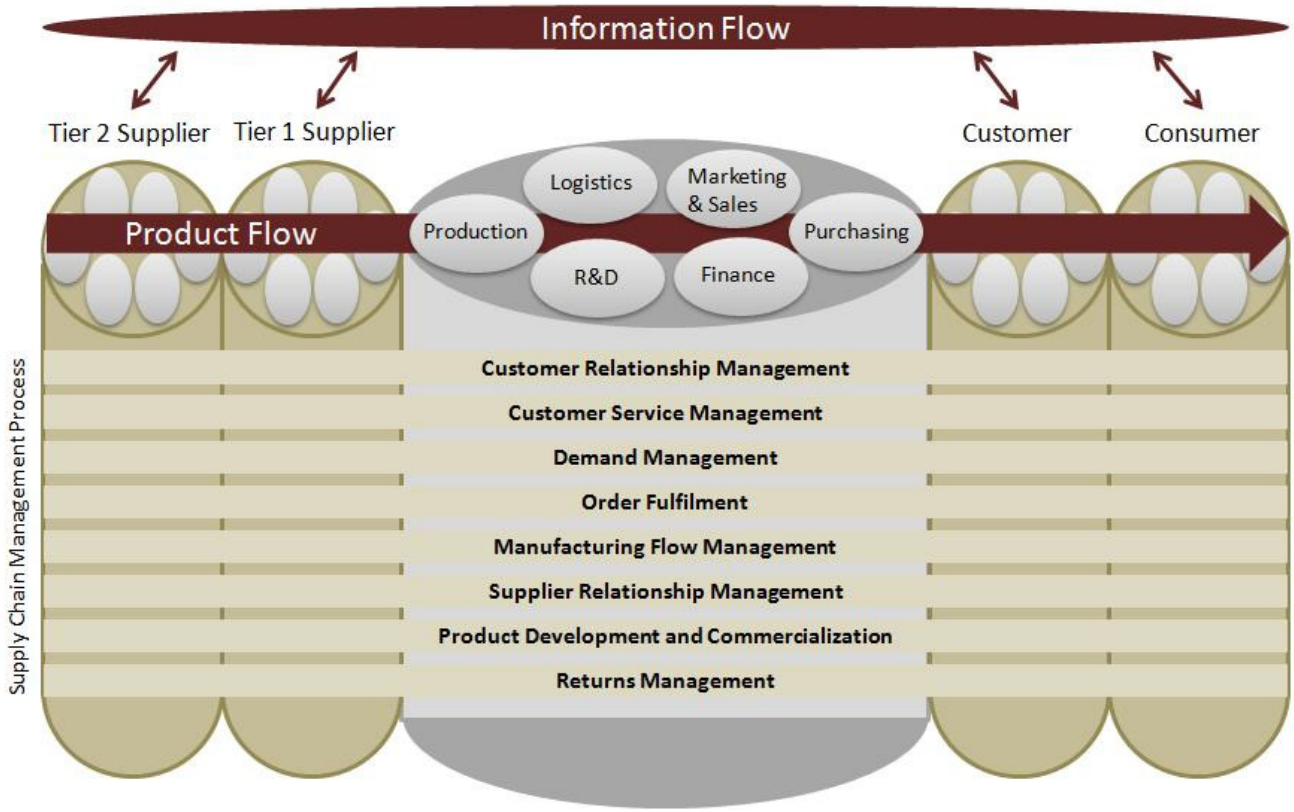



**Figure 4 Supply chain management players and processes (Lambert 2004)**

The elements of Lambert's SCM framework are described as follows (Lambert 2004):

*Customer Relationship Management* involves:

- Identifying key customers and customer groups to be targeted as part of the organization's mission
- Segmenting customers based on their value over time
- Increasing customer loyalty by providing customised products and services appropriate to the particular value proposition
- Working with key customers to improve processes and eliminate demand variability and non-value added activities

*Customer Service Management* involves:

- Providing customers with real-time information on promised shipping dates and product availability through interfaces with manufacturing and logistics
- Assisting customers with product applications

*Demand Management* is the process that balances customer requirements with supply chain capabilities and involves:

- Forecasting of demand
- Synchronising supply and demand
- Increasing flexibility in supply
- Controlling all the practices that increase demand variability
- Coordinating marketing requirements and production plans

*Order Fulfilment* involves:

- Defining customer requirements
- Designing a distribution network that enables the organization to meet customer requirements while minimising total cost
- Developing a seamless system that allows the flow of orders, products, invoices and payments between all the links in the supply chain
- Fulfilling orders

*Manufacturing Flow Management* involves:

- Obtaining, implementing and managing manufacturing flexibility in the supply chain
- Moving products through the plants

*Supplier Relationship Management* involves:

- Developing close relationships with a small number of suppliers based on the value that these suppliers bring to the organization over time

*Product Development and Commercialisation* involves:

- Working with customers to develop products and bringing them to market

*Returns Management* involves:

- Managing the activities associated with returns, reverse logistics, and return avoidance across the links of the supply chain

- Finding ways to minimise the number of return requests
- Changing promotional programs that load the pipeline where there is no realistic chance that the product shipped will be sold

## 2.5 The public sector SCM framework

A Regulatory Framework for Supply Chain Management in the public sector came into effect on 5 December 2003. It consists of a SCM model, framework and guidelines which will collectively be referred to as the *public sector SCM framework* and is significant in that it governs supply chain management in all national and provincial departments, including the Department of Health.

To support the implementation of the public sector SCM framework, the Department of Finance produced a SCM guide that provides a SCM model and guidelines for Accounting Officers and Authorities (Republic of South Africa 2004). Figure 4 presents the SCM model that is offered in the guide and shows that it has four main elements: Demand, acquisition, logistics and disposal.

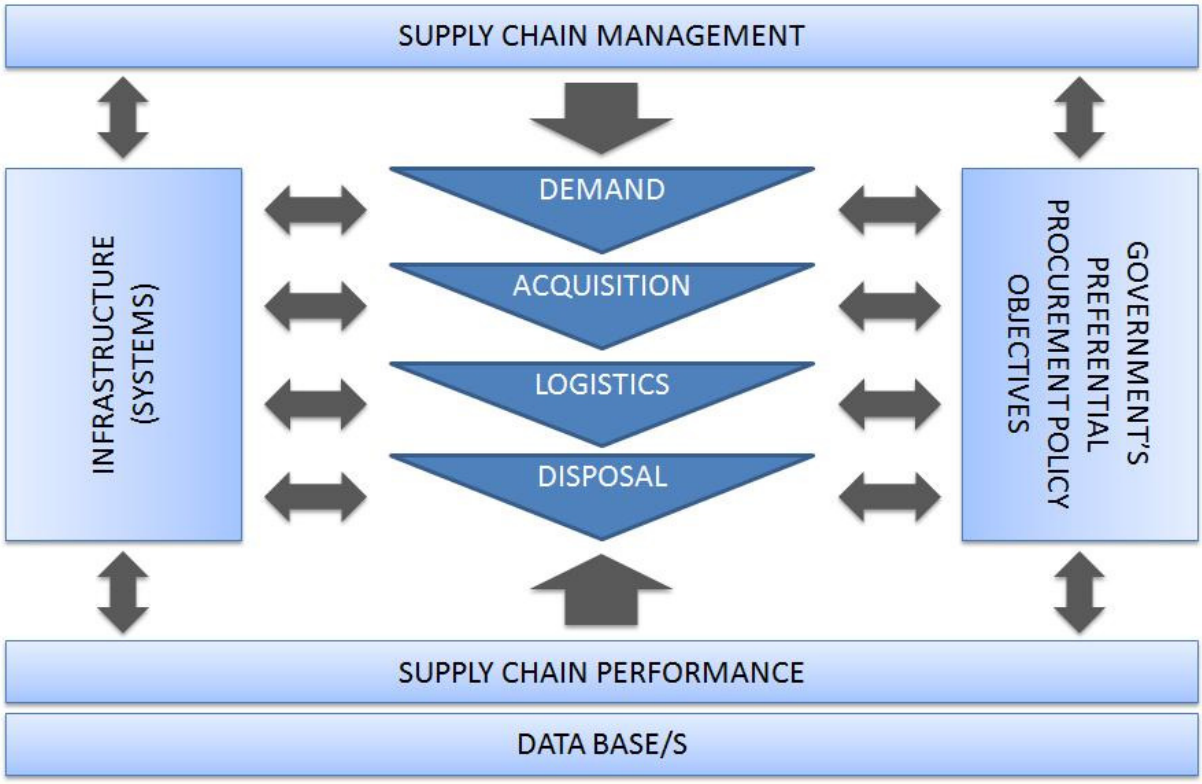



**Figure 5 Elements of supply chain management in the public sector**

The elements in the public sector SCM model are described as follows (Republic of South Africa 2004):

*Demand Management* is the beginning of the supply chain and involves:

- Conducting a needs assessment to determine which goods and services are required to deliver the agreed service
- Determining precise specifications for the goods or services
- Linking requirements to the available budget
- Analysing the supplying industry

The stated objective of demand management is to ensure value for money by bringing the supply chain practitioner close to the end user.

*Acquisitioning Management* involves:

- Deciding how the market will be approached
- Determining the total cost of ownership

- Ensuring that bid documentation (including evaluation criteria) is complete
- Evaluating bids based on evaluation criteria
- Contracting

*Logistics Management* involves:

- Setting inventory levels
- Receiving and distributing materials
- Managing stores, warehousing and transportation
- Reviewing vendor performance

*Disposal Management* involves:

- Planning obsolescence
- Maintaining a database of redundant material
- Inspecting material for potential re-use
- Determining a strategy for disposing of obsolete items
- Implementing the physical disposal process

*Supply Chain Performance*

The framework makes provision for reviewing the SCM process to determine whether the desired objectives were achieved.

## 2.6 Weaknesses in the public sector SCM framework

Lambert's SCM framework, as presented in Section 2.4, covers all the key elements of current thinking on SCM and is therefore an excellent yardstick to use when evaluating SCM practices.

It is recognised that not all elements of Lambert's SCM framework are applicable in the public sector. Elements such as "segmenting customers based on their value over time", "increasing customer loyalty by providing customised products and services appropriate to the particular value proposition", "assisting customers with product applications",

“moving products through the plants” and “product development and commercialization” were therefore ignored in the evaluation of the public sector SCM framework.

The biggest strength of the public sector’s SCM framework is in the area of acquisitioning management which has been well defined and developed. In addition, it addresses defining and fulfilling customer requirements and tying expenditure to budgets as part of demand management. The framework also appears to address the most important aspects of logistics management, i.e. setting inventory levels; receiving and distributing materials; managing stores, warehousing and transportation and reviewing vendor performance.

However, when the two frameworks are compared, the following shortcomings become apparent in the public sector SCM framework:

- There is no indication that either suppliers or customers are considered an integral part of the supply chain.
- The importance of successfully coordinating all functional areas within one’s own organization as a prerequisite for further successful integration up and down the supply chain was completely ignored.
- Customer relationship management is ignored.
- Customer service management is ignored.
- The element of demand management is defined very narrowly from a purchasing perspective and ignores aspects like demand forecasting, synchronisation of supply and demand, supply flexibility, all practices that increase demand variability and coordinating marketing requirements and production plans.
- It fails to address distribution system design and the flow of orders, products, invoices, payments and information between all the links in the supply chain.
- It ignores supplier relationship management and manufacturing flow management.
- It fails to address returns management.

While the weaknesses in the public sector SCM framework are clear enough, further investigation is necessary to determine whether any of the weaknesses were transferred into the Department of Health's SCM practices and whether it had any impact on the implementation of South Africa's ARV treatment programme.

## 2.7 Conclusion of literature review

The literature review showed that there is a large body of theory available that relates to SCM. It also showed that there seems to be a high degree of consensus among leading SCM practitioners and academics on topics such as how the SCM concept evolved, how SCM should be defined and what its scope, key principles, goals, potential benefits, performance drivers and metrics are.

It also uncovered two SCM frameworks. Lambert's framework covers all the key elements of modern SCM. The second framework was developed by the Department of Finance and currently governs SCM across all government departments at provincial and national level. A comparison between the two highlighted a number of shortcomings in the public sector SCM framework and prompts investigation of the Department of Health's current SCM practices and the implications this may have on the implementation of South Africa's ARV treatment programme.

### 2.7.1 *Research question 1:*

To what extent are the weaknesses in the public sector SCM framework mirrored in the SCM practices within the Department of Health?

### 2.7.2 *Research question 2:*

What impact do the Department of Health's SCM practices have on the implementation of South Africa's ARV treatment programme?

# CHAPTER 3

# RESEARCH METHODOLOGY

This chapter starts with a discussion on the research methodology/paradigm that was used in the study. Next, the research design is explained and its strengths and weaknesses considered. This is followed by an overview of the criteria that were used for sample selection, the method of selection and a definition of the population. A description of the procedure used for data gathering, analysis and interpretation is given and the study's limitations are discussed briefly. The chapter is concluded with a brief discussion on validity and reliability.

## 3.1 Research methodology / paradigm

A pragmatic paradigm was used in this study. The emphasis was on the research problem itself and the selection of research methodologies was based on "the best way to get the job done". Rather than being tied down to any particular approach or methodology, the key assumption in this paradigm was that truth is what works at the time and the researcher is therefore free to choose the methods and techniques that best meet the purpose of the study (Creswell 2009). Another assumption is that because the world is complex, i.e. it covers different domains such as organizations, functions, groups, legal and institutional frameworks, etc. it has to be examined holistically (Stake 2000).

Adopting a pragmatic paradigm allowed the researcher to produce outcomes through this study that can be used by others as foundation for improving supply chain management in the public sector in future.

A qualitative approach was used in this study and the following characteristics, previously identified by Creswell (2009) in relation to qualitative studies, were applicable:

- Data was gathered in a natural setting
- The researcher was the key instrument in gathering data

- Data was gathered from multiple sources
- An inductive process was used for data analysis
- Focus remained on learning the meaning that participants hold about the problem or issue throughout the research process
- Research design was emergent and evolved as the process unfolded
- A theoretical lens was be used to view the study
- The study is interpretive in nature
- Within the bounds of what is practical, a complex picture of the issue under investigation was developed

## 3.2 Research design

The *instrumental case study* method was used as strategy of enquiry in this research. The unique characteristics of this specific type of case study were described by Stake (2000: 437): "I call it *instrumental case study* if a particular case is examined mainly to provide insight into an issue or to redraw a generalization. The case is of secondary interest, it plays a supportive role, and it facilitates our understanding of something else. The case still is looked at in depth, its context scrutinized, its ordinary activities detailed, but all because this helps the researcher to pursue the external interest."

The real issue under investigation (the "external interest") in this study is the potential impact that weaknesses in the public sector SCM framework could have on the way in which government departments – in this case the Department of Health – manage their supply chains. The case study investigated how the ARV treatment programme is rolled out to HIV/AIDS patients and illustrates the impact of supply chain management on this process. In this way, the case study helped to focus the investigation and to make the impact of the public sector SCM framework more concrete.

## 3.3 Population and sample

### 3.3.1 *Case site*

The case site included the part of the supply chain that is under the direct control of the Gauteng Department of Health, i.e. the Medical Supplies Depot, hospitals, regional pharmacies and clinics in Gauteng province.

### 3.3.2 *Sample and sampling method*

As explained in Section 1.2.3, the Gauteng Department of Health is divided into five regions. An effort was made to obtain input from at least one respondent in each of the types of facilities and key processes that were involved in the distribution of ARVs to patients in each region. Facilities differed in size, sophistication and distance from the MSD. As far as was practically possible, these characteristics were taken into consideration when selecting the sample.

Data for this study was collected by interviewing individuals who were responsible for managing or implementing the ARV supply chain at their facility. Care was taken to ensure that all respondents had a good working knowledge of local conditions and processes used at their facilities.

Table 3 provides a breakdown of the sample based on region, type of facility / process, number of respondents interviewed, relative size of facility, relative sophistication of facility and travelling time from MSD.

**Table 3 Breakdown of sample**

| | | **Entire province** | | | | |
|---|---|---|---|---|---|---|
| ***Medical Supplies Depot*** | No. of respondents: | 1 | | | | |
| ***Procurement*** | No. of respondents: | 1 | | | | |
| ***Invoicing and payments*** | No. of respondents: | 1 | | | | |
| | | **JHB Metro** | **Ekurhuleni** | **West Rand** | **Tshwane** | **Sedibeng** |
| ***Hospitals*** | No. of respondents:<br>Relative size: | 1<br>Large | 1<br>Medium | 1<br>Medium | 1<br>Medium | 1<br>Small |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Relative sophistication:<br>Travelling time from MSD: | High | Low | High | Low | Medium |
| ***Regional pharmacies*** | No. of respondents:<br>Relative size:<br>Relative sophistication:<br>Travelling time from MSD: | 1<br>Large<br>Low | 1<br>Large<br>Low | 0<br>n/a<br>n/a<br>n/a | 0<br>n/a<br>n/a<br>n/a | 1<br>Medium<br>Medium |
| ***Clinics*** | No. of respondents:<br>Relative size:<br>Relative sophistication:<br>Travelling time from MSD: | 1<br>Medium<br>Low | 1<br>Small<br>Low | 1<br>Small<br>Low | 0<br>n/a<br>n/a<br>n/a | 1<br>Medium<br>Low |

The regional pharmacy in the West Rand indicated that they were not involved in the distribution of ARVs and the one in Tshwane only started getting involved shortly before being approached to participate in the study. Both these facilities were therefore unable to provide usable input and were omitted from the study. Access to a clinic in Tshwane could not be arranged.

A total of 15 interviews were conducted with respondents from the Gauteng Department of Health. Interviews with a major supplier of ARVs and a large private logistics company that specialises in pharmaceutical logistics provided the researcher with additional contextual information.

## 3.4 The research instrument

The research instrument was based on Lambert's SCM model and covered a total of 26 items in 9 sections.

Items 1 – 2 covered the respondents' role and challenges in getting ARVs to patients and provided information on the current process and obstacles.

Items 3 – 7 covered various elements of SCM and provided information on participants' current level of understanding of SCM.

Items 8 – 26 covered all the applicable elements contained in Lambert's SCM framework. Participants were asked to describe the manner and extent to which each element formed part of their organization's current SCM practice.

A copy of the research instrument is attached as Appendix A.

## 3.5 Procedure for data collection

Permission to conduct the study was obtained from the Gauteng Department of Health. Appropriate facilities were identified in line with the criteria described in Section 3.3.2 and management at the Gauteng Department of Health offered invaluable assistance in obtaining the necessary authorization from facility managers and facilitating access to the relevant respondents.

Data was collected on-site so and respondents physically walked the researcher through the process where necessary. Interviews were done by appointment to minimise interruptions.

Data was collected through semi-structured face-to-face interviews, guided by the research instrument. With respondents' permission, audio recordings were made of all interviews and the researcher's observations. The recordings were transcribed after each interview while still fresh in the researcher's memory. The recordings and transcriptions were backed up on a secure storage site on the internet. All research data was treated in accordance with confidentiality agreements.

## 3.6 Data analysis and interpretation

As proposed by Creswell (2009), data analysis and interpretation was approached as an ongoing process that started during the data gathering phase and involved continual reflection about the gathered data, asking analytic questions and writing down thoughts and insights throughout the study. Creswell's framework was treated as a broad guideline rather than rigid sequential steps.

After transcribing all interviews, a matrix was created to organise and prepare the collected data for analysis. Next, the data was coded based on categories that were already present in the research instrument and aggregated by type of facility or, where more appropriate by type of process. At that point, it became apparent that certain gaps existed in the data that was collected during the initial interviews and follow-up interviews were conducted telephonically to collect the missing data. With all the data finally in place, the analysis was completed and themes were identified and interpreted.

## 3.7 Limitations of the study

- Any quantitative study involves a substantial element of interpretation and the researcher's education, experiences and expectations would invariably have influenced the questions, perceptions and interpretations to some extent.

- Data gathering happened in the field where complex interrelationships between multitudes of elements exist. Despite the researcher's best efforts, it is likely that under these circumstances some relevant issues were not uncovered during the interviews.

- Participants may have distorted or omitted some information to protect themselves and/or their colleagues if they feared that the outcome of the study could have had adverse real-life implications.

## 3.8 Validity and reliability

### 3.8.1 *Reliability*

Bell (2005: 117) defines reliability as "… the extent to which a test or procedure produces similar results under constant conditions on all occasions".

The following actions were taken to promote reliability in this study (Creswell 2009):

- The study's procedures and process were documented

- Transcripts and field notes were checked to ensure that they do not contain obvious mistakes

- The consistency of coding was continually checked

### 3.8.2 *Internal validity*

Kalof, Dan and Dietz (2008: 156) note that "internal validity means that the study is drawing appropriate conclusions from the data at hand".

The following strategies were used to promote internal validity of the study (Creswell 2009):

- Different data sources and perspectives were triangulated to build coherent justification for themes
- The themes and case analysis from the draft report was checked for consistency
- All information, including negative and discrepant information and perspectives that contradict the general perspectives of themes were presented in the report

### 3.8.3 *External validity*

"External validity is the ability to generalize from a study to a larger population" (Kalof et al. 2008: 157).

The value of qualitative research is usually found in the descriptions and themes that are developed in the context of a particular site rather than in the generalisation of the findings (Creswell 2009). However, the case is instrumental in this study as pointed out in Section 3.2 and while the descriptions and themes cannot be generalised, findings may have more general implications for the way in which the Department of Health and other Departments in the public sector manage their supply chains.

# CHAPTER 4

# PRESENTATION AND DISCUSSION OF RESULTS

## 4.1 Introduction

This chapter starts by describing how the ARV supply chain operates, what operational changes were being implemented at the time, what challenges respondents were experiencing and the respondents' level of understanding of SCM. The impact of the public sector SCM framework on the SCM practices within the Gauteng Department of Health is then examined and finally, the effects that those practices have on the implementation of the ARV treatment programme are discussed.

## 4.2 Demographic profile of respondents

With the assistance of the Gauteng Department of Health, all criteria described in Section 3.3.2 were adhered to in as far as they were relevant in practice. The only deviation from the original plan was that no data could be collected from a clinic in the Tshwane region.

## 4.3 The ARV supply chain

### 4.3.1 *Role of the Medical Supplies Depot*

The Medical Supplies Depot (MSD) which is situated in Auckland Park plays a pivotal role in the ARV supply chain. They are responsible for procurement and ordering of ARVs from suppliers as well as warehousing and distribution to nearly 150 customers that include regional pharmacies, hospitals and clinics. They utilise a computer based system to manage their stock and place orders with suppliers based on input from the system and actual orders received from customers. In line with Gauteng Department of Health's policy, they keep roughly 3 months of ARVs in stock for each customer. Large hospitals are allowed to order ARVs twice a week and other facilities once a week. The

MSD deliver all orders within a week of receiving them based on a set schedule. Most ARVs are stocked at the MSD although selected items are ordered on behalf of facilities and delivered directly by manufacturers.

### 4.3.2 *ARV tenders*

ARVs are procured by means of national tenders that are valid for a period of two years. The tender process is managed by the Department of Finance. Tender specifications are drawn up based on demand forecasts supplied by the National Department of Health. The forecasts are based on ARV treatment statistics received from each province.

Suppliers are invited to submit tenders and a committee evaluates all tenders that are received against preset criteria that include price, quality, ability to supply and government's preferential procurement policy objectives before awarding the tender to the most suitable supplier(s). The whole process should take approximately three months to complete.

It is preferred practice to split tenders between companies because it spreads the load and avoids being dependent on a single supplier. Because of the dynamic nature of the disease, forecasting is seldom accurate and actual consumption tends to be higher than initial estimates. Tenders are therefore worded in a way that provides some flexibility and the Gauteng Department of Health sends updated estimates to suppliers on a monthly basis. Suppliers use these estimates to plan their production and stock levels but if the difference between original and updated estimates is substantial, suppliers sometimes struggle to bridge the gap and in practice this has lead to temporary shortages from time to time.

Ideally, tenders should be finalised three months before the current tender expires to allow suppliers to get their production up to the required levels. However, this seldom happens in practice and managing procurement and ensuring availability of stock during the period of transition between tenders is challenging.

All facilities are encouraged to have three month's ARVs in stock by the end of the tender and replenishment orders are then placed under the new tender. If the new

supplier(s) cannot meet demand initially while they get their production up to the required levels, old suppliers are typically willing to supply the shortfall at the tender price for a period after their tender expired. Although this approach tends to load the pipeline with a high volume of stock, the MSD believes that it is justified because it ensures continuous availability of stock.

### 4.3.3 *ARV budgeting*

Each year, the Gauteng Department of Health prepares a budget with input from all facilities and ARVs are included in each facility's budget.

This is forwarded to the National Department of Health who consolidates provincial budgets into a national budget which is submitted to the Department of Finance. The Department of Finance allocates funding to functions and projects on a national basis, based on input from all the departments and the forecasted income for the next financial year. The Minister of Finance approves allocations and announces it in his budget speech in February each year. In line with this, funds are then allocated to departments and projects on a provincial basis. Budgets and spending is reviewed on a quarterly basis and funds may be reallocated.

### 4.3.4 *Sources of ARV stock*

All the facilities that were interviewed for this study order ARVs directly from the MSD. In practice, some items are delivered by MSD while others are supplied directly by the manufacturers. Figure 4 gives a breakdown of where the various types of facilities receive their ARV stock from.

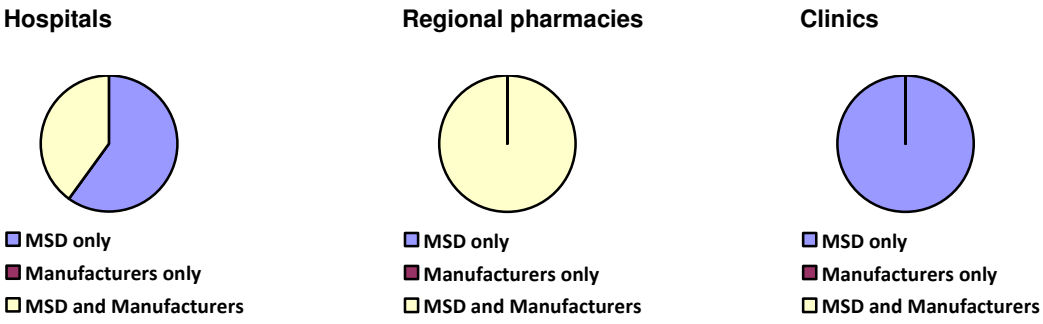


**Figure 6 Sources of ARV stock**

### 4.3.5 *ARV ordering and payment*

A relatively small number of facilities are able to order ARVs via a computer system that is linked to the MSD. Manual orders are sometimes placed by fax or e-mail but smaller facilities often do not have access to this kind of technology and send drivers to physically deliver their order cards to the MSD. Figure 5 illustrates the methods used by different types of facilities to order ARVs.

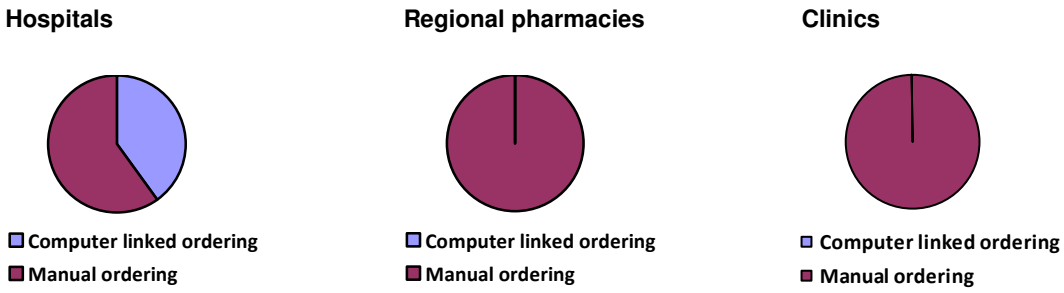



**Figure 7 Methods of ARV ordering**

When a requisition for ARVs is received from a hospital, regional pharmacy or clinic, an internal order is raised by the MSD if they keep the products in stock or an external order is placed directly with the supplier. The facility is required to send proof of delivery to the MSD within a week of receiving the stock. The transaction should be recorded at the MSD within 5 days of receiving proof of delivery from the facility. Because all funds allocated to Gauteng Department of Health remain under the control of the National Department of Health, a transfer of the necessary funds to cover orders received is requested from them via a linked computer system on a weekly basis. The transferred funds should be received within 14 days and this should allow the MSD to pay suppliers within 30 days of receiving their invoices.

Because HIV/AIDS is a priority project, funding allocated to ARVs is tracked separately, but not ring fenced.

Order frequency is determined by each facility based on its own circumstances. All facilities that were interviewed reported that they received ARV deliveries from the MSD within a week of placing their orders. With the exception of one clinic whose delivery

was made to the local hospital and then collected, deliveries were made directly to the facilities.

The frequency with which different facilities order ARVs is illustrated in Figure 6.

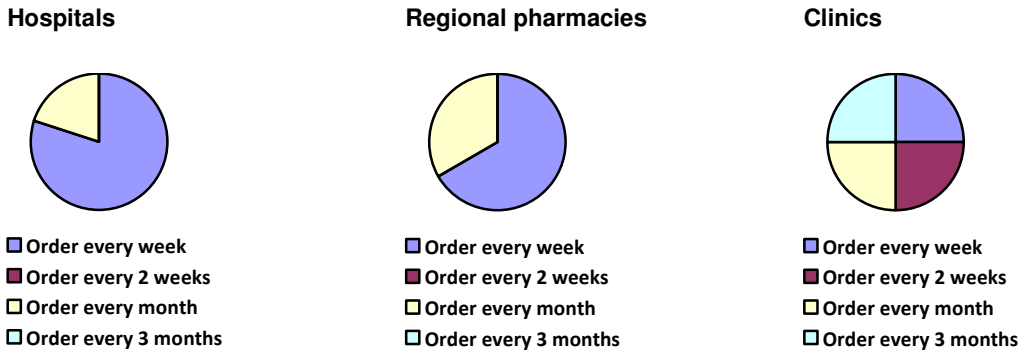



**Figure 8 Frequency of ARV orders**

### 4.3.6 *Stock management*

Stock management at the majority of the clinics and regional pharmacies is done manually while most hospitals make use of computerised systems to manage their stock. The methods used by the different types of institutions to manage their stock are illustrated in Figure 7.

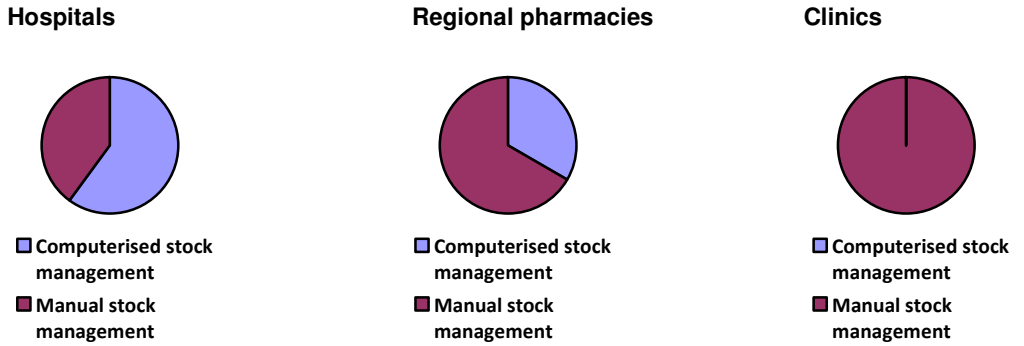



**Figure 9 Methods used for stock management**

### 4.3.7 *Dispensing of ARV medication*

As illustrated in Figure 8, it is most common for ARVs to be dispensed at clinics although some regional pharmacies and ARV pharmacies at a few of the hospitals interviewed also dispensed directly to patients.

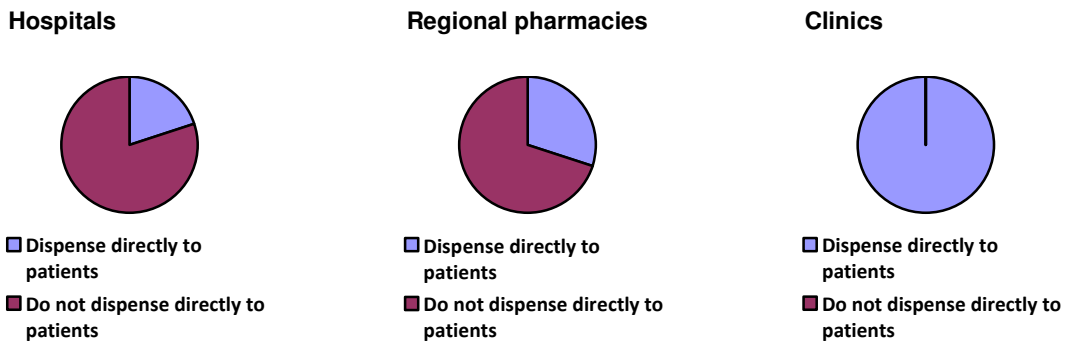



**Figure 10 Dispensing of ARVs by different types of facilities**

Most of the facilities that dispense supply one month's ARVs to patients initially and 2 – 3 month's ARVs once they are stabilised on a regimen. Most facilities that dispense ARVs request patients to bring their unused ARVs with them when they collect their new prescription. A count is done and this information is recorded and used to determine the extent to which patients adhere to their prescribed regimens.

### 4.3.8 *ARV Stock levels*

As illustrated in Figure 9, most facilities keep 3 month's stock of ARVs for all their customers as prescribed by the Gauteng Department of Health's policy. Figure 9 illustrates the stock levels reported by respondents from the various types of facilities.

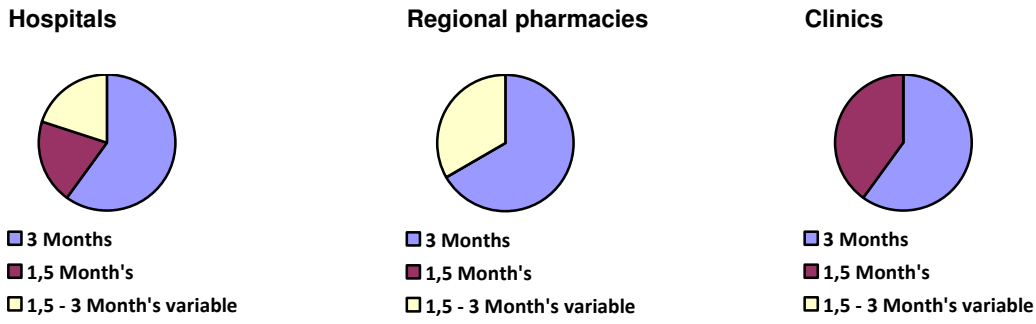



**Figure 11 ARV Stock levels at different types of facilities**

If the stock kept at the MSD and manufacturers is taken into consideration this means that, in practice, the ARV supply chain is typically loaded with between 8 and 12 month's stock.

### 4.3.9 *Supplying ARVs to other facilities*

As can be seen in Figure 10, regional pharmacies play a critical role in supplying ARVs to clinics in their area, although a few of the hospitals and clinics also fulfil this role where it is deemed to be practical by the Gauteng Department of Health.

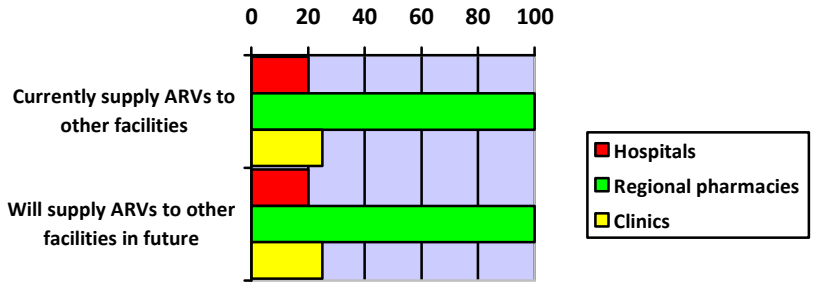



**Figure 12 Supplying ARVs to clinics in their region**

### 4.3.10 *Changes in the ARV supply chain*

Two significant changes were taking place during the period in which the research was conducted. First, the Gauteng Department of Health were implementing changes in its ARV treatment regimens. A target date was announced for the implementation of the new regimens, but because it took longer for the supplier to get their production to the required level, most facilities experienced a shortage of stock of some items and could not implement the new regimen by the published date. Second, the number of public health facilities through which patients can access ARV therapy will be expanded from 496 to 4 333 based on a new policy that was announced in April 2010 by the Minister of Health (Motsoaledi 2010). The change in policy has significant consequences at operational level because of issues such as storage space and equipment, availability of trained personnel, ordering and distribution, etc. The Department was doing its best to implement the necessary changes but since the changes were not budgeted for it will be phased in over time.

### 4.3.11 *Current challenges*

*Lack of availability of drugs that were included in the new regimens* was cited as a challenge by some respondents in each type of facility. *Lack of storage space* was also cited by the majority of the respondents from all four types of facilities. The implementation of the new policy of having ARVs available at all facilities is making this an even bigger challenge. Another challenge that was identified at all hospitals, regional pharmacies and clinics was the *shortage of staff*. The common theme in all three these issues is the fact that policies and programmes are stretching the physical capacity of the available resources beyond its limits while no additional resources are provided in support. This is a strong indication that policy makers are not taking the physical limitations that exist in the supply chain and the operational impact of policy changes into consideration when formulating and announcing policies.

All respondents from MSD, hospitals and regional pharmacies said that they experienced periodic problems with *availability of stock from manufacturers*. At the same time, *difficulty in forecasting demand* and the *absence of an integrated information system* was also cited as challenges by some respondents from MSD, hospitals and regional pharmacies. Without an integrated information system it would be difficult to obtain accurate information on actual consumption of ARVs and the number of patients that are receiving treatment. Without this information, reasonably accurate forecasting of demand was practically impossible and the Gauteng Department of Health was unable to provide manufacturers with accurate figures on which they could base their production planning. Under such conditions, shortages occurred from time to time and the reason for loading the ARV pipeline with 8 – 12 month's stock, as mentioned earlier, becomes obvious. Another down side to not having an integrated system across the supply chain is that manual ordering and stock management is very labour intensive and prone to mistakes. The same is also true when orders have to be captured manually on the MSD's current system. This contributes to the current staff shortages.

Respondents from some hospitals and regional pharmacies cited *budget constraints and cash-flow problems* as challenges. This perception was based on incidents where suppliers restricted the supply of ARVs due to delayed payment. It was acknowledged by the MSD that such incidents do occur from time to time as a result of delays caused

by lost paperwork and suppliers who are not registered on the national system. Delays in payments can also be caused when institutions exceed their overall budgets due to poor financial management or overspending in an attempt to deliver an essential service with limited resources. In such instances, Treasury can make additional funds available for ARVs but this takes time and causes other problems.

As illustrated in Figure 11, all other challenges appear to be unique to each different type of facility.

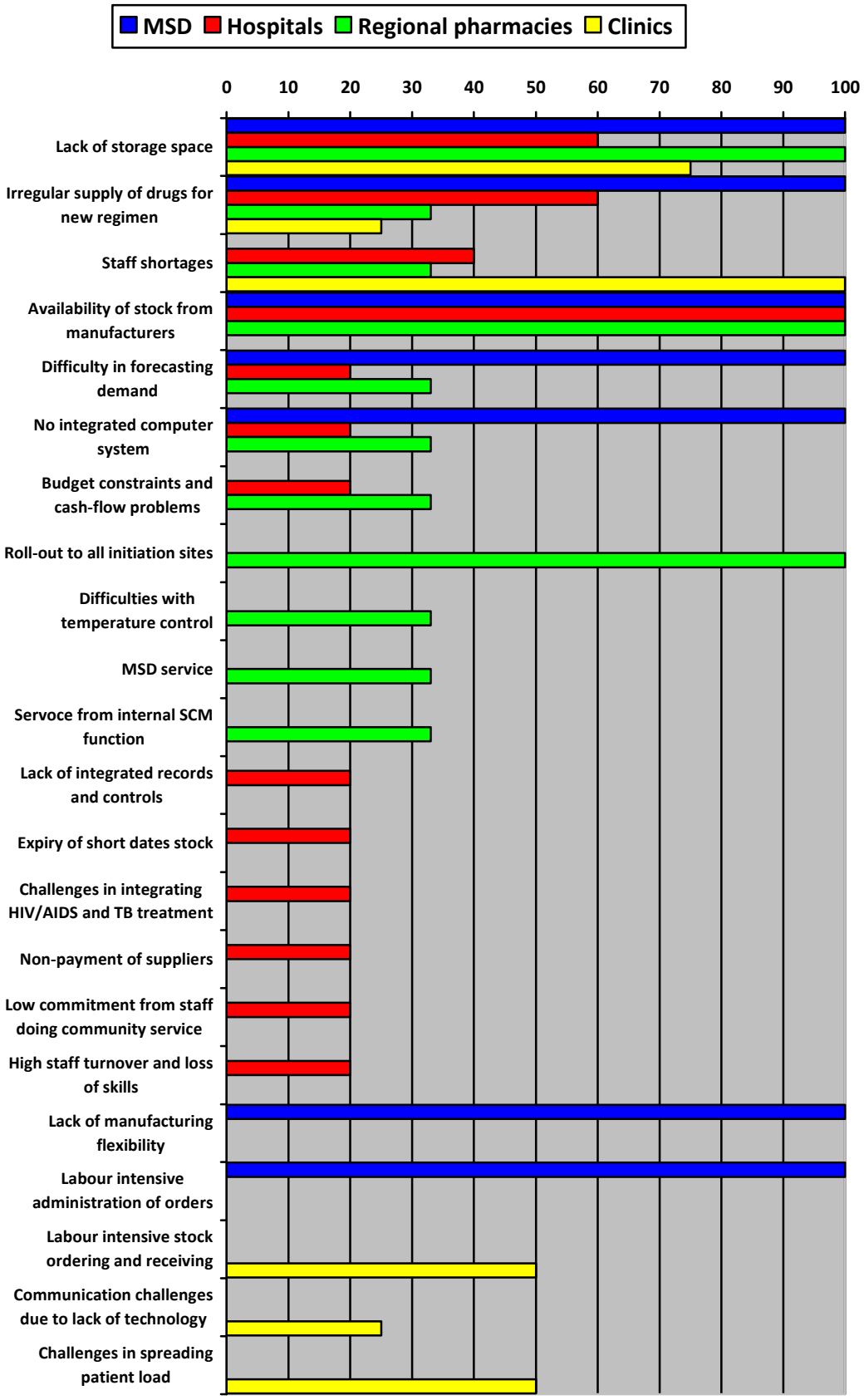



**Figure 13 Challenges in the ARV supply chain**

### 4.3.12 *Respondents' knowledge of SCM*

All the respondents interviewed as part of this study played important roles in the ARV supply chain.

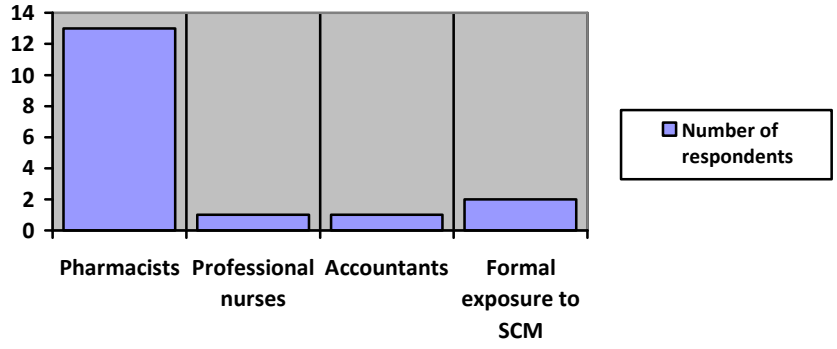



**Figure 14 Qualifications of respondents**

As can be seen in Figure 12, thirteen respondents were qualified pharmacists, one was a professional nurse and one was an accountant. Drug supply management was covered in a superficial way in pharmacists' qualification and only two of the respondents had some form of post graduate exposure to SCM.

Respondents' understanding of the scope of SCM was related to the key supply chain activities that were discussed in Section 2.3.3 of the literature review and the outcome is summarised in Figure 13.

In describing the scope of SCM, the MSD mentioned forecasting of demand, tendering and procurement, processing of orders, warehousing, stock management, and payment of suppliers – all their own core activities. However, activities that were performed by manufacturers on the one side of the supply chain and hospitals, regional pharmacies and clinics on the other side, were not mentioned at all. This indicates that SCM is viewed in relative isolation at this level.

Respondents from hospitals also included most of the elements in the supply chain that are central to their own contribution. Most respondents were also familiar with tendering and procurement as a key process of SCM. However, the fact that the other core SCM activities were either omitted or only mentioned by one or two respondents indicates that there is a limited understanding of the scope of SCM at this level.

Similarly, respondents from regional pharmacies also included most elements of SCM that are central to their own contribution although the fact that none of the respondents mentioned activities such as ordering and receiving of stock was quite surprising. Drug selection, forecasting of demand, tendering and procurement, invoicing and payment of suppliers was mentioned, but not by a sufficient number of respondents to indicate that there is a wider awareness of other participants and activities in the supply chain.

Once again, respondents from clinics also included most elements of SCM that are central to their own contribution while other SCM activities were either omitted or mentioned by only one respondent.

Based on the above, there is a clear pattern of limited understanding of the scope of SCM and viewing SCM activities in relative isolation.

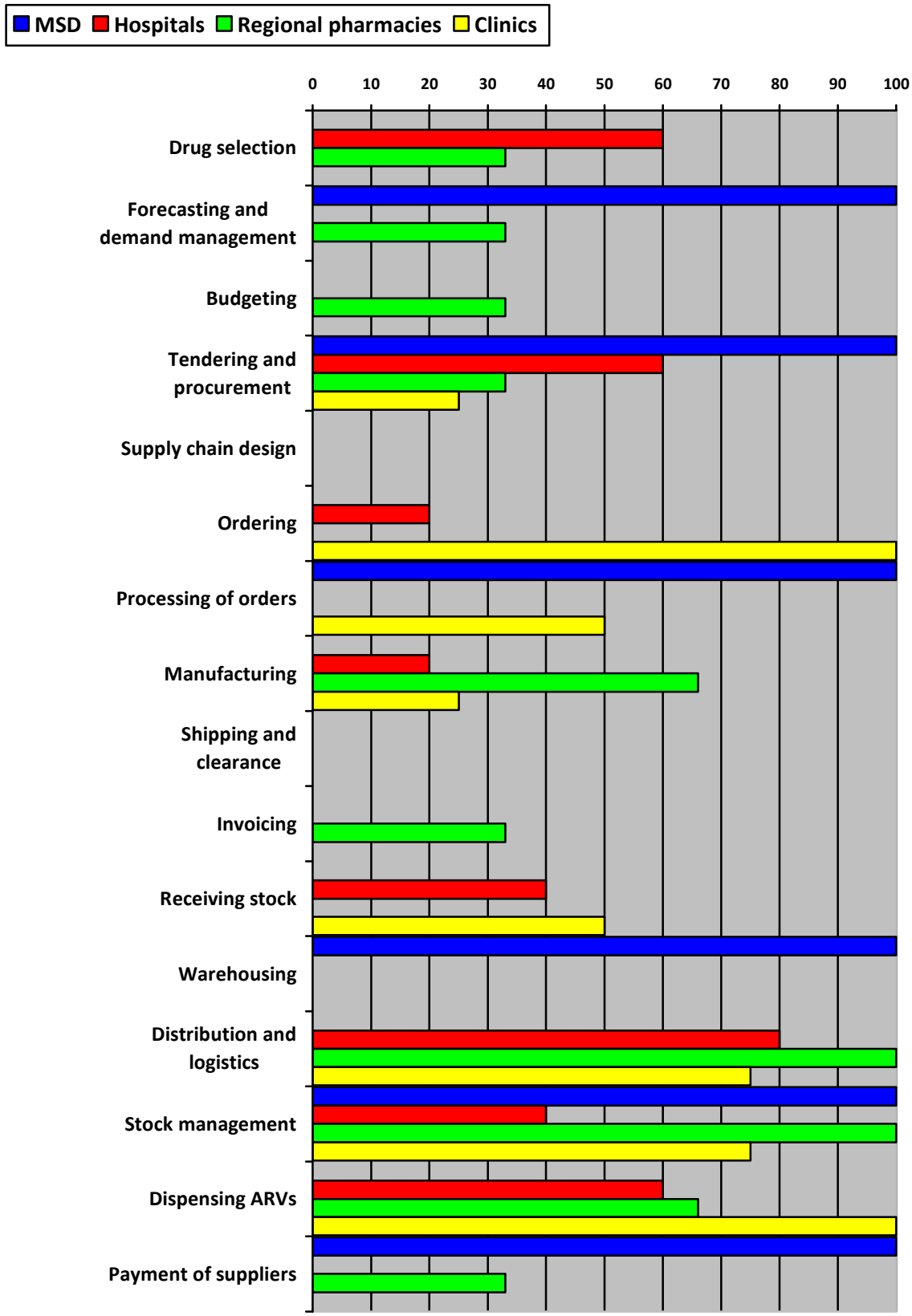



**Figure 15 Scope of supply chain management**

### 4.3.13 *Goals and potential benefits of effective SCM*

Figure 14 illustrates the goals and potential benefits of effective supply chain management that were mentioned by respondents from each type of facility. Respondents from all the different types of facilities agreed that the most important goal and potential benefit of effective SCM was to ensure uninterrupted availability of drugs. Another benefit of effective SCM that was identified by the majority of respondents from the MSD, hospitals and clinics was improved cost effectiveness that would, in part, come from improved stock management. However, there was no indication that they understood that a prerequisite of this was collaboration and coordination of all activities up and down the supply chain as stated in Section 2.3.6 of the literature review.

When further comparing respondent's responses with the goals and potential benefits that were identified in Section 2.3.5 and 2.3.6 of the literature review it becomes clear that none of them realised that effective supply chain management could lead to improved resource utilization, reduce the overall cost of supplying drugs to patients, improve the value offered to customers through integration across the supply chain, increase internal and external customer satisfaction, improve synchronization of supply and demand at all levels, lead to greater innovation, reduce lead times, shorten order cycle time and lead to greater input, process and output flexibility.

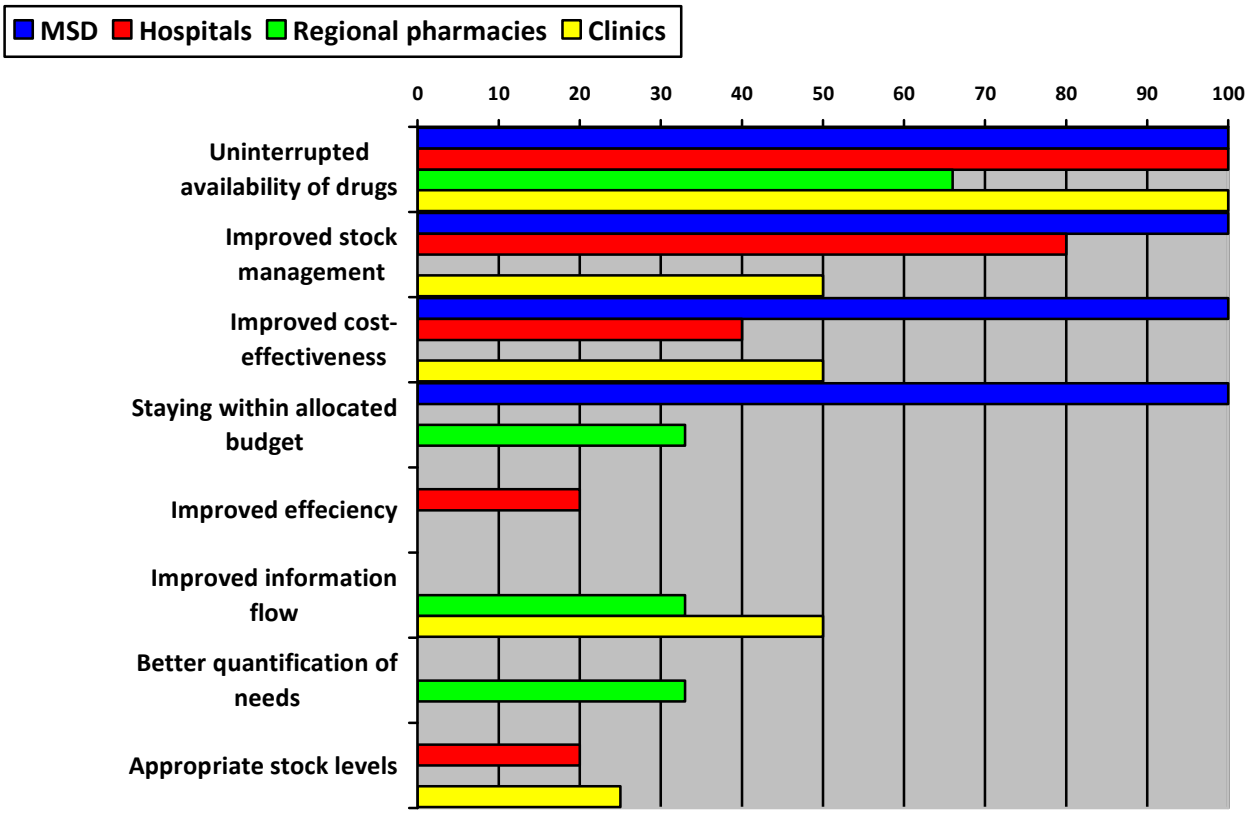



**Figure 16 Goals and potential benefits of SCM as identified by participants**

## 4.4 Impact of the public sector SCM framework on the Gauteng Department of Health's SCM practices

In Section 2.6, a number of weaknesses were identified in the public sector SCM framework. This section examines the extent to which these weaknesses are reflected in the Gauteng Department of Health's SCM practices.

### 4.4.1 *Customer relationship management*

Lambert's SCM framework specifies customer relationship management as one of the key processes of SCM. Three of the key activities that were identified as part of this process are relevant to the public sector: (a) identifying key customers and customer groups to be targeted as part of the organization's mission, (b) collaborating with key customers to improve the process and (c) collaborating with key customers to eliminate demand variability and non-value adding activities. In contrast, the public sector SCM

framework pays no attention to customer relationship management and this weakness is mirrored to a large degree in the Gauteng Department of Health's SCM practices. It was encouraging to find that the Department of Health clearly identified HIV / AIDS patients as key customers to be targeted. On the down side, respondents from the MSD, hospitals, regional pharmacies and clinics consistently indicated that there was no collaboration with key customers (internal or external) to improve the process through which ARVs are delivered to patients. Furthermore, only 40% of respondents from hospitals indicated that they made some attempt to collaborate with key customers to eliminate demand variability and non-value adding processes while the MSD, hospitals and clinics never engage with their customers for this purpose.

### 4.4.2 *Customer service management*

Lambert's SCM framework describes customer service management as providing customers with real-time information on promised shipping dates and product availability through interfaces with manufacturing and logistics. Again, the public sector SCM framework made no mention of this important process and this was clearly reflected in the Gauteng Department of Health's SCM practices. Despite this, the MSD indicated that they started disseminating information of this nature since early in 2010 at monthly meetings with hospitals, regional pharmacies and clinics to whom they directly supply ARVs. However, only 66% of respondents from regional pharmacies and 40% of respondents from hospitals acknowledged receiving such information while only 40% of hospitals and 33% of regional pharmacies claimed that they passed this information on to other facilities or patients to whom they supply ARVs. On the whole, all respondents were in agreement that no real-time information on promised shipping dates and product availability is available to internal or external customers.

### 4.4.3 *Demand management*

Although both frameworks include the process of demand management, it is defined very differently. In the public sector SCM framework, the concept is defined very narrowly from a purchasing perspective and ignores aspects such as demand forecasting, synchronisation of supply and demand, supply flexibility, eliminating all

practices that increase demand variability and coordinating marketing requirements and production plans that were suggested in Lambert's SCM framework. Although there were indications that respondents at some of the facilities were intuitively paying attention to some of these elements, the omissions were still clearly reflected in the SCM practices of the Gauteng Department of Health.

80% of respondents from hospitals, 66% of respondents from regional pharmacies as well as respondents from the MSD said that they supply stats to the Central Office for planning purposes. Despite this, input received from one of the largest manufacturers of ARVs indicated that there were often very substantial differences between initial forecasts that are made by the Department of Health and actual orders that were placed. This brings the methods used in forecasting into question. At facility level, no attempt was made to forecast demand over the longer term. Figure 15 shows the various methods used at different types of facilities to estimate ARV demand for ordering purposes. The MSD relies exclusively on re-order levels and it is also the most preferred method of regional pharmacies. Respondents from most clinics tended to rely on their own statistics and the application of common sense to estimate future demand for ARVs while respondents from hospitals used re-order levels, their own statistics and the application of common sense or, in some cases, a combination of the two methods.

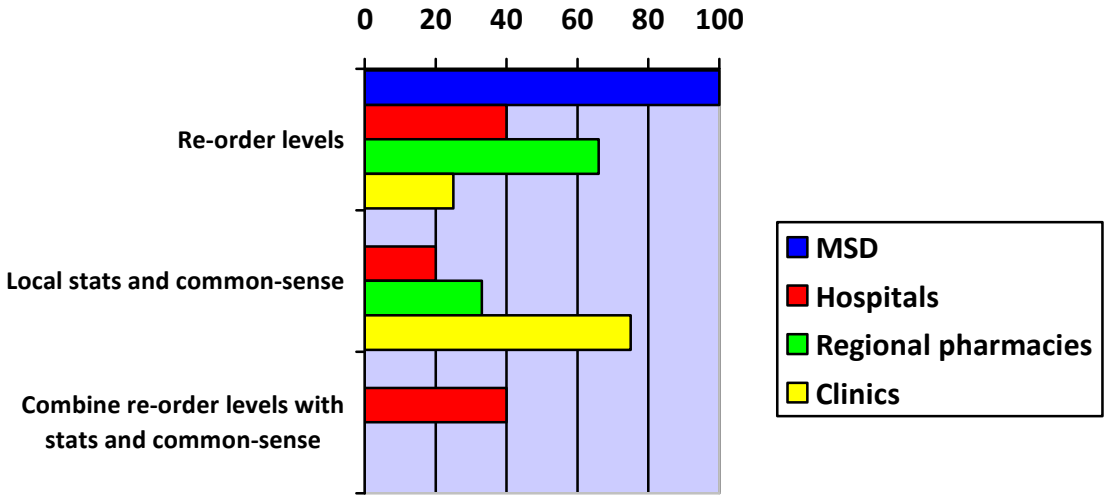



**Figure 17 Methods of estimating demand**

The MSD plays a key role in terms of synchronising supply and demand of ARVs. In particular, two of the practices that they employ have a positive impact: First, they regularly provide updated demand figures to suppliers. Second, they routinely screen

orders received from hospitals and regional pharmacies and query seemingly incorrect order quantities. This reduces the over- or under supply of ARVs to facilities based on incorrect demand figures. Differences between supply and demand at provincial level also tend to be smoothed somewhat at national level. Some helpful practices that can assist in synchronising supply and demand were also reported by a few respondents from hospitals. One respondent said that she built up additional ARV stock over the preceding months so that two month's supply can be issued to patients who go on holiday over November / December. Another respondent said that she kept four months of stock on ARVs that are more difficult to obtain and six weeks of stock of other items. These examples illustrate that constructive practices can originate at facility level, but unfortunately this was the exception rather than the rule as no such practices were reported by respondents from regional pharmacies and clinics. The norm at clinics, regional pharmacies and hospitals was to rely on flexible ordering to adjust supply in line with demand and to ensure that they never ran into trouble, a high volume of safety stock was kept by all these facilities.

Flexibility in ARV supply is enhanced by borrowing and lending stock between facilities. This practice was reported by all hospitals and clinics but not by any of the regional pharmacies. In cases where facilities are seriously over stocked or have a serious shortage, regional pharmacies and the MSD can become involved to facilitate the borrowing / lending process. If ARVs are not available from the supplier on tender, buy-outs from other suppliers are also possible. This is typically only used as a last resort because it is usually more complicated and costly.

As illustrated in Figure 16, a high percentage of respondents from all the various types of facilities indicated that they could not think of anything that could be done to control practices that increase demand variability. All respondents from clinics said that they used an appointment booking system but that patients did not cooperate very well. Prescriber preference was identified as one of the practices that increase demand variability and the implementation of treatment guidelines and regimens was a good strategy to limit this. One respondent from a hospital and another from a regional pharmacy said that they discuss these kinds of issues at the quarterly Pharmaceutical and Therapeutics Committee meetings. This shows that there may be ways of dealing with this issue but that it was not viewed as a high priority.

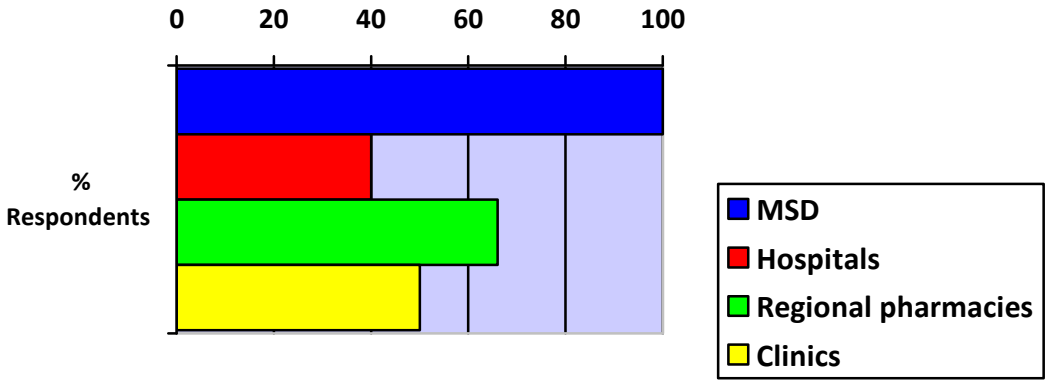



**Figure 18 % of Respondents who did not think anything could be done to control practices that increase demand variability**

In the Department of Health, marketing is done in the form of national and provincial campaigns that are initiated and coordinated at each province's Head Office. A respondent from a major ARV manufacturing company confirmed that the Department of Health informed them of proposed campaigns which allowed them to update their production plans accordingly. Campaigns are usually implemented at the primary level and 75% of respondents from clinics indicated that increases in demand are typically experienced as a result. Additional stock is delivered to clinics based on demand estimates that are made by the Head Office. However, 75% of respondents from clinics indicated that there was often a misalignment between the impact of campaigns and drugs being pushed into the system to address the expected increase in demand. As one respondent put it, "we usually have to engage in some form of crisis management or damage control to make campaigns work as well as possible". Even though the Department of Health is making a good effort to ensure that production plans are coordinated with campaigns, the challenge that they have with coming up with reasonably accurate demand estimates limits their success in this area.

### 4.4.4 *Order fulfilment*

The process of order fulfilment in Lambert's SCM framework includes defining customer requirements; designing a distribution network that enables the organization to meet customer requirements while minimising total cost; developing a seamless system that allows the flow of orders, products, invoices and payments between all the links in the

supply chain; and physically fulfilling orders. Only the element of defining customer requirements is covered in the public sector SCM framework. Once again, this is precisely mirrored in the Gauteng Department of Health's SCM practices.

In the case of ARV distribution, customer requirements are balanced against available finances and first and second line treatments are prescribed in the form of regimens. This not only simplifies treatment, but is also the most cost effective way of providing ARV therapy in line with customer requirements.

When it comes to designing the distribution network, the Central Office will investigate and come up with the most viable alternative based on the prevailing circumstances and resources of facilities. Each facility is then informed of the role they need to play and expected to design / update their part of the distribution network accordingly. All respondents agreed that each facility designed their part of the distribution system in isolation. Only one respondent from a hospital said that they requested their customers' input when designing or changing the part of the distribution system for which she was responsible. Another respondent, also from a hospital, said that it was possible to motivate for improvements that spanned several functions and/or links in the supply chain by coordinating with the Central Office. These two examples illustrate that it would be possible to collaborate in the design of the distribution system to a greater degree but that it has never been done in the past, possibly because this expectation was not encapsulated in the public sector SCM framework.

All respondents agreed that there is a system in place to facilitate the flow of orders, products, invoices and payments between all the links in the supply chain but that instead of being seamless, it was fragmented, labour intensive and often broke down due to challenges with technology and human error.

### 4.4.5 *Supplier relationship management*

In the private sector, developing close relationships with a small number of suppliers based on the value that these suppliers bring to the organization was identified as a best practice in supply chain management. The public sector SCM framework indicates that the acquisition of goods and services should be aligned to Government's preferential

procurement policy objectives, but provides no further guidelines in relation to supplier relationship management.

All respondents from hospitals, regional pharmacies and clinics agreed that because suppliers were selected based on tender, they had little opportunity to develop relationships with them. The MSD was responsible for developing relationships with suppliers and respondents agreed that, in practice, relationship building was only encouraged during the tender period. All respondents from hospitals and regional pharmacies and 25% of respondents from clinics felt that the tender process hampered long-term relationship building with suppliers. One respondent put it this way: "Government works on tenders and will switch suppliers if they think it is to their advantage in terms of price. They don't appear to consider long term benefits of committing to quality suppliers that deliver reliable service." While participants from the MSD agreed with this in principle, they were of the opinion that it was not a problem because the potential volume of the business that suppliers could receive from tenders ensured that they remained interested in doing business with government even if little effort is made to build long term relationships. Respondents from the MSD acknowledged that Government's preferential procurement policy objectives had a significant influence on their procurement practices. While the policy objectives may be worthwhile on the one hand, it becomes a concern when 66% of respondents from regional pharmacies, 40% of respondents from hospitals and 25% of respondents from clinics point out that tenders are re-awarded to suppliers even when they performed poorly in the past.

### 4.4.6 *Returns management*

Returns management is described in Lambert's SCM framework as managing the activities associated with returns, reverse logistics, and return avoidance across the links of the supply chain as well as changing promotional programs that load the pipeline unnecessarily. This is an important element of SCM because when ARVs are returned up the supply chain or the pipeline is loaded with unnecessary stock, it requires extra effort and additional cost is incurred without providing any additional benefit to patients. Despite its importance, the public sector SCM framework ignores returns management.

As can be seen in Figure 17, all respondents from hospitals and some respondents from regional pharmacies and clinics reported that the standard operating procedures that were implemented by the MSD has a positive impact on returns management.

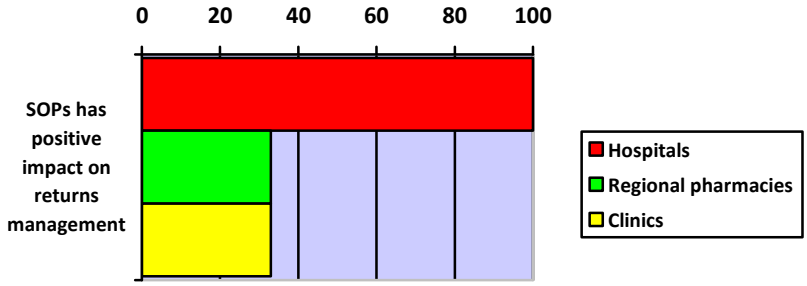



**Figure 19 Impact of SOPs on returns management**

A practice that was identified by 66% of respondents from regional pharmacies and 40% of respondents from hospitals as having the potential to activate the reverse logistics process is the release of short-dated stock to facilities by the MSD with the understanding that it can be returned if unused by the expiry date. But not everyone was aware of the negative implications of reverse logistics. One respondent from a clinic said that she thought it was a good idea to accept short-dated stock because it can be returned if unused by the expiry date. Respondents from the MSD said that they were aware of the risk and only released short-dated stock in cases where there were shortages and items were fast-moving.

As illustrated in Figure 18, all respondents from clinics reported that managing their ARV stock carefully by adhering to reorder levels and using first-in-first out (FIFO) / first-expiry-first-out (FEFO) systems was a good practice that helped them reduce returns. Unfortunately a much smaller percentage of regional pharmacies and hospitals cited these practices as having a positive impact.

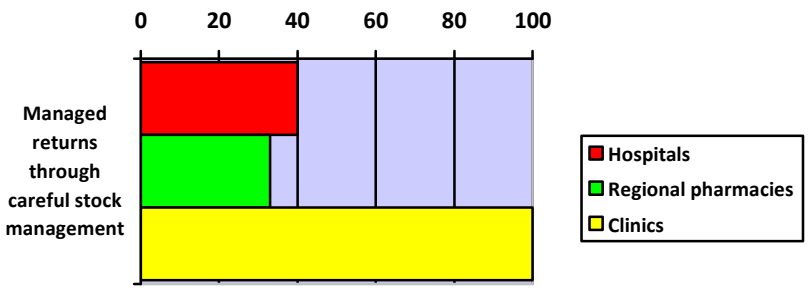


**Figure 20 Returns management through stock management**

33% of regional pharmacies and 25% of clinics said that they tried to distribute ARV stock that is close to expiry to other facilities in their region. This practice, although only reported by a relatively small number of respondents has a positive effect in that it promotes the use of stock that would otherwise have expired, but at the same time it has cost implications that have not been quantified sufficiently to judge whether activating the required logistics is worthwhile.

### 4.4.7 *Integration across the supply chain*

One of the key goals of SCM, as described in Section 2.3.5 is to provide superior value to customers by integrating all aspects of the supply chain's resources with the aim of delivering superior value to the customer. This concept is illustrated clearly in Lambert's SCM framework. In contrast, the main focus of supply chain management, as described in the public sector SCM framework, is on procurement (i.e. understanding the internal customer's needs and then finding the most cost-effective product or service to meet those needs) and logistics (i.e. getting the product or service to the internal customer). Suppliers and end users / external customers are not included in the supply chain but rather treated as parties on either side of the supply chain whose role is to successfully link them. This view conflicts with the definition of SCM in Section 2.3.2 which specifically includes manufacturers on the one end and final users on the other end. It also severely limits the extent to which the key principles of SCM as described in Section 2.3.4 can be implemented.

The majority of respondents from clinics, regional pharmacies, hospitals and the MSD correctly identified suppliers as part of the supply chain while only a single respondent identified patients as an important part of the supply chain. While the limitations in the public sector SCM framework are therefore only partially reflected in the Department of Health's SCM practices, the absolute lack of integration and collaboration across the links in the supply chain and in many instances even across functions within facilities is a very serious concern.

### 4.4.8 *Conclusion*

The data gathered from respondents indicates that weaknesses that were identified in the public sector SCM framework are mirrored almost exactly in the Department of Health's SCM practices. It is clear from this finding that the public sector SCM framework has a significant impact on SCM practices.

## 4.5 Impact of the Gauteng Department of Health's SCM practices on the implementation of the ARV treatment programme

In this section, the impact of the Gauteng Department of Health's SCM practices on the implementation of South Africa's ARV treatment programme will come under the spotlight.

### 4.5.1 *Policy*

Policy making is critical to successful SCM because processes are developed to facilitate the successful implementation of policy. The recent policy changes on the availability of ARVs at all facilities indicates that policies are made without due consideration for practical constraints and conditions in the field. This is illustrated by respondent concerns about practical and quantifiable issues such as lack of storage space and transport challenges. While the intention behind the policy is clearly to make access to ARVs easier for patients, the fact that no additional resources were budgeted for or provided brings into question whether policy makers understood the serious practical implications that their policy changes would have. On the one hand, patients' expectations are raised while on the other hand field personnel are set up for failure because the envisaged outcomes cannot be realistically achieved within the time frames and resource constraints that exist. Any improvements that come about as a result of the policy changes will rely heavily on improvisation by field personnel and will therefore not be as widespread as desired. Without the sensible allocation of additional resources, improvements are also not likely to be sustainable.

### 4.5.2 *Lack of collaboration and integration*

As described in Section 2.3.6, collaboration and integration up and down the supply chain is associated with benefits such as synchronizing supply and demand at all levels; replacing stocks with flows; reducing costs and increasing customer satisfaction. However, due to the complete lack of integration and collaboration across the supply chain, processes through which ARVs are delivered are so unreliable that facilities have to keep very high levels of stock to ensure continuous availability of drugs. This increases the overall cost of providing ARVs to patients and because funds are limited, fewer people will ultimately have access to the life-saving drugs. Designing the various stages in the supply chain in isolation, as is currently the practice, promotes inefficiencies that further increases the total cost of providing ARVs to patients.

### 4.5.3 *Lack of technology*

A low level of use of basic technology such as fax machines and computers was found at primary and secondary government health facilities in Gauteng. As a result, many facilities are currently physically delivering their ARV orders to the MSD. This inefficient practice is both costly and time consuming.

Another factor that contributes to inefficiency and higher costs is the fact that there is no integrated computer system in place to facilitate order placement and tracking. Recapturing orders at the MSD promotes human error and is very labour intensive. Manual stock management at facilities is also time consuming and often inaccurate.

### 4.5.4 *Forecasting*

The absence of an integrated computer system also makes access to HIV / AIDS patient numbers and ARV ordering information a big challenge and this makes forecasting at an aggregate level practically impossible. Because statistics are manually captured and reported, the data is often not timely and accurate and under these circumstances the use of scientific methods for demand forecasting would not add any value. When demand estimates are very inaccurate during the tendering phase, suppliers who are appointed are often unable to consistently meet the actual demand for ARVs later. To

compensate for this, facilities are encouraged to keep very high stock levels which ties up large amounts of capital, greatly increases the risk of expired stock and makes stock management much more difficult and time consuming. These factors further increase the overall cost of providing ARVs to patients.

### 4.5.5 *Staff utilization*

Since ARVs are delivered to patients through the supply chain, it is not surprising that a substantial number of operational activities within the Department of Health revolve around supply chain management. The tendency in most organizations is to utilise their current staff to perform the required activities and many pharmacists and professional nurses are currently spending a significant amount of their time on SCM activities. This practice impacts negatively on the implementation of the ARV treatment programme in a number of ways: First, as noted in Section 4.3.12, the formal training that pharmacists and professional nurses received did not prepare them adequately to perform these kinds of activities and the supply chain is therefore not as efficient and cost-effective as it should be. Second, tying up pharmacists and professional nurses in SCM activities leaves them with less time to do what they were trained to do – dealing with patients. This adversely affects the service that patients receive in terms of rushed consultations and longer waiting times. Third, it contributes significantly to the perceived shortage of skilled staff in these categories because expecting pharmacists and professional nurses to spend a significant amount of their time on what they see as cumbersome administrative duties frustrates them and promotes high staff turnover. It also makes it harder to find interested applicants to replace them.

### 4.5.6 *Service delivery*

When the flow of ARVs through the supply chain is constricted, facilities typically issue less medication to patients. While this approach helps to ensure continuous availability of drugs, it still has a negative impact on HIV / AIDS patients in terms of additional travelling costs and taking additional time off work to collect their medication. The fact that very little is done to communicate with patients, as mentioned in Section 4.4.2, further exasperates this problem.

### 4.5.7 *Conclusion*

Within the Department of Health, SCM practices such as making policies in isolation, lack of integration and collaboration across the supply chain, limited use of technology, inaccurate forecasting of ARV demand, inefficient staff utilization and lack of customer service management have a significant negative impact on the implementation of the ARV treatment programme.

## 4.6 Summary of the results

The results of this study answers both research questions in the affirmative. First, it showed that the weaknesses that were identified in the current public sector SCM framework were mirrored closely in the Gauteng Department of Health's SCM practices. This confirms that there is a link between the public sector SCM framework and SCM practices in the Department. Second, the results showed that the weaknesses that were identified in the Gauteng Department of Health's SCM practices had a considerable negative impact on the implementation of government's ARV treatment programme.

# CHAPTER 5

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

In this chapter, the researcher's conclusions and recommendations are presented and topics that would warrant further research are suggested.

## 5.2 Conclusions of the study

The purpose of this study was to examine the impact of the public sector supply chain management framework on the SCM practices in the Department of Health and to see if their SCM practices had an effect on the implementation of government's antiretroviral treatment programme.

The results showed that the weaknesses that were identified in the public sector SCM framework were largely mirrored in the SCM practices of the Gauteng Department of Health. It was also shown that SCM practices such as making policies in isolation; lack of integration and collaboration across the supply chain; limited use of technology; inaccurate forecasting of ARV demand; inefficient staff utilization; and lack of customer service management had a significant negative impact on the implementation of the ARV treatment programme.

Supply chain management is a key element in getting ARVs to patients and the efficiency of the supply chain has an important impact on the overall cost of providing ARV treatment to patients and the level of service delivery that they experience as customers. The results of this study show that there is a great opportunity for the Gauteng Department of Health to drive down the total cost of providing ARV treatment to patients and to improve service delivery by implementing the principles of modern supply chain management.

The fact that the weaknesses that were found in the public sector SCM framework was mirrored closely in the Gauteng Department of Health's SCM practices suggests that addressing the weaknesses in the framework would have a positive impact on their SCM practices. Because the public sector SCM framework also governs SCM in all other government departments, the benefits of updating the framework to include all the principles of modern SCM would in all likelihood spill over into other departments as well.

## 5.3 Recommendations

In this study, the supply chain through which ARVs are delivered to patients came under the spotlight and some of the recommendations that are made here will therefore have specific relevance in this context. However, as explained in Section 3.2, the main reason behind focussing on ARVs was to make the findings regarding the impact of the public sector SCM framework more concrete. Because all other medication is delivered through the same supply chain as ARVs, the recommendations offered here therefore apply to the entire supply chain through medicines are delivered to patients unless specifically stated otherwise.

### 5.3.1 *Review and update public sector SCM framework*

The fact that the weaknesses that were identified in the public sector SCM framework were mirrored almost precisely in the Gauteng Department of Health's SCM practices shows that there is a definite link between the two. In addition, the same framework governs SCM in all public sector organizations which means that its impact could extend well beyond the scope of this research. In this context, it is strongly recommended that the public sector SCM framework be urgently reviewed and updated to reflect all the applicable goals and principles of modern SCM theory and practice.

### 5.3.2 *Take operational limitations into account in policy making*

Policies are meant to guide the decisions and actions of practitioners in the field so that the outcomes envisaged by policy makers can be achieved. The latest policy changes show that policy makers understand the needs and concerns of HIV / AIDS patients and

are committed to ensuring that they receive the best possible service. However, for policies to be implemented successfully, the necessary physical resources need to be available at operational level. If there is misalignment between the policy and the resources required for the implementation of the policy, everyone is set up for failure. Such a misalignment was identified with regards to the latest policy changes in the Department of Health. It is recommended that in future, operational conditions and practical limitations in the supply chain are investigated first and taken into consideration when formulating policies. Sufficient time should also be allowed for the necessary changes to be implemented before the policy is announced publically and peoples' expectations are raised.

### 5.3.3 *Take note of supply chain costs*

The indirect costs involved in getting ARVs from the manufacturers to the end users via a supply chain can add significantly to the total cost of service delivery. The fact that these costs were not accounted for in Table 2 suggests that its significance may not be fully appreciated by the Department of Health. This has two important consequences: First, there would always be a shortfall because these costs were not taken into consideration during the budgeting process. Second, lack of awareness of the indirect costs means that those costs will not be managed effectively and will therefore contribute to the higher overall cost of supplying ARVs to patients. It is therefore recommended that all costs related to the supply chain be identified and purposefully managed in future.

### 5.3.4 *Commit to turning stocks into flows*

Best practice in modern SCM is to promote the reliable *flow* of stock so that stock levels can be reduced. Given the volume of stock that is currently in the pipeline, this approach can have considerable benefit, but can only be achieved through integration and collaboration across the entire supply chain. It is recommended that the Department of Health makes a strong commitment to this goal and contract a project manager who is fully conversant with the elements and principles of modern SCM to assist with the scoping, design and implementation of a strategy to achieve this.

### 5.3.5 *Utilise technology*

This research uncovered a number of areas such as stock management and the placement and processing of orders in which resources like manpower and transport are wasted because telephones, faxes and the internet are not available and utilised appropriately at facilities. It is recommended that the Department of Health identify facilities at which the use of these technologies would lead to worthwhile savings and invest the required capital to unlock those savings.

In addition it is recommended that an integrated information system that links all the participants in the supply chain be implemented as soon as possible. If implemented successfully across the entire supply chain, such a system would greatly improve forecasting, budgeting, decision making, information flow, accountability, staff productivity, cost effectiveness and ultimately service delivery. Such a system is referred to in the current public sector SCM model and was piloted on a small scale with limited success. This raises the question of whether developing and rolling out an integrated information system internally would not be too risky since it would require a substantial investment in technology and software. An alternative may be to collaborate with a private company that already has proven technology, software and the required expertise. Either way, forecasting should be done in a more scientific manner and this will only be possible if a robust integrated information system is in place.

### 5.3.6 *Ring-fence the ARV budget*

Currently, ARV budgets are included in facility budgets where it can be depleted if not managed properly. This scenario has in fact played out in a number of instances. As priority project, it is recommended that funds allocated for ARVs be ring fenced and managed at a national level. This will ensure that the allocated money is spent on its intended purpose and avoid the situation where ARV suppliers cut supply due to non-payment.

### 5.3.7 *Utilise staff in their areas of expertise*

There is a serious shortage of qualified pharmacists and professional nurses on a national basis. Yet, these are the very people that are utilised in managing the supply chain. It is therefore recommended that supply chain activities be restructured in such a way that all supply chain activities that do not specifically require pharmaceutical knowledge become the responsibility of staff with a supply chain background. This would relieve the shortage of professional staff while simultaneously improving the performance of the supply chain.

## 5.4 Suggestions for further research

It is often said that good research tends to create more questions than it answers and in this context, the following questions would merit, in the researcher's opinion further research:

- Are the weaknesses that were found in the Gauteng Department of Health's SCM practices also present in other provinces?
- Are the weaknesses in the public sector SCM framework also mirrored in the SCM practices of other departments? Does this impact on their service delivery?
- What would be the most effective approach to developing the required information technology to support SCM in Department of Health?

# CONSISTENCY MATRIX

**Table 4 Consistency matrix**

| **To examine the impact of the public sector SCM framework on the Department of Health's SCM practices and the implementation of South Africa's antiretroviral (ARV) treatment programme.** | | | | | |
|---|---|---|---|---|---|
| **Sub-problem** | **Literature Review** | **Research questions** | **Source of data** | **Type of data** | **Analysis** |
| **To examine the impact of the public sector SCM framework on the Department of Health's SCM practices and the implementation of South Africa's antiretroviral (ARV) treatment programme.** | (Ahlstedt and Hameri 2004)<br>(Beier 1995)<br>(Burns 2001)<br>(Chan 2003)<br>(Lambert 2004)<br>(Li et al. 2005)<br>(Nelson et al. 2001)<br>(Russell 2007)<br>(Stock 2009)<br>(Stock and Boyer 2009)<br>(Tracey et al. 2004)<br>(Zaklad et al. 2004) | To what extent do the weaknesses in the public sector SCM framework translate into weak SCM practices within the Department of Health? | Interviews using questions in Section A, B and "Is this currently done? How?" in Section C of the Research Instrument. | Qualitative | Ongoing reflection, coding (predetermined and emerging), identification and interpretation of themes |
| | | What impact do weak SCM practices in the Department of Health have on the implementation of South Africa's ARV treatment programme? | Interviews using questions in Section A, B and "Is this currently done? How?" in Section C of the Research Instrument. | Qualitative | Ongoing reflection, coding (predetermined and emerging), identification and interpretation of themes |

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