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**Application of the Sales and Operations
Planning (S&OP) Process at
Douglas Pharmaceuticals Limited**

**A thesis presented in partial fulfillment of the
requirements for the degree of Masters in Applied Science
in Logistics and Supply Chain Management at
Massey University, Palmerston North, New Zealand.**

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Abstract

To be successful in today's fast paced, demanding markets, companies must be poised to support changeable market demand while maintaining operational efficiencies. Recognising the need to coordinate and communicate details of supply and demand across multiple divisions, successful companies have adopted a process that has become widely known as sales and operations planning (S&OP). When implemented effectively, S&OP can provide many benefits including improved customer service, stability in production plans, improved forecast accuracy and reduced inventories.

This report analyses S&OP processes operating at three successful companies and outlines the benefits these companies are achieving with S&OP. The report identifies the critical success factors in S&OP and how S&OP can be operated effectively. The report also presents a generic executive S&OP meeting format based on the formats operating at these companies and includes key performance metrics that should be presented as part of the S&OP process.

The report analyses the S&OP process that has been operating at Douglas Pharmaceuticals Ltd since May 2000 and finds it to be lacking in several key areas. The report concludes that the main barriers to successful implementation of S&OP at Douglas were a lack of knowledge about the process at middle management level and a lack of buy-in and participation at senior management level. As a consequence, the current S&OP process at Douglas Pharmaceuticals is limited. There are major shortfalls in the reports used, the key performance metrics presented and accountability for key metrics such as forecast accuracy results. This report provides detailed recommendations on how Douglas Pharmaceuticals can substantially improve its S&OP process.

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Chapter 1

Introduction

One of the key challenges in business has always been to support changeable market demand, supplying the right product at the right time and at the least possible cost. Large multi-divisional companies face the difficulty of bringing available functional skills to bear on the decision making process at the right time in the right place (Howard, 1983). Recognising the need to coordinate and communicate details of supply and demand across multiple divisions, successful companies have adopted a process that has become widely known as sales and operations planning (S&OP).

In the mid 1980s, Richard C. Ling helped develop S&OP. According to Ling, in the early days S&OP was created to get senior management more involved in the supply and demand process. Over the years S&OP has developed into an all-inclusive process that ties in financial planning and senior management strategy. According to Ling, S&OP provides a framework that companies need to make better decisions and create more predictable financial results (Burke, 2004).

Sales and operations planning is a process that ensures the different departments of a company are working in sync (Dwyer, 2000) to supply product in line with market demand. Tom Wallace, author of *Sales and Operations Planning: The How to Handbook*, describes S&OP as “A powerful set of decision-making processes to balance demand and supply” (Wallace, p. 18). The S&OP process has become a key driver in companies seeking to integrate otherwise separate functional divisions and focusing their efforts on one set of numbers and one operational plan that best meets the company’s strategic goals and objectives.

In May 2000, an S&OP process was introduced at Douglas Pharmaceuticals Ltd by management consultants, Simpl Group. However, Douglas managers appointed to administer the process lacked S&OP expertise and there was no direct involvement from senior management. As a result, the S&OP process developed slowly over the following three years. On 26 August 2003, key marketing, production and supply chain

staff at Douglas Pharmaceuticals met to discuss the current S&OP process. The general consensus at this meeting was that the current S&OP process could be vastly improved to better coordinate supply with market demand, reduce operating costs and exploit opportunities for improved competitive advantage.

Douglas Pharmaceuticals now competes on the world stage with 60% of sales revenues generated from international markets. Reducing unit cost, improving delivery performance and customer service is key to the company's continued growth and sustained competitive advantage in this global market. The company must be positioned to react quickly to changeable market demand and to supply high value product with shorter lead-times to maximise market penetration opportunities in niche markets. Supply chain optimisation is therefore crucial to Douglas Pharmaceuticals' on-going success. In relation to effective S&OP practice, the researched findings of this paper will provide answers to many of the questions currently facing the Douglas management team. This paper will provide guidance on how the current S&OP process can be improved so that Douglas Pharmaceuticals can gain the substantial benefits available from effective S&OP.

Many companies have implemented highly effective S&OP processes achieving reduced costs and vastly improved service to market. Reductions in production cycle times and consistent on-time delivery via the S&OP process have lead to lower unit cost, better customer service and improved competitive advantage. This paper examines the S&OP processes operating at Johnson and Johnson Pacific Pty Ltd, Cadbury Confectionery Ltd, and Caterpillar. This paper also presents findings of a survey conducted on S&OP practices at semiconductor companies by University of Dallas and Cornell University. These companies have successfully applied S&OP to reduce finished goods inventory, improve customer service, improve manufacturing productivity and maintain more flexible operations.

This paper will identify critical success factors in S&OP. The researcher will examine the S&OP processes of companies operating S&OP successfully. The researcher will develop a generic executive S&OP meeting format that can be adopted by a manufacturing based company interested in developing an effective S&OP process.

This paper will examine Douglas Pharmaceuticals' current S&OP process and compare it with effective S&OP processes operated by companies that are gaining benefits from S&OP. This paper will also outline an action plan for implementing an improved S&OP process at Douglas Pharmaceuticals.

It is vital that Douglas Pharmaceuticals takes full advantage of the benefits provided by a high performance S&OP process. An improved S&OP process at Douglas Pharmaceuticals will align operations with company strategy and contribute to improvements in operational efficiency and demand planning.

1.1 Research Question

How do manufacturing companies operate effective S&OP processes and how can Douglas Pharmaceuticals implement this type of process?

1.2 Research Objectives

1. To identify how manufacturing companies apply the S&OP process for optimal results.
2. To identify the critical success factors of an effective S&OP process.
3. To develop a generic executive S&OP meeting format including key performance metrics that is based on the formats operated and metrics used at companies that operate effective S&OP.
4. To evaluate Douglas Pharmaceuticals' current S&OP process against effective S&OP processes operated by successful manufacturing companies.
5. To establish an action plan for implementing an improved S&OP process at Douglas Pharmaceuticals.

Chapter 2

Literature Review

2.1 Introduction

The S&OP process is a relatively recent phenomena with most literature on the subject dating back less than ten years. The process was developed in the mid 1980s with Richard C. Ling being credited with helping develop the process in its early stages. Ling, a manufacturing management educationalist and consultant is a recognised authority and pioneer in the field of S&OP (Burke, 2004).

Following an exhaustive search of multidisciplinary databases accessing scholarly journals and peer reviewed titles on the subject, the researcher can conclude that within New Zealand there is very little, if any, published research on S&OP. The researcher was fortunate to have been assisted by Dr Carole Page, primary author of *Applied Research and Design for Business and Management* (2000) in the search for literature on the subject. Dr Page came to the same conclusion when she was unable to locate New Zealand based research on S&OP. There is however, some international research and reporting on S&OP. These reports concentrate on the benefits and successes organisations have achieved through effective S&OP and the issues relating to implementation and management of the process.

S&OP, as a subject, is widely covered and reported upon in business journals and in management resource articles. The articles are generally short documents that concentrate on describing the process and offer individual examples of how companies have applied the process to yield positive results. Some articles offer reasonably detailed explanations of how the process can be implemented, the benefits and advantages along with common challenges businesses face. Throughout this research the researcher did not locate any research or articles that seriously challenged the process or application of the process in business.

2.2 Application of S&OP at Douglas Pharmaceuticals Limited

At Douglas Pharmaceuticals the management team participating in the S&OP process recognise that the current process requires substantial improvement. These views were expressed formally in an S&OP review meeting held in August 2003. The management team is aware of the substantial benefits that an effective S&OP process can yield. One of the obstacles faced at Douglas Pharmaceuticals has been a lack of S&OP knowledge and understanding as to how the current process can be improved. The research findings of this paper will provide answers to many of the questions currently facing the Douglas management team. This paper will provide guidance on how the current S&OP process can be improved so that Douglas Pharmaceuticals can gain benefit from an effective S&OP process.

2.3 S&OP Defined

S&OP is a business planning process used mostly by manufacturing based companies to balance supply and demand. S&OP serves to integrate otherwise separate functional divisions and focus their efforts on one set of numbers and one operational plan that best meets company strategic goals and objectives. The S&OP process is normally conducted within a monthly cycle, in a very formal and prescribed format by the senior management team. S&OP provides a monthly balancing of supply and demand over a six to twelve month planning horizon by aggregate product families (Boyer, 2004).

Olhager, Rudberg & Wikner (2001) describe S&OP as a fundamental process that maintains the balance between aggregate supply and aggregate demand by way of monthly updates to the annual business plan. The process provides a forum where different functional strategies meet for establishing a production plan that economically serves the needs of the market, while supporting both the strategic and financial plans of the firm (Olhager, Rudberg & Wikner, 2001).

Gray Research, a research and consultancy company based in New Hampshire, USA is a leading authority on S&OP and describes the process as a way of drawing out functionally conflicting objectives and resolving them. This resolution of differences results in the development of a workable manufacturing/marketing contract and integration of all functions of the business by developing a single set of numbers. Plans and schedules are then developed from this single set of numbers. S&OP also provides a forum for evaluating company performance (Gray Research, 2004). S&OP is now recognised as a key business process by companies aiming to achieve operational excellence (Davis, 2000).

2.4 Benefits and Application of S&OP

Bell (1996) describes how operational improvements that reduce business costs, impact directly on bottom line financial results. Coca-Cola Bottling, located in Toronto, Canada, made major improvements to its operational planning that resulted in case fill rates improving to 99%, while finished goods inventories decreased by more than 20% (Bell, 1996). By doing more with less, this company raised the competitive ante by successfully making operations planning quality part of the overall product it delivers to customers (Chapman, 1996). Making these improvements is easier said than done. Large multi-divisional companies face the problem of bringing available functional skills to bear on the decision-making process at the right time and place (Howard, 1983). The difficulty in bringing about coordinated effort in marketing and operations planning is hampered further where divisions work in 'silos', or relative isolation, rather than cross-functional, multi-disciplinary teams. The latter is a key strength of the S&OP process as sales, marketing, operations and finance teams are forced to work together making decisions about business operations in consultation with one another and with a shared vision and objectives.

In late 2000, Elkay Manufacturing Company, based in Chicago realised that to lower the cost of production while improving customer service, the formal balance of supply and demand would have to be addressed. Elkay developed an S&OP process that linked top management planning to daily production operations, capacity planning, production

priorities and to purchasing activities. The results include a 32% reduction in total inventory dollars, 35% increase in total inventory turns, 25% improvement to 91% in on-time shipments, 35% reduction in backorders and 48% reduction to 7.7 days in cycle-time (IOMA, 2003). Elkay significantly improved its competitive position through the implementation of an effective S&OP process.

Peter Baldwin, Operations Director for Thornton's, a confectionery company based in Derbyshire, implemented a highly successful sales and operations planning process in 1998 that transformed this 'Class D' manufacturer into a 'Class A' manufacturer under the Oliver Wight consultancy's performance definition. Consistent with the findings of Dwaraknath, Chen, Cakanyildirim & Isbulan (2002) on S&OP practices at semiconductor companies, Baldwin identified the need to tie financial planning into the S&OP process and the importance of operating with one set of numbers (Dwyer, 2000). Thornton's achieved many benefits from implementing an effective S&OP process including improving forecast accuracy from 20% to 60%, inventory accuracy from 64% to 98% and manufacturing schedule performance from 62% to 95%. According to Baldwin (cited in Dwyer, 2000), "Thornton's could only improve its forecasting and balance highly seasonal supply and demand if all the directors were involved in the S&OP process. Top management buy-in was key. Without that, don't even bother starting" (p. 31).

2.5 Common Myths about S&OP

Thomas Wallace, in his book, *S&OP: The How to Handbook*, is one of the few writers who puts forward questions about S&OP. Wallace explains that there is a fair amount of misinformation about S&OP. Wallace says there are four major myths about S&OP. The myths are that it's just a monthly meeting, it's no big deal it's just looking at numbers on a spreadsheet, it concentrates on aggregate numbers and therefore can't be useful and finally that S&OP is just a new term for production planning. Wallace sets about dispelling each of these myths with a series of facts to the contrary. The handbook is frequently referred to by other authors, is the primary text for several United States and United Kingdom based training courses on S&OP, and has received very positive

reviews. The book does provide an excellent step-by-step guide to implement or improve S&OP but clearly lacks references to other sources. Wallace, makes statements about S&OP where he backs them up with no more than his own opinion and knowledge of the subject. In some cases he refers to general examples or experiences of companies but does not mention organisation names assumedly to protect confidentially. Despite this lack of external referencing, Wallace is well respected as an authority on the subject of S&OP. Wallace has been involved in a substantial number of successful S&OP implementations and is a Distinguished Fellow at the Ohio State University's Centre for Excellence in Manufacturing Management (Wallace, 2002).

2.6 Supplementing Information Systems

Lapide (2003) argues that many companies that implemented new Materials Requirements Planning (MRP) and Enterprise Resource Planning (ERP) systems over the previous five years did nothing with their operational processes, which are now under performing. According to Lapide (2003):

“Ensuring that sufficient supply is available requires a more robust, technology-supported S&OP processes than many have in place today. AMR research has benchmarked high-performing companies and found that S&OP was one of the most important best-practice processes in their operational success. One finding shows that best-in-peer companies across four industries, Consumer Products, Bulk Chemical, Industrial Electronic Equipment and Tier Automotive, maintain up to a 10% advantage in perfect order fulfillment. All these high-performing companies are linked by the fact that they use S&OP to plan for 100% of their demand” (p. 1).

When S&OP is done well it contributes to lower inventories, reduced operating costs, improved customer service levels, increased profitability and increased return on assets. Companies are now looking to revise their current operational processes to ensure they are operating effectively (Lapide, 2003). Douglas Pharmaceuticals implemented a limited, narrowly focused, S&OP process soon after implementing ERP system Protean in early 2000. It is likely that Douglas Pharmaceuticals falls into the category of

companies described by Lapide who are not gaining maximum value from their S&OP process.

2.7 S&OP Practices at Global Semiconductor Companies

In a combined effort from staff of Motorola, Austin, Texas and the University of Texas, four researchers surveyed nine semiconductor companies about their S&OP practices. As far as the researcher can ascertain this is the only survey of its kind that has been made available to the general public. The report was published in February 2002 and provides a detailed summary of survey results. The report finds that forecast accuracy, efficiency and responsiveness of the process and integration of finances into the S&OP process were common issues in S&OP in this industry. Researchers go on to say that the report's conclusions are relevant to a great extent to all manufacturers (Dwaraknath et al., 2002).

Consistent with the findings of Dwaraknath et al., (2002) and like many business process issues, it is commonly accepted that most S&OP process issues or challenges are generic across many different industries and types of business. Other key issues commonly encountered are the level of senior management buy-in to the process and direct involvement (Dwyer, 2000, Rooney, 2001, Wallace 2003). Research into current S&OP practices at semiconductor companies provides a useful comparison for Douglas Pharmaceuticals' current S&OP process as the research applies to existing S&OP processes rather than new implementations.

2.8 S&OP Implemented at Caterpillar

In 2003, researchers at North Carolina State University identified United States based heavy equipment company Caterpillar's S&OP process as a best practice example for implementation of S&OP at Bayer Biological Products (Andrews, 2003). James Correll describes Caterpillar's S&OP structure and how the process was implemented in an APICS International Conference article (Correll, 2002). Correll provides a detailed account of how and why the process was implemented, elaborates on the sections of the

S&OP process and shows how S&OP is tied to Caterpillar's business strategy. Correll also describes the lessons learned during implementation and describes some of the benefits Caterpillar have enjoyed from operating the process (Correll, 2002).

2.9 Summary

The reports compiled by Correll (2002) on Caterpillar's S&OP process and Dwaraknath et al., (2002) on S&OP practices in semiconductor companies are among the most comprehensive available in the public arena. These reports provide a valuable insight into the S&OP process and how it is applied in real life examples. However, these reports do not provide sufficient low-level detail required to understand how S&OP is actually applied in these companies. This lack of detailed information on how S&OP is successfully applied in organisations can be overcome by conducting case studies of companies that are operating effective S&OP processes.

The researcher has identified two successful multi-national manufacturing based companies that are operating effective S&OP processes. Gaining a detailed understanding of how the S&OP process operates at these companies will provide a valuable and practical insight into how the process could be improved at Douglas Pharmaceuticals. The research will provide valuable feedback from managers participating in the process at these companies. Research findings will include views on the strengths and weaknesses of S&OP processes, the benefits of S&OP and keys to success in S&OP. The research will effectively close the gap on current S&OP research by narrowing down the detail of S&OP practices, formats and effective application of the process.

Chapter 3

Methods

The overall research strategy is applied research using the action research process with the aim of applying research findings at Douglas Pharmaceuticals. The researcher has identified an ineffective S&OP process as an important issue facing Douglas Pharmaceuticals. Managers and staff currently participating in the S&OP process outlined deficiencies in the current process at a meeting in August 2003 and suggested ways in which they felt the process could be improved. Participants believed that an improved S&OP process could yield significant benefits for the company including improved forecast accuracy, improved customer service levels and stability in production plans.

To gather data the researcher has interviewed staff and managers currently participating in the Douglas S&OP process in order to discuss and analyse the current process, reports, and meeting formats in detail. The researcher has also drawn on reports and articles published on the topic of S&OP. In particular, the S&OP processes of global semiconductor companies (Dwaraknath et al., 2002) and Caterpillar (Correll, 2002) will be presented and discussed.

To supplement this research, primary data has also been collected from successful companies that are already operating effective S&OP processes. The researcher has conducted case studies of two manufacturing based companies. Johnson and Johnson Pacific Pty Ltd based in Sydney and Cadbury Confectionery Ltd based in Auckland agreed to participate in this research. Both are successful companies that are part of multi-national global corporations and are operating successful, performance driven S&OP processes. To draw useful comparisons between the case study companies and Douglas Pharmaceuticals, it was important that the companies selected operated some form of manufacturing or processing operation that interfaced with sales and marketing functions. To operate sophisticated S&OP processes, case study companies would most likely be operating with an annual turnover in excess of \$80 million. Case study companies would also need to demonstrate monthly reporting of key supply chain

performance metrics with measurement and reporting of this performance linked back to an S&OP process. Examples of these metrics are customer service level (CSL), sales forecast accuracy, inventory turns, delivered in full, on time (DIFOT) monitoring of financial contribution by product line, actions on slow moving and obsolete lines and performance to schedule.

The researcher contacted senior supply chain and operations managers in both case study companies to gain approval to conduct the research. The aim of the research was explained to each company representative along with an indication of the time commitment the research would require of key staff. All research participants were given an assurance that research findings would be kept confidential and not disclosed outside of Douglas Pharmaceuticals or Massey University. Any summary of research findings disclosed to case study companies would not include the names of organisations or individuals that participated in the research.

The researcher has operated independently in conducting this research but periodically research findings and progress have been reported back to Douglas Pharmaceuticals' monthly executive S&OP meeting. The Douglas S&OP improvement project team will primarily be made up of staff and managers currently participating in, or contributing to, the monthly executive S&OP meeting. It is therefore important that this group in particular be kept informed about developments in the research and findings considered relevant. The project improvement team will later work through the action planning and implementation stages of the Douglas S&OP improvement project and finally the project evaluation process (Page, 2000).

3.1 Data Collection

Secondary and primary data relating to S&OP key performance indicators and general performance metrics have been collected and presented in this paper. This data is made up of performance statistics such as CSL, DIFOT, inventory turns and forecast accuracy (%). In some cases, data is presented from several reporting periods in order to assess trends in performance results.

Key staff within case study organisations were asked to participate in structured interviews that posed questions relating to their S&OP process. The researcher used two different structured interview formats. The first was a general company interview designed to gain a general overview of the process. The S&OP company sponsor or coordinator was interviewed using the general company interview. Interview questions were designed to gain a general overview of the process including how long it had been operating, how it was implemented, what were the main sections of the process, what metrics were reported, who was responsible for what, what timings were involved and how the process had developed. A copy of the general company interview questionnaire is attached as Appendix A.

An S&OP process participant interview questionnaire was used to interview staff and managers participating in the S&OP process at case study companies. The participant interview included questions relating to the perceived strengths and weaknesses of the process, keys to success with S&OP, issues and conflicts that arise during the S&OP process and asks participants how important they think the process really is. A copy of the participant interview questionnaire is attached as Appendix B.

The interview process involved selecting a stratified sample of S&OP process participants including managers representing operations, supply chain, sales and marketing. This ensured that the views of each functional area were equally represented. Respondents were encouraged to elaborate on key topics raised in the interview. In total, eight primary interviews were conducted with case study company staff and managers. Some interviews were conducted face to face and some were conducted over the telephone. In several cases, further telephone interviews were conducted or email transmissions sent to gain a more detailed understanding of various aspects of the S&OP process and issues relating to it.

In addition to the general company interview conducted at Johnson and Johnson, the researcher was fortunate to have the Johnson and Johnson S&OP process formally presented to him in a detailed forty minute power point presentation that included S&OP reporting formats and key metrics.

3.2 Data Analysis

This type of research did not provide a large enough data set that the results were statistically significant and therefore advanced quantitative statistics analysis software such as SPSS was not relevant to data analysis.

Some primary data has been presented in graphical form to show Johnson and Johnson's performance in key S&OP metrics. Line graphs have been used to present performance trends in line fill rate, order fill rate, inventory days of supply and forecast error rate over a four-year period.

While the results may not be statistically significant, the responses to interview questions have provided a valuable insight to how those directly involved with successful S&OP processes view the process. Interview participants have shared their views on the process, its strengths, its weaknesses, keys to success in S&OP, how they think it could be improved and how important they feel the process is to their company.

3.3 Ethical Issues

The paper contains commercially sensitive information that has been disclosed to the researcher with the understanding that this information will not be made publicly available. The researcher will apply to embargo this thesis to protect the confidentiality of this information.

Chapter 4

Results and Discussion

4.1 S&OP Theory

S&OP is a business planning process used mostly by manufacturing companies to balance supply and demand. S&OP serves to integrate otherwise separate functional divisions and focus their efforts on one set of numbers and one operational plan that best meets company strategic goals and objectives.

In the mid 1980s, Richard C. Ling helped develop S&OP. According to Ling, in the early days S&OP was created to get senior management more involved in the supply and demand process. Over the years S&OP has developed into an all-inclusive process that ties in financial planning and senior management strategy. According to Ling, S&OP provides a framework that companies need to make better decisions and create more predictable financial results (Burke, 2004).

According to Dwaraknath et al., (2002) S&OP is a process that integrates customer-focused marketing plans for new and existing products with the operational management of supply chains. S&OP brings together the plans for the business operating in sales, marketing, new product development, production, purchasing and financial into one set of numbers. The process is designed to reconcile all supply, demand and new product plans at both detailed and aggregate levels and ties into the business plan.

John Boyer, past President and Education Vice President for APICS The Educational Society for Resource Management describes S&OP:

“S&OP is a monthly formal balancing of supply and demand through a six to twelve month planning horizon by aggregate product families. It generally includes incoming orders, backlog, shipment, finished goods inventory, production, and capacity

projections in monthly time buckets. It is conducted in a very prescribed format by the top management team. This is a critical point: top management” (Boyer, 2004, p.1).

Boyer goes on to say that the process must engage the President, and direct reports, otherwise there will be a disconnect between their wishes and the information on the formal S&OP document. S&OP is derived from a company’s Strategic Plan and provides direction in operational tasks such as scheduling, order promising and purchasing. According to Boyer, many manufacturing companies have recently discovered the power of S&OP and are successfully applying it to lower cost, provide the best service and minimise investment (Boyer, 2004).

4.1.1 Assumption: $1+1+1+1+1 = \text{Opt}$

Companies can successfully improve in one or two operational areas and achieve good results. Take for example, Coca-Cola Bottling, Toronto, where major improvements were made to its operational planning that resulted in case fill rates improving to 99%, while finished goods inventories decreased by more than 20% (Bell, 1996). In this case, Coca-Cola Bottling, Toronto, appears to have been successful in more than one area. There is however, an inherent danger in optimising one part of a business and assuming the overall effect on the business will also be favorable. According to Goldratt, (cited in Massey University, 2002) “The total of the local optima is not equal to the optimum of the total” (p. 5). There is a deeply rooted assumption within many businesses that if every division performs well then the whole company will perform well. Goldratt expresses this assumption as $1+1+1+1+1 = \text{Opt}$. We know that optimisation in one area does not always necessarily result in overall optimisation. In the Coca Cola Bottling example, if operational improvements were achieved through the purchase and implementation of expensive, sophisticated planning software, requiring capital investment and the employment of additional technicians to maintain it, then these improvements came at a cost that impacts directly on financial performance. If the improvements at Coca Cola were achieved through shorter batch runs, which resulted in less efficient utilisation of equipment and more frequent, costly machine setups and clean downs, then the financial impact of these changes also needs to be considered. While service improved and inventory was reduced at Coca Cola, we cannot assume

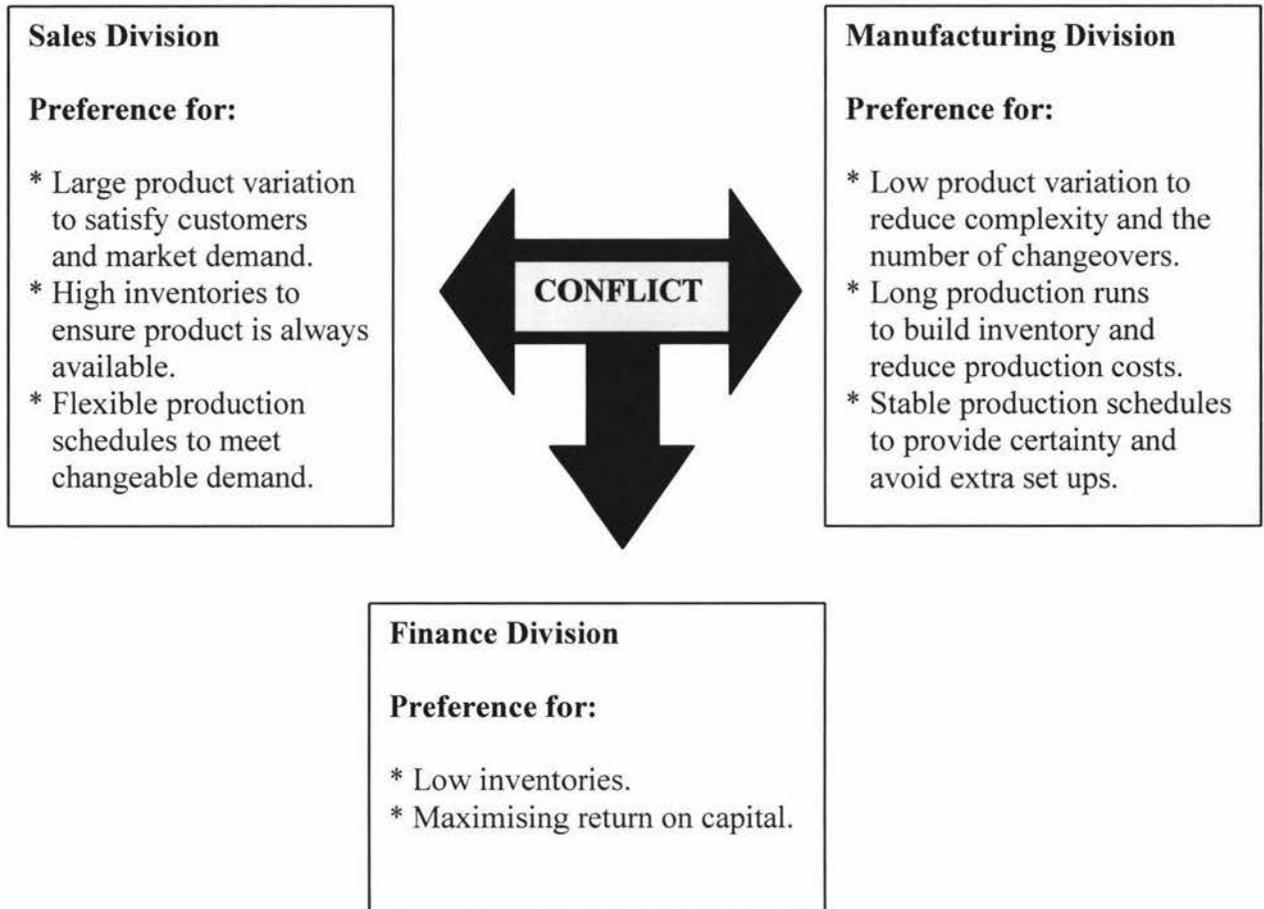
there was overall benefit to the company unless these cost reductions outweighed other costs associated with obtaining the improved result.

4.1.2 Divisional Conflicts of Interest

Historically, company divisions tended to operate in 'silos' where each company division went about their business doing the best they possibly could to optimise performance in their respective divisions. This approach was supported by the $1+1+1+1+1 = \text{Opt}$ assumption, emphasising the belief that performance in each resulted in positive performance overall (Goldratt, as cited in Massey University, 2002). In reality, company divisions, or functional areas, often work in conflict as opposing forces, each out to improve their own position. Some traditional areas of conflict are identified in Figure 1 below.

It is sometimes said that in the extreme, it would be ideal for a manufacturing operation to make one product, 24 hours per day, seven days per week, 365 days per year. This way the plant achieves maximum output with 100% capacity utilisation, no breaks for set up or changeover between products, production is simple and costs are low. Conversely, marketing and sales divisions would like the manufacturing operation to produce an infinite number of products, and variations on products, at a low cost and be entirely flexible to change production schedules at short notice if a product promotion goes better than expected and inventories run low. The S&OP process encourages functional areas or divisions within a company to operate as cross-functional teams out to improve the performance of the company overall, resolving areas of difference and conflict along the way.

Figure 1: Company Divisions Working at Cross Purposes



Wallace highlights one of the myths surrounding S&OP, that it is just a new name for the production planning process. Wallace says that the difference between S&OP and production planning “is as large as the differences between functional silos and cross-functional teams” (Wallace, 2002, p. xvii). Under the old silo approach, sales and marketing developed a forecast and handed it to manufacturing for production planning. The scheduler then broke it down into individual products and set about producing product. Conversely, S&OP is a powerful, cross-functional, decision-making process. S&OP calls for input from all divisions of the company to work together and develop an integrated plan that all departments can support and pass onto the executive for sign off. The process results in an authorised, company-wide game plan that is far more than simply production planning (Wallace, 2002). In support of this Boyer (2004) states, “S&OP is not a scheduling tool! It is not an inventory replenishment tool! It is,

however, a top level planning technique to provide overall rates of sales and production, backlog and finished goods inventory positions” (p.1).

4.1.3 Application of S&OP

Companies ranging from small factories or distribution operations to large multinational corporations can benefit from an effective S&OP process. S&OP is widely used in manufacturing-based companies but it also has application in companies that don't have integrated manufacturing, third party manufacturing or assembly operations. S&OP can be applied in any company supplying products, or services, to a market where the company is large enough to support different functional divisions and there is a reasonable level of diversity in supply and demand. There is little written about what size a company needs to be to operate and benefit from S&OP. There appears to be no documented correlation between the size of a business and the effective application of S&OP. However, many of the benefits that are obtained from S&OP come from drawing together different functional divisions of marketing, sales, manufacturing, supply chain and finance. The S&OP process works toward ensuring supply and demand are balanced to meet demand effectively and efficiently. S&OP also aims to ensure all divisions are working to one set of numbers; performance is contributing to the achievement of the annual business plan, and is tied to company strategy. S&OP most likely has application in small/medium and medium sized companies upwards. Companies that fall into this category are likely to have annual sales turnover of \$10 million plus.

Chapter 5

Results and Discussion

5.1 The Application of S&OP at Manufacturing Companies

The aim of this chapter is to report on how manufacturing based companies have successfully applied the S&OP process. This chapter examines how two Australasian-based operations of global manufacturing companies, Johnson and Johnson, and Cadbury Schweppes, operate S&OP. The chapter also examines the S&OP process recently introduced at Caterpillar Inc, USA, and the results of a survey conducted by the University of Texas, Dallas, into S&OP practices at semiconductor manufacturing companies.

5.2 S&OP at Johnson and Johnson Pacific Pty Ltd

On a global basis, Johnson and Johnson achieves sales revenues of USD\$36 billion and is the world's most comprehensive and broadly based manufacturer of healthcare products. The company has 70 consecutive years of sales increases and 41 consecutive years of dividend increases (Johnson and Johnson, 2003). The Australian operation has an annual turnover in excess of AUD\$200 million and has operated a successful S&OP process for seven years. The introduction of the process was self-initiated. The implementation was lead by the supply chain division who involved sales and eventually sold the process to top management. S&OP is operated globally throughout the company group but under different regional formats.

The S&OP process is conducted on a monthly basis and chaired by the chief executive officer. Sales, supply chain and marketing managers attend the monthly meeting, which takes about three to four hours and deals with product families individually. Two days prior to the monthly meeting a results summary sheet is promulgated to all participants providing a short window of opportunity for pre-S&OP meetings to be conducted.

5.2.1 Key Agenda Items: S&OP Meeting

The standard agenda for the S&OP meeting includes the following items.

1. Forecast sales. Turnover (\$) compared with budget.
2. Market and product risks/opportunities.
3. Gaps to budget.
4. Market and supply issues highlighted.
5. Forecast accuracy.
6. Slow moving and obsolete (SLOB) product lines.

Table 1. Key Metrics Reported at Johnson and Johnson

Key Metric	Description
Sales versus budget gap analysis (%)	Sales versus budget by product family. Risks and opportunities discussed by exception.
Line item fill rate (%)	Cases delivered complete.
Out of stocks	Root cause analysis is presented. Out stock report updated daily on the company intranet. This report is presented at the S&OP meeting.
Forward stock situation report	Identifying potential, future out of stocks.
Forecast accuracy (%)	Measured by mean absolute percentage error (MAPE) and mean percentage error (bias) by product family. MAPE is a measure of forecast accuracy that represents the average absolute error as a percentage of the actual demand as compared to forecast. MAPE is therefore always presented as a positive value (Chopra, 2001).
Lead-time for resupply	What if scenarios are posed and assessed for selling over or under forecast.
Inventory projections	Day's forward cover is presented and assessed. Past cover is also examined. Excess inventory levels are analysed in detail and reasons are presented.
Slow moving and obsolete lines	Slow moving and obsolete inventory exposure is assessed under product categories of finished goods, raw material and packaging.
SCOR card key business indicators	SCOR metrics are based on the Supply Chain Council's SCOR card (Supply Chain Council, 2003). Key financial metrics are presented. Includes promotional spend and how these costs will impact on profitability and revenues.

Johnson and Johnson Pacific operate the S&OP process with a cross-matrix team of managers responsible for different functions. In regard to the key metrics reported in Table 1 above, the sales team is primarily responsible for gap analysis on sales actual to forecast, forecast accuracy and SLOB. Marketing are responsible for SCOR card key business indicators. Supply chain are responsible for reporting on line fill rate, out of stocks, forward stock position, leadtime for re-supply and inventory projections.

5.2.2 Strengths and Weaknesses of the S&OP process

Participating managers believe the major strengths in the S&OP process include the high level of commitment from senior management, that it aligns departments and functional areas and as one manager described it, “everyone is on the same page”. The process also allows open dialogue with other departments and with the board of directors. The process allows departments to gain a greater understanding of what issues and challenges other departments face and the flow on effect of certain events, or actions, and how these issues impact on other areas of the business. Other strengths identified were that it includes detailed financial analysis of inventory, risk, brand profit and loss accounts, promotional cost and overall brand contribution. The process also aligns business strategy through communication and looks at the business from a strategic and tactical level because it has senior management involvement.

The main weakness of the process was identified as the time it takes to gather and prepare information. Some participants also felt that they were not given reasonable time to prepare for the process if reports were generated too late. It was felt that the process could be improved through automation of data gathering and presentation of key reports.

5.2.3 Benefits of S&OP

At Johnson and Johnson the S&OP process focuses management’s attention on key performance areas such as customer service level, inventory investment and demand forecast accuracy. Statistics show consistent improvement in company results over the four years 2000 to 2003. See the graphs below, Figures 2 – 6. Inventory days of supply

dropped from 131.9 days in 2000 down to 84.8 days in 2003. Line fill rate improved steadily over this period with 97.3% achieved in 2003 up 4.3% on 93% achieved in 2000. The forecast error rate (MAPE) has improved by 16% dropping from 42.7% in 2000 to 26.7% in 2003. These results show Johnson and Johnson is consistently improving customer service levels with reduced inventory levels. Management at Johnson and Johnson are of the opinion that these results did not occur just because they had an S&OP process. These results were achieved because the S&OP process they developed required reporting on these key metrics and this focused management attention on improving in these key areas. The improved performance results achieved at Johnson and Johnson are consistent with the results achieved at Thornton's Confectionery (Dwyer, 2000) and Elkay Manufacturing (IOMA, 2003) discussed in the first chapter of this report. Both of these companies experienced similar levels of improvement in customer service metrics and finished goods inventory reduction that were directly attributed to the S&OP process.

Figure 2: Inventory Days of Supply – Johnson and Johnson



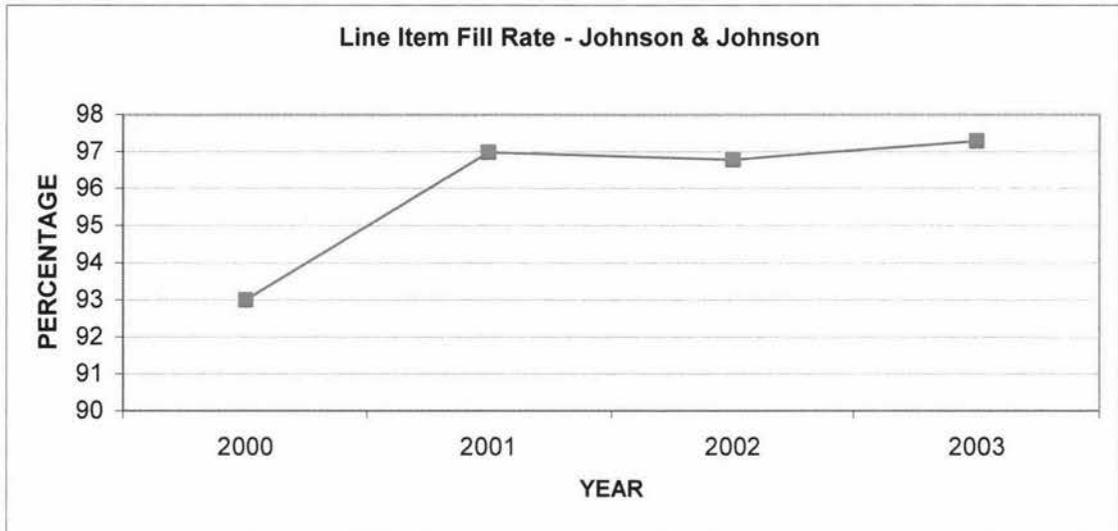
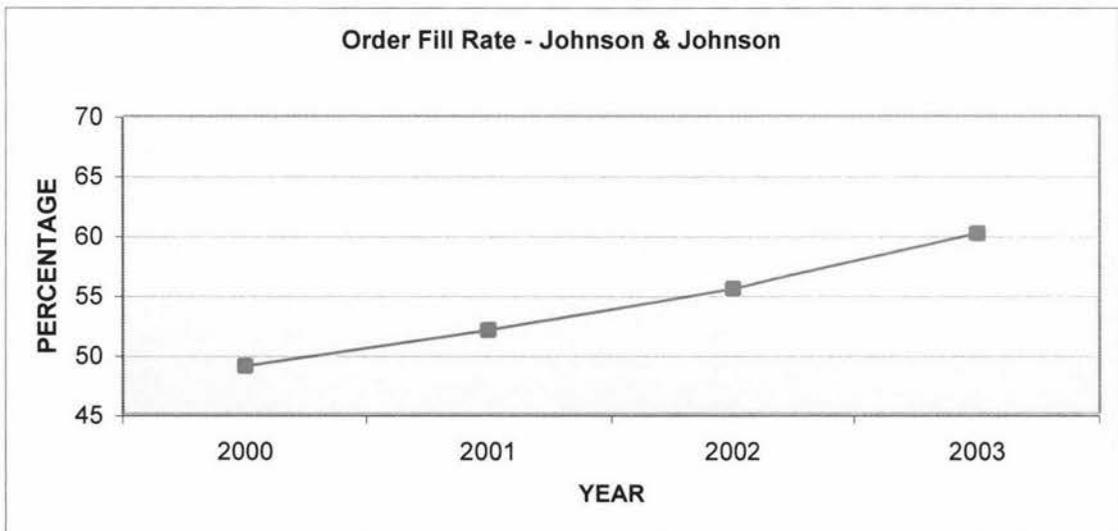
Figure 3: Line Item Fill Rate – Johnson and Johnson**Figure 4: Order Fill Rate – Johnson and Johnson**

Figure 5: Case Fill Rate – Johnson and Johnson

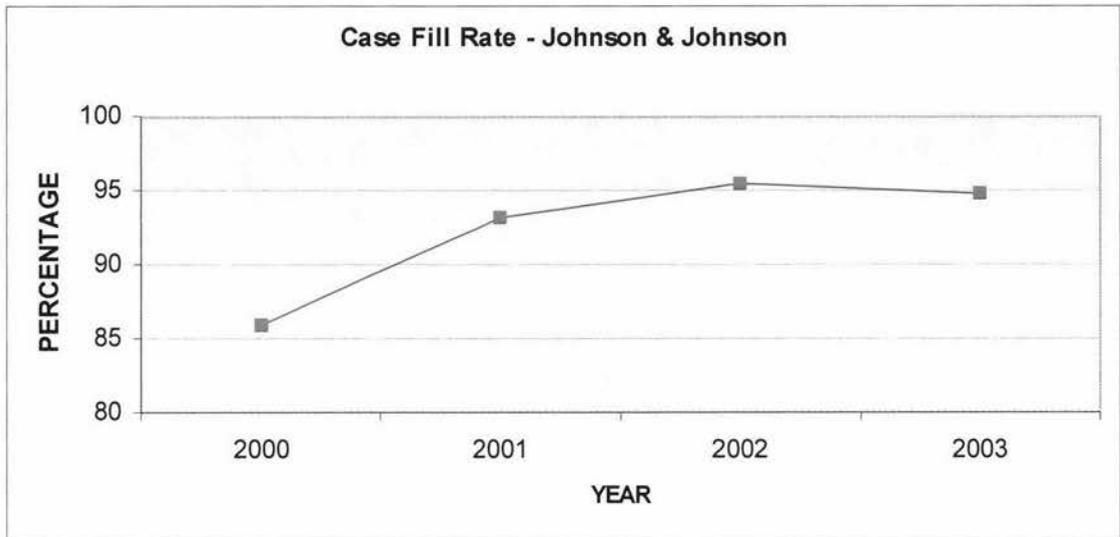
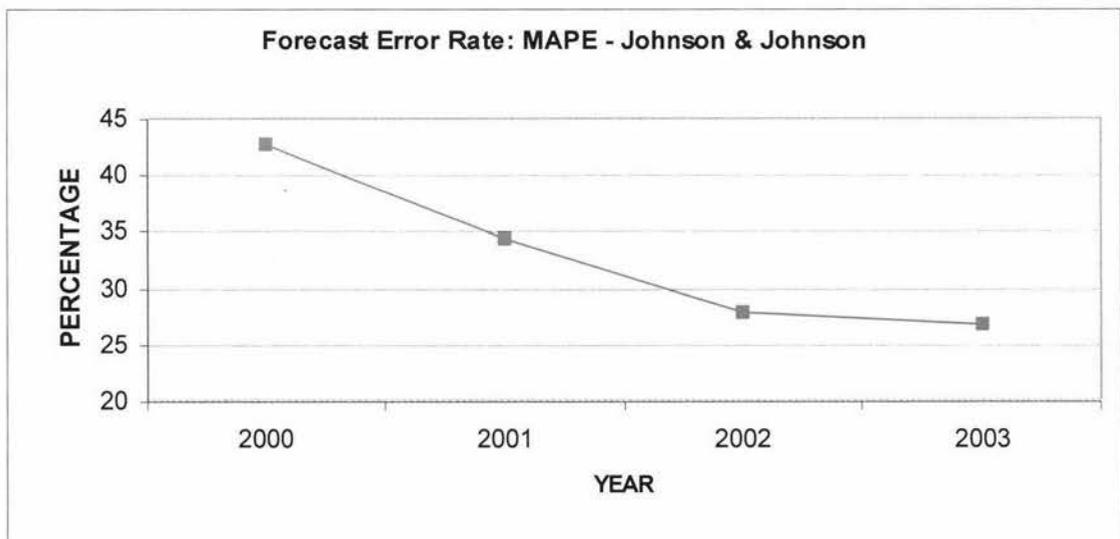


Figure 6: Forecast Error Rate: MAPE – Johnson and Johnson



5.2.4 Keys to Success in S&OP

The management team considered that keys to success in this company's S&OP process were senior management commitment to the process and ensuring that the information presented was 100% accurate and in a format that people understand.

The S&OP process is considered a crucial element for ongoing success in this company. Supply chain manager, Chris Hudson, offered an interesting insight, "S&OP is critical. If you haven't got it you are probably foundering with sales and marketing pulling one way and supply chain/operations pulling the other. The S&OP process allows participants to be held strictly accountable in an almost autocratic fashion without making them feel as if they have been singled out. The process becomes self-regulating. You're not only being held to account by your manager but also, and as importantly, you're being held to account by your peers who gain an insight into your rationale and the logic you are applying to problem solving and the issues presented to you"(C. Hudson, personal communication, February 9, 2004).

The S&OP process is constantly evolving and is continuously reviewed and refined. Future improvements to the process are expected to result in the process being fully automated and report generated rather than a mix of standard reports and spreadsheets. Any issues with the process are dealt with by refining the process and through a process of continuous improvement. Senior managers of Johnson and Johnson Pacific expressed the opinion that they could not do without the S&OP process and were of the view that the process was critical to the on-going success of their company.

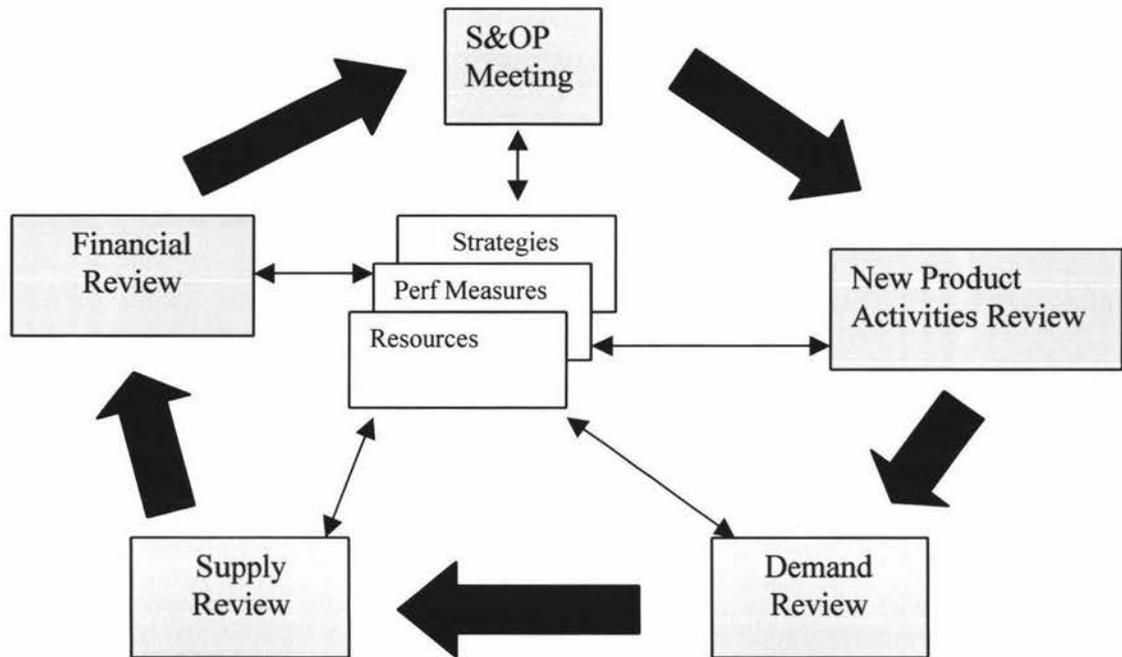
5.3 S&OP at Caterpillar Inc (Correll, 2002)

Caterpillar Incorporated is a USD\$22 billion company based in Peoria, Illinois. Caterpillar is perhaps best known for its highly successful range of earth moving equipment and machinery. In 2003 Caterpillar posted profits of \$1.1 billion equivalent to USD\$3.13 per share and representing an increase of 38% on the previous year. Projections for 2004 are for similar growth. Vice Chairman Jim Owen and Chairman Glen Barton emphasised the company's reliance on recently improved and improving processes to continue reducing core operating costs and reaching growth targets in 2004 and beyond (Yahoo Finance, 2004).

In August of 1999, Glen Barton challenged his entire corporation to achieve Class A as defined by the Oliver Wight Operational Excellence checklist by December 2000.

Caterpillar set out to achieve Class A certification in the planning and control chapter. The planning and control chapter is built around the integrated business-planning model. The model starts with a strategic plan that is the responsibility of senior management to develop and implement. Once the strategic plan has been put in place, the S&OP process is established. The S&OP process is described in Figure 7 below.

Figure 7: S&OP Process at Caterpillar



The S&OP process is established to support the company's strategic plan. The process is led by senior management and on a monthly basis evaluates revised, time-phased projections for supply and demand and the resulting financials. The main objective is to ensure tactical plans and divisional efforts are aligned and in support of company strategy.

5.3.1 S&OP Process at Caterpillar

Step 1: New Products/Activities Review. This part of the process ensures that new product developments and or introductions are aligned with the strategy, that future resource requirements to support these are considered and that introduction and launch targets are being met.

Step 2: Demand Review. The process then turns to demand creation activity, commonly referred to as forecasting or better stated as 'request for product'. Major emphasis is on performance measures such as market share and forecast accuracy by unit. This part of the process also ensures that sufficient marketing and sales resources are allocated to ensure demand eventuates.

Step 3: Supply Review. The supply review evaluates if sufficient resources are available to support demand. This will include rough-cut capacity planning to ensure both mid term and long-term demand can be met. A typical measure is whether or not the production plan is being achieved.

Step 4: Financial Review. The aim of the financial review is to ensure that the demand and supply plans meet the financial commitments both in strategy and the yearly business plan. The finance team is also responsible for quantifying the costs associated with a change, so that management can assess the impact of a change prior to implementing it and select the most cost-effective option.

To achieve a Class A rating under the Oliver Wight Operational Excellence Checklist requires that the General Manager or Chief Executive Officer attend the meetings and is available to make the decision where there is conflict between divisions.

5.3.2 S&OP Timeline

To operate effectively across multiple marketing divisions, product groups and component groups, S&OP had to be run on a tight timeline. The following monthly timeline was established:

Table 2. Monthly S&OP Timeline at Caterpillar

Working Days	Activity
By 4 th day	Marketing confirms forecasts/requests for product
By 6 th day	Product groups evaluate supply responses
On 7 th day	Pre-S&OP meetings held
On 8 th & 9 th days	Product group S&OP meetings held
On 11 th & 12 th days	Component S&OP meetings held
On 14 th day	Financial projections submitted by marketing, product and component groups.
On 15 th day	Executive roll up. RBM/S&OP

Achieving this demanding timetable was a difficult task but had to be accomplished if the maximum benefits were to be gained from the S&OP process.

5.3.3 Establishing Common Goals

Caterpillar developed a common set of goals to guide the monthly S&OP meeting. This provided guidance to participating managers so that even when the company chairman was unable to attend the meeting, all divisions were fully aware of what was expected of them individually and collectively. The common goals were:

- * Executive-level agreements
- * To be reviewed at least semiannually
- * To tie S&OP to longer-term strategy
- * Measurable
- * Documented and shared

Common goals included interrelated and quantifiable items such as percentage of market share, finished product availability, total chain inventory, forecast accuracy, and net revenue yields. Once common goals were mutually agreed, monthly discussion would then center on tactics and actions that would ensure goals were achieved. The S&OP and common goals processes have been so successful at Caterpillar that they are now working to extend aspects of these in both directions through the supply chain to their customers the equipment dealers and to their external suppliers.

Prior to S&OP implementation the relationship between divisions was often adversarial and dictatorial. The conversations were often one-way, with demands to change the schedule or plan and 'make it or else'. Often there was little understanding of, or accountability for, the additional costs of making these changes. The S&OP process makes this far more transparent and groups are now better informed of the cost implications of disrupting assembly lines or schedules. Knowledge of these cost implications prior to making promises to customers ensures profit objectives are met or at least reduction in profit is understood in advance.

5.3.4 Implementation of S&OP

The implementation of S&OP at Caterpillar was not without difficulties. The implementation required a major culture change within the organisation. Participants quickly realised that S&OP is a disciplined process and requires a lot of up front work to ensure the data is accurate and that exceptions and alternative courses of action are researched before the meeting takes place. The process required that people who had barely spoken to one another in the past now had to work closely together.

The main lessons learned during implementation at Caterpillar were:

1. Educate early on. The more people know about the process before it starts the faster the implementation and results. Education must include top management right down to the people collecting the data.
2. Maximise buy-in from all divisions and participants by involving them from the very beginning through the design stage and through implementation.
3. Marketing/manufacturing barriers must be broken down early in the process.
4. The implementation must have a senior executive sponsor with passion to drive the process.

5. Ensure there are shared performance measures with customer focus.
6. Establish a strict timetable into the process to ensure various functions deliver required information on time.
7. Agree and then publish information definitions and formats. This ends ongoing debates about validity of data, which delays results.
8. Celebrate successes. Recognition of a job well done is a great motivator to continuously improve.

5.3.5 S&OP Benefits

Within the Caterpillar group there are numerous success stories and examples of how the process helped improve the business. The main successes were total inventory was reduced significantly, shop productivity was up significantly, supplier costs were down and product availability was increased (Correl, 2002). "Sales and operations planning in many ways is institutionalised common sense," explain Dales Roberts, manager, sales and operations planning, North American Commercial Division, Caterpillar, Inc. and Peter J. Skurla, principal, Oliver Wight Americas (IOMA, 2003, p.11). The new S&OP environment encourages management teams to make changes as soon as they were known and adjustments started earlier avoiding the major inventory bubbles for the plants to deal with. The lower inventory also improved cash flow that could be channeled into higher return activities to support growth goals (IOMA, 2003). In 2003, researchers at North Carolina State University identified Caterpillar's S&OP process as a best practice example for implementation of S&OP at Bayer Biological Products (Andrews, 2003).

5.4 S&OP at Cadbury Confectionery Limited

Cadbury Confectionery Ltd is part of Cadbury Schweppes based in the United Kingdom, a global market leader in confectionary manufacturing and marketing and is

the third largest soft drink producer worldwide. The company has global sales equivalent to NZD\$15 billion per annum and growth of approximately 15% (Cadbury Schweppes, 2003). The New Zealand based operation has been running S&OP successfully for four years. The implementation of the process was driven by supply chain and fully supported by Directors who were eager to pursue what they regarded as a best-practice approach to demand and operations planning. This multi-national company has adopted the process globally but the format is not standardised and therefore varies from region to region.

In May 2002, Gil Cassagne, Chief Executive of Asia Pacific Region, wrote a report entitled 'Driving Good Growth' to Global Commercial Headquarters describing plans for an improved business model. Cassagne described S&OP as one of the key changes for improved commercial and production planning. The report states that benefits will be derived from implementing optimised production performance, availability of timely and accurate data to support supply chain planning and the reduction of operational costs through the implementation of S&OP (Cassagne, 2002). The New Zealand operation had already implemented S&OP two years earlier and was already experiencing the benefits.

At the New Zealand operation, S&OP meetings are held on a monthly basis and are chaired by the National General Manager. Other senior managers who attend the meeting represent the functional areas of supply chain, operations, demand planning, sales, marketing, engineering, human resources and finance. The main S&OP meeting takes approximately two - three hours. The commercial team and supply chain/operations team both meet separately each month in pre-S&OP meetings. The aim of these meetings is to review the previous month's results. The supply chain/operations meeting concentrates on plan attainment (reported daily) over the month, capacity analysis and CSL, in particular, order fill rates and line fill rates. The commercial team, which is made up of sales and marketing staff, and the demand planner, discuss forecast accuracy, promotions and competitor activity in preparation for the integrated S&OP meeting. Forecast updates are prepared for the months ahead and the demand planner factors in promotional demand prior to submission.

5.4.1 Key Items Considered at the S&OP Meeting

The meeting agenda is as follows:

1. Review of forecast accuracy
2. Review of customer service levels achieved
3. Review of production capacity analysis. Including constraints and overtime
4. Production plan attainment
5. Inventory position
6. Slow moving and obsolete lines
7. Distribution performance
8. Sales versus budget
9. Market and competitor activity
10. Business risks identified and discussed
11. Other issues raised

5.4.2 Key Metrics Reported

1. Forecast accuracy – weighted average
2. CSL - order fill rate and line fill rate
3. Production plan attainment. This includes changes/misses and reasons

Sales and marketing are responsible for reporting on forecast accuracy, identifying and taking action on market risks ie. competitor activity. Operations and logistics are responsible for reporting on plan attainment, distribution performance and customer service levels.

The S&OP process looks both forward and back. The process is used as a positive tool, not to lay blame, but to direct the business toward continuous improvement. The process has been improved over time, particularly data collection. The emphasis is on what data is collected and how this data is measured. Participants don't have any major issues with the process apart from the time it takes to prepare for the meetings in collecting and analysing the data.

5.4.3 Benefits of S&OP

The S&OP process brought significant benefits to Cadbury Confectionery. Prior to S&OP the company experienced major peaks in sales turnover during the last week of each financial period. The financial year at Cadbury is broken down into 13 periods of approximately one month. The emphasis for the sales team was always to show positive sales for each period and this inevitably resulted in a major drive to sell in as much stock as possible at the end of each period. In some cases, sales in the fourth week could account for up to 70% of sales for the period. This became known as the 'week four spike' and was a major issue for production and logistics staff.

Cadbury's factory scheduler described a time prior to S&OP, when Cadbury entered the first week of each new period, the impact of week four sales would become apparent. It was common for product to be run out of stock or so low that the production schedules for weeks one and two needed major changes, capacity constraints occurred, raw material and packaging orders had to be expedited and temporary staff had to be employed in the factory to meet the demand. Toward the end of each period, when production had caught up with stock requirements, it was common for the plant to experience a lull in demand. Cadbury was experiencing the 'bullwhip effect' caused by its own unstable system and parts of the supply chain acting in their own interests (Goldratt, cited in Massey University, 2002). The bullwhip effect is characterised by substantial peaks and troughs in demand and inventory within a supply chain. In Cadbury's case the week four spike was causing the bullwhip effect in inventory holdings at Cadbury and a ripple effect was transferring back through production and logistics who would expedite to fill the gaps. The bullwhip effect also carries forward to wholesalers and retailers who are impacted by the increased volume in stock receipts and inventory holdings at the end of each month. According to operations staff at Cadbury, the week four spike resulted in major inefficiencies in plant operations and was a source of ongoing frustration.

The week four spikes became a self-perpetuating problem as stocks ran low early in each period and then became available in the latter half of the period when production

caught up. After operating S&OP for several months, operations staff became more confident of sales forecasts and sales staff become more confident of operation's ability to supply product on time. The S&OP process effectively matched supply with demand, smoothing out the peaks and the week four spike disappeared six months after S&OP implementation. Now, week four spikes appear very rarely and are the exception rather than the norm. As a result, expedites, schedule changes and inventory have all been reduced. Some lines are now managed on a just in time basis and offsite storage is now used only for seasonal stock builds just prior to Christmas and Easter. Plant equipment is also being used more efficiently for longer runs with less set ups and schedule interruptions. The factory scheduler attributes these improvements directly to the effective implementation of the S&OP process.

One of the key operations staff members interviewed at Cadbury in Auckland in late 2003 has now been relocated to Cadbury's production facility in Claremont, Tasmania. The implementation of S&OP is in its infancy at this plant and of particular interest, the 'week four spike' is alive and well at this facility. This staff member observed that it was like going back in time and looks forward to the full and successful implementation of an effective S&OP process.

5.5 S&OP at Global Semiconductor Companies (Dwaraknath et al., 2002)

In February 2002, the University of Dallas, Texas, and Cornell University, published the findings of an extensive survey into effective S&OP planning processes in nine semiconductor companies. The survey sample represented more than half of global semiconductor companies worldwide. The primary aim of the research was to reveal effective planning practices of participants to facilitate benchmarking of S&OP activities.

Research found that all companies surveyed used the S&OP process, but that the detailed operation of the process varied significantly. In all cases, marketing, operations and finance divisions were involved in the process and in most cases the process involved sales, logistics and product development divisions. In one of the nine

companies, human resources, information technology and legal were also included in the process. Sales, marketing, manufacturing and operations are the main drivers of the S&OP process in semiconductor companies.

Companies surveyed conducted S&OP on a monthly cycle. All companies hold pre-S&OP meetings at divisional or departmental level as part of the S&OP process. Only four out of nine companies surveyed had a concisely documented S&OP policy that covers the purpose, process and participants in the process. The main emphasis in S&OP was found to be aligning plans with sales demand and business strategy.

5.5.1 Forecasting

In all companies there was clear accountability for developing the forecast with one or more departments taking responsibility for forecast errors, excess inventory and lost sales. Excess inventory was not perceived as undesirable as backorders or lost sales. Many companies believed their S&OP process suffered most from inaccurate forecasts.

Companies felt that while forecasting software and statistical techniques can be useful, sales or 'field calls' and consensus estimates were considered the most effective inputs used in forecasting. In the main, forecast updates were completed monthly. In all companies there was a strong emphasis on measuring forecast accuracy. Accuracy of past forecasts gives feedback to forecasters and allows them to improve their forecast procedures. In most cases, semiconductor companies surveyed measured forecast accuracy on a monthly basis.

5.5.2 Key Items Considered at S&OP Meetings

1. Current sales, orders, sales plans and promotions
2. Sales forecast accuracy
3. Production issues
4. New product schedules and introductions
5. Financial forecasts
6. Customer service levels

7. Inventory
8. Contingency plans/risk assessments
9. Gap closure plans/actions

When considering supply and demand match most companies aggregate at product level. Some companies aggregate at product family level or a combination of both family and product level.

5.5.3 Key Metrics Reported

1. Fulfillment of the production plan
2. Capacity utilisation
3. CSL
4. DIFOT
5. Excess inventory

In all but one company the S&OP process was owned at President level. Companies rate highly two aspects of S&OP: senior management commitment and effective decision making. According to many semiconductor companies the main strength of S&OP is the bringing together of several departments and forcing them to make integrated decisions. The main weakness highlighted in S&OP processes was that the cycle was too long and there were problems with data integrity and validity.

5.5.4 Major Issues in S&OP Practices

The major issues that stood out during the survey into S&OP practices at semiconductor companies were efficiency and responsiveness of the process, forecast accuracy and integration of finances into the S&OP process.

Efficiency and Responsiveness. Companies assessed the efficiency or success of their S&OP processes by how quickly it can respond to demand changes. Many companies complained about the length of the cycle, its complexity and the validity and integrity of input data. Researchers considered that building integrated databases, and automating

the process, could resolve these issues. Automation could be achieved through utilisation of databases; intranet and improving information systems to expedite communication and extracting required data automatically. Automating the process would allow cycle time to be cut down and for the process to be run through more cycles in a month. More frequent forecasting and planning would allow S&OP plans to be updated and changed more frequently therefore leading to greater responsiveness.

Forecast Accuracy. Maintaining the highest possible levels of forecast accuracy is absolutely critical to the S&OP process. The first step toward improving forecast accuracy is measuring it. According to Dwaraknath et al. (2002), research proves the more frequent the forecasts are, the more accurate they are. It is recommended that forecast accuracy be assessed on a monthly basis.

Integration of Finances into S&OP. All companies agreed that S&OP's strength lies in the integration of decision making by bringing departments together. However there was a tendency in semiconductor companies to maintain S&OP only as an operational planning tool. Researchers expressed the view that financial planning was so critical to business success or failure that a financial view must also be integrated into S&OP (Dwaraknath et al., 2002).

Chapter 6

Results and Discussion

6.1 Critical Success Factors for Effective S&OP

Business systems and processes must be customised to meet the needs of an organisation. The S&OP process is no different. This report has examined the S&OP processes of several successful companies. These companies all take a slightly different approach to S&OP. However, there are common themes found in the approaches adopted by successful businesses.

One aspect of effective S&OP that comes through very strongly is senior management focus and support. This research finds that senior management support is absolutely critical for an S&OP process to operate at its full potential. Tied into senior management involvement in S&OP is the link between company operations and company strategy. S&OP should be operated in such a way, that it supports company strategy. Securing the link between operations and strategy are key performance metrics. Effective S&OP processes are found to have a strong emphasis on monitoring performance with all participants understanding their responsibilities and what they are accountable for. The most common timeframe for conducting S&OP is on a monthly cycle. Effective S&OP processes are regulated by strict monthly timetables and set agendas to ensure all participants understand what is required of them and the timeframe within which they must operate. These common themes are now discussed in further detail.

6.1.1 Senior Management Focus and Support

Senior management support, and involvement, is a critical requirement for S&OP. Ideally the CEO, or Managing Director, will chair the executive S&OP meeting. At semiconductor companies the process was owned at President level in all but one company (Dwaraknath et al., 2002). At both Johnson and Johnson, and Cadbury, the

CEO chairs the monthly executive S&OP meeting. At Johnson and Johnson participating managers expressed the view that one of the major strengths of the S&OP process was the high level of commitment from senior management. Peter Baldwin, Operations Director of Thornton's, a confectionery company based in Derbyshire, stated, "Thornton's could only improve its forecasting and balance highly seasonal supply and demand if all the directors were involved in the S&OP process. Top management buy-in was key. Without that, don't even bother starting" (Dwyer, 2000, p. 31).

For S&OP to achieve its full potential, senior management must be involved. Many of the decisions made at the S&OP affect the financial plan for the current year and senior management own that plan. Senior management are responsible for the financial plan and only they can make decisions that affect the outcome of the 12 month plan. If the business plan is not changed to reflect the new S&OP plan, there will be a disconnect in the financial numbers senior management is expecting and what sales and operations is working towards. In other words there will be two sets of numbers (Wallace, 2002).

6.1.2 S&OP Supports Company Strategy

The S&OP process is used to guide the business, balance supply and demand and ensure that tactical and operational level activities support company strategy. Caterpillar's integrated business planning model links the company's strategic plan to S&OP. Once the strategic plan has been put in place the S&OP process is established to support it. The S&OP takes a short-term view of operations and market activities (Correl, 2002). What management defines as critical success factors at the strategic level must be linked to the operational and tactical levels (Donovan, 2002). S&OP provides a medium for maintaining this link and forces regular review of key performance metrics.

6.1.3 S&OP Meetings Held Monthly

S&OP meetings are most commonly held monthly. Caterpillar, Johnson and Johnson and Cadbury all hold meetings monthly. Semiconductor companies surveyed were also

found to hold S&OP meetings on a monthly basis (Dwaraknath et al., 2002). It is considered that reviewing S&OP beyond a monthly timeframe would lead to the process becoming less responsive to market changes in supply and demand. However, preparation for S&OP meetings can be a major undertaking. To conduct S&OP more than once monthly would be less than ideal unless all reports and at least some of the analysis was automated. Within the monthly cycle, divisional groups hold pre-S&OP meetings to analyse results and prepare explanations and contingency plans for discussion at the executive S&OP.

6.1.4 Clearly Defined Responsibilities and Accountabilities

It is very important that S&OP meeting participants are made accountable for key performance metrics. For example, marketing and sales management would normally be held accountable for forecast accuracy and related metrics such as inventory holdings, slow moving and obsolete lines. Forecasts drive purchasing and production planning and therefore excess inventories, and slow moving lines, can result from inaccurate forecasting. At Johnson and Johnson, sales managers are held accountable for forecast accuracy and slow moving obsolete (SLOB) product lines. Manufacturing management must be held accountable for manufacturing performance metrics such as delivery in full, on time. Supply chain management is generally responsible for reporting on customer service level, reporting on out of stock events and assessing forward stock position. These accountabilities are consistent with the approach taken at both Cadbury and Johnson and Johnson.

6.1.5 Establish an S&OP Timetable and Agenda

S&OP is a structured process that requires activities to follow a logical sequence. It is important that an S&OP timetable is agreed to by the management team and that timings are followed. The process requires considerable preliminary work, which includes report generation, analysis, investigation and follow up action. Divisions conduct pre-S&OP meetings to prepare for the executive S&OP where senior managers will require explanations of the results achieved. This is a major part of the process at

Johnson and Johnson and Cadbury. One of the issues participants had with the process, was the amount of preparation work required prior to the S&OP and not always having the necessary reports and results available in time. Management at Caterpillar documented as 'lessons learned' during implementation of S&OP the importance of establishing a strict timetable, as part of the process, to ensure the various functions deliver required information on time (Correl, 2002). It is also important that an S&OP meeting agenda is published showing who is responsible and accountable for what parts of the process. This is particularly important during implementation but becomes less important as the process becomes ingrained in the culture of the company as it has become at Johnson and Johnson.

S&OP agenda items often include:

- New product developments/introduction activities.
- Forecast accuracy (%).
- Gap analysis – sales versus budget.
- Market opportunities and threats.
- Financial review of products by line and group.
- Production plan attainment.
- Production plan sign off.
- Production constraints/capacity issues.
- Delivered in full on time % (DIFOT)
- Out of stocks reported with root cause analysis presented.
- Customer service level (CSL). Reported as order/line fill rates (%).
- Inventory position including stock-turns, slow moving/obsolete (SLOB) lines and forward stock position.

6.1.6 Summary

These common themes, found in effective S&OP processes are considered critical success factors in S&OP. Critical success factors are:

- Senior management focus and support.

- S&OP supports company strategy.
- S&OP meetings are held monthly.
- Clearly defined responsibilities and accountabilities.
- Establishing an S&OP timetable and agenda that includes key performance metrics.

Chapter 7

Results and Discussion

7.1 Developing a Generic Executive S&OP Meeting Format

It is apparent from the discussion in the previous chapter that to be effective an S&OP process must be structured, have clear lines of responsibility and accountability and flow logically. The monthly executive meeting format needs to be standardised so that participants understand what performance metrics they are responsible for, and so that trends in performance can be monitored, and compared, over subsequent periods. It is the view of the researcher that Johnson and Johnson, and Caterpillar, provide excellent examples of simple, yet effective executive meeting formats that include relevant, key performance metrics.

7.1.1 S&OP Agenda Items

New Product Development and Introductions

A new product activities review is the first stage of the S&OP process at Caterpillar. New product activities must be highlighted to ensure they are aligned with company strategy and are adequately resourced to ensure product launches are kept on track (Correl, 2002). New product development has changed from its traditional role operating as a detached silo to a cross-enterprise, collaborative process (AMR Research, 2004). S&OP provides the delivery medium for ensuring new product development activities are communicated and collaboration exists across cross-functional teams. New product developments often compete with existing products for production capacity when pilot or scale-up batches are completed and production methods are being validated. These requirements need to be factored into the S&OP process and the impact of these activities on production of existing products must be understood well in advance. Reporting on new product development activities is the responsibility of the product development manager.

Marketing management is responsible for reporting on new product introductions and launch activity planned over the next 12 months. A standard format needs to be presented for each new product introduction showing launch timetable, launch stock order projections and required supply dates. The marketing, or product manager, should also be responsible for presenting a financial analysis including expected sales volumes, revenues, promotional costs, launch stock inventory investment, margin and market share targets for at least the first 12 months after launch. This analysis will show the financial contribution expected from the product on a monthly basis for the first 12 month period and show how promotional and launch costs impact upon gross margins during this period. At Johnson and Johnson this analysis allows senior management to ensure product introduction activity is aligned with company strategy and individual products are likely to meet margin targets.

Review Forecast Accuracy

Forecasts drive business and the S&OP process. Measuring forecast accuracy is a fundamental element of an effective S&OP process. Forecasts drive all aspects of a business, from purchasing to production planning, to marketing effort and financial planning. The survey of S&OP practices, in semiconductor companies, included a full section dedicated to forecasting. The report concluded that forecast accuracy was one of three major S&OP issues facing manufacturers and that measuring forecast accuracy was absolutely critical to the S&OP process. It was recommended that forecast accuracy be measured on a monthly basis (Dwaraknath et al., 2002). Measuring forecast accuracy was also considered one of the key aspects of the S&OP process at Cadbury, Caterpillar and Johnson and Johnson. Marketing and sales managers are responsible and accountable for forecast accuracy.

At Wyeth-Ayerst, the ninth largest pharmaceutical company in the world, with sales of USD\$12 billion, the forecasting process is framed within the format of the monthly sales and operations process and given a high priority. Daniel Kiely, Associate Director of Global Strategic Forecasting and Analysis at Wyeth-Ayerst, says that forecasting has very good support from high-level management. Upper management has made forecasting a priority at Wyeth and ensured adequate funding and support is provided to

the function. The company runs a specialised sales forecasting training programme aimed at improving the technical forecasting skills of its marketing staff. At Wyeth demand forecasts are used as the basis for formulating sales targets (Chaman, 2001). This approach makes a lot of sense and ensures that sales targets are closely tied to forecasted units. Logisticians are often heard to complain that there is a mismatch between sales budgets and actual forecasted units supplied by sales and marketing, in other words, two sets of numbers. At Wyeth S&OP meetings budget and forecasts are constantly compared during the formal and informal gap-analysis. This is considered a key part of the S&OP process. Forecast accuracy is measured at stock unit level and presented as average percent error, mean absolute percent error and weighted absolute percent error (Chaman, 2001).

Gap Analysis (sales versus budget) and Market Opportunities/Threats

At Cadbury, and Johnson and Johnson, gap analysis is used to track sales performance against budget. Sales and marketing managers report on gap analysis, which involves highlighting where sales are falling short or running ahead of budget. As part of this reporting process, marketing and sales managers also highlight market activity that represents opportunities or threats to the product or product group. Threats can come in a number of different forms including competitor activity, price erosion, adverse publicity, economic conditions, exchange rate fluctuations and changes in regulatory status in some industries. At the S&OP meeting contingency plans should be presented that will minimise the impact, or help avoid these threats, affecting the product and sales. Opportunities also need to be highlighted and discussed to ensure manufacturing and supply chain resources are in place to support sales and marketing in exploiting opportunities. Opportunities and threats need to be discussed in the context of their likely impact on the sales budget and operational plan. At semiconductor companies most companies considered gap closure plans as part of the S&OP process (Dwaraknath et al., 2002).

Financial Review of Products by Line and Group

Financial reviews by product or group are an important agenda item at Johnson and Johnson, Cadbury, and Caterpillar. Included in the financial review are current and projected product margins, brand contribution, inventory investment, stock turns and exposure on slow moving and obsolete lines. Revenue and margin projections are presented at Johnson and Johnson at product family level. Promotional activity, projected discounting and any other element that will impact on margins are reported by exception. Gross margin target criteria are set at strategic level and the S&OP is used as a forum to highlight and report on any products that are failing to meet minimum margin criteria. The financial review section of the S&OP is also used to confirm senior management sign off on major spends in advertising and promotion.

At semiconductor companies, financial forecasts were included as part of the S&OP process. However, the financial view was not always adequately integrated into the S&OP process at semiconductor companies. Semiconductor companies were criticised for maintaining S&OP mainly as an operational planning tool (Dwaraknath et al., 2002).

Production Plan and Plan attainment

One of the fundamental elements of the S&OP process is effectively balancing demand with supply. In manufacturing companies supply is supported directly from production activities. Production activities are dictated by production plans and derived directly from sales forecasts and inventory planning data. Production plan attainment is reported as a key metric at Cadbury's S&OP meetings as it relates directly to how well operations are supporting sales and market demand. The operational plan is set, and agreed, at the S&OP meeting, so plan attainment becomes a direct measure of performance for the operations manager.

At Cadbury, the operations manager is responsible for highlighting capacity issues or constraints that impacted plan attainment for the previous month and also where these issues will impact upon fulfillment of the current production plan. Capacity constraints

are discussed by exception and suggested solutions, or courses of action, are discussed with a full understanding of the cost implications associated with each option. The production plan is then agreed and signed off at the executive S&OP. In assessing production plan attainment an operations manager is also responsible for reporting on delivery performance or what is sometimes referred to as delivery promise. This is usually presented as a DIFOT metric. That is; what did the production unit promise or agree to as part of the S&OP process and ultimately what did it deliver on? DIFOT measures the delivery performance by due date and by completeness of delivery.

Out of Stocks

Out of stocks are reported as part of the S&OP at Johnson and Johnson along with root cause analysis. Supply chain planners conduct root cause analysis identifying the reason for the out of stock and showing the financial impact of the stock out. Johnson and Johnson have a policy of not committing out of stock lines to backorder due to the expense of administering and transporting small back orders. Therefore, an out of stock event represents lost opportunity. Out of stocks impact directly on the customer service level metric also reported at Johnson and Johnson. The CSL metric is how Cadbury and semiconductor companies monitor out of stocks. Out of stocks impact directly on order and line fill rates, which make up the CSL performance metric.

In addition to reporting out of stocks, Johnson and Johnson take a proactive approach to out of stocks by assessing forward stock position by product line and highlighting products where there is potential for an out of stock position. This allows contingencies to be planned ahead of time, with a view to avoiding an out of stock position, or at least minimising the stock out period and forewarning sales and marketing divisions.

Inventory Position

Inventory position must be assessed as part of the financial review. Inventory investment directly impacts upon company cash flow and warrants careful analysis at the S&OP. Stock turn and total inventory investment should be presented and measured by product line and group. Excessive inventory by line should be reported by exception.

Johnson and Johnson apply an inventory holding charge (%) by line that impacts on overall product contribution. This holding charge represents the opportunity cost of having company revenue tied up in inventory.

Many companies also use the S&OP process to highlight exposure on slow moving and obsolete lines. Visibility on SLOB lines at the S&OP ensures actions are taken to reduce this financial exposure and product managers responsible for these lines remain accountable. At Johnson and Johnson sales management is responsible for reporting on actions taken to reduce SLOB.

7.1.2 Generic Executive S&OP Meeting Format

A generic S&OP meeting format is set out in Table 3 below. The outline format is based on the format used at Caterpillar with performance metrics based on the S&OP processes in place at Cadbury Confectionery New Zealand, Caterpillar USA, and Johnson and Johnson Pacific. It is suggested that with some customisation, this executive meeting format could be successfully applied at Douglas Pharmaceuticals Ltd, or at any other manufacturing based operation, wanting to adopt an effective S&OP meeting format.

Table 3. Generic Format – S&OP Executive Meeting

S&OP Executive Meeting Format	Responsible
<p><u>Section One: New Product/Activities Review</u> Review new product developments, introductions/launches over the next 12 months. Production capacity requirements, both immediate and medium term. Review financials including return on investment (ROI) over first 12 months. (launch stock investment, promotion activity, revenues, margins, market share targets). Highlight supply chain/manufacturing support required.</p>	NPD Manager Marketing Manager Marketing Manager Marketing Manager
<p><u>Section Two: Demand Review</u> Forecast accuracy by division and group. Presented as MAPE and/or % bias. Market opportunities and threats discussed.</p>	Product Manager Product/Marketing Manager
<p><u>Section Three: Supply Review</u> Review historical CSL. Production plan attainment, deliveries (DIFOT %) and capacity utilisation (%). Aggregate level production plan over next three to six months. Production constraints/capacity issues, immediate and projected (up to 12mths). Out of stocks with root cause analysis. Forward stock position highlighting potential out of stocks by exception, present contingencies.</p>	Supply Chain Manager Production Manager Production Manager Production Manager Supply Chain Manager Supply Chain Manager
<p><u>Section Four: Financial Review</u> Inventory Stock turn and (\$) investment by division and group. Slow moving and obsolete (SLOB) stock. Review and decisions. Financials Gap analysis, sales versus budget. Highlight and discuss market threats and opportunities. By product and group - projected revenue and margins (includes expenses ie. promotions and advertising spend by product group. Incorporates non - budgeted increases in COGS and sales price reductions).</p>	Product Manager Product Manager Marketing Manager Product Manager

Chapter 8

Results and Discussion

8.1 Evaluation of Douglas Pharmaceuticals' S&OP Process

8.1.1 Background

In 1999, management consultants Price Waterhouse Coopers, conducted a review of business processes and practices at Douglas Pharmaceuticals Ltd. One of the recommendations of that review was that the company would benefit from a more detailed review of its supply chain operations, including logistics and manufacturing operations. In late 1999, management consultants, Simpl Group, conducted a detailed review of supply chain operations. Simpl would be charged with making recommendations for improvement, re-engineering where necessary and driving implementation of improved processes. The main findings of this review included the need to introduce a formal demand forecasting system, integrated ERP and an S&OP process.

Douglas Pharmaceuticals had planned to implement the Protean ERP system at its Auckland head office by mid 1999. By March 1999, the implementation had foundered and was postponed for 12 months. Protean had been implemented within the manufacturing operation three years prior, but the planning module had never been activated. Douglas Pharmaceuticals' head office, which included the logistics and purchasing functions, used the Pinnacle system, which operated in complete isolation to the manufacturing operation's Protean system.

Demand for product was placed on the Douglas manufacturing facility via purchase orders generated in Pinnacle. Purchase orders were faxed to the manufacturing facility where they were manually keyed into Protean. In early 2000, Simpl Group management consultants introduced demand forecast software 'Demand Solutions' and for the first time demand forecasts were being downloaded into manufacturing's MRPII system. However, the benefits of interfacing demand forecasting with Protean would not be realised until the Protean-planning module had been activated. This would not occur until October 2000.

Simpl Group introduced the S&OP process at Douglas Pharmaceuticals in May 2000. Simpl involved mainly operations staff, when implementing the S&OP process. The process was presented to product managers, the senior executive team, and directors, in a presentation that outlined the process, how it could be applied and the potential benefits the process could bring. The Simpl consultant then appointed manufacturing as the main sponsor of S&OP and assisted key operations staff in developing the process.

Although Douglas did not yet have an integrated planning process, Simpl consultants felt that putting the mechanics of the process in place would be worthwhile. This would allow Douglas staff to be involved in implementing the process and for them to become familiar with the mechanics of the process and the various reporting responsibilities. The consultant responsible for implementing S&OP left the company shortly after the first monthly cycle, which left Douglas managers grappling with a new process, that none of them had experience with.

In his book, *Sales and Operations Planning: The How To Handbook* (p.66), Tom Wallace recommends that where there is no in-house support from an S&OP-knowledgeable person that a consultant should be employed during implementation. The consultant should only be required for about two days per month for the first eight months of S&OP implementation and is there to guide the process, head off problems before they occur and keep the project on the rails. "Among companies that have used this kind of outside expertise, the percentage of successful implementations is very high. Among companies that haven't done so, the success rate is much lower" (Wallace, 1999, p.66).

Without support from an S&OP knowledgeable person during the implementation at Douglas, the process was developed with a narrow, operational focus. There was a lack of understanding and knowledge about the S&OP process. Some operational staff and managers became disillusioned with the process early on and the process never gained direct senior management involvement or support.

8.1.2 Introduction of Monthly S&OP Meetings

Initial development of the S&OP process at Douglas involved agreeing divisional responsibilities for generating reports and reporting on the results. Reports included the recommended production plan for the next three months, forecast accuracy performance for the previous month and current out of stocks. The recommended production plan was generated from the company's Protean MRPII module. The forecast accuracy report was generated from the newly introduced demand forecasting system, Demand Solutions. The out of stock list, generated by the logistics department, was a historical report presented as an excel spreadsheet that showed current out stocks and the expected date of arrival. These three key reports made up the agenda of early S&OP meetings. Typical S&OP meetings lasted approximately an hour to an hour and a half with about 10% of this time allocated to forecast accuracy and out of stock review and the remaining 90% of time spent confirming the production schedule for the following month. The early S&OP meetings could be more accurately described as production scheduling meetings rather than true S&OP meetings.

The main emphasis for meeting participants was discussing the production plan in detail and suggesting adjustments to production schedule due dates and quantities. The main focus for the logistics manager, was ensuring appropriate quantities of product were being produced to meet customer order requirements or to replenish distribution centre stockholdings on time. The production planner, and production manager, came to the meeting prepared to comment on production or capacity issues that may impact the plan. Purchasing staff came to the meeting prepared to discuss any order delivery issues that may impact the plan. The business development manager attended meetings to represent the interests of marketing, sales and product managers who only occasionally attended the meeting and to gain an overview of the production plan and any issues that may impact supply of product. The business development manager would also occasionally share information on marketing strategies with various products or up coming product launches for products he was involved with.

The initial approach to S&OP placed heavy emphasis on setting and agreeing the production plan. Forecast accuracy performance was given little attention in the

early stages of S&OP implementation. This was understandable, given that the planning module had not been activated at manufacturing and therefore the demand forecasts were not yet driving planning and production scheduling. At semiconductor companies, forecast accuracy was one of the three major S&OP issues facing manufacturers and measuring it is considered absolutely critical to the S&OP process (Dwaraknath et al., 2002).

8.2 Evolution of the S&OP Process at Douglas Pharmaceuticals

Over the past four years, the S&OP process at Douglas has evolved as staff and managers have come to understand the process and its limitations. The process has been improved as new systems have become available and responsibilities and accountabilities have been more clearly defined. Improvements in the process also include the streamlining of meeting and reporting formats.

8.2.1 Integrated ERP and S&OP

By late 2000, the planning module within Protean had been activated at manufacturing and Protean had been successfully implemented at Douglas head office. Douglas now had a fully integrated ERP system operating. ERP is a term used to describe multi-module application software that serves to integrate important business activities including product planning, purchasing, inventory management, supplier interaction, customer order management, tracking of orders and financials. MRP on the other hand, is limited to materials requirements planning only. While MRPII (manufacturing requirements planning) is a process that determines the material, labour and machine requirements in a manufacturing environment (Piasecki, 2003). It is important to understand the differences between MRP, MRPII and ERP as these terms are often used interchangeably, in error.

The new ERP system integrated demand forecasting with planning, purchasing and production scheduling. As with all new systems, validation would take several months. Software and set up problems were identified and corrected by users and system support staff. By April 2001, staff had gained confidence in the new system and began incorporating it into the S&OP process. The main contribution, the automated planning system would make would be in providing production planning

recommendations, and purchasing recommendations, for future months. These recommendations were derived directly from the demand forecasts entered into the planning system. As part of the S&OP it was decided to report production schedule recommendations for only three months in advance.

8.2.2 Management of the S&OP Process

In June 2001 it was suggested by meeting participants that it was more appropriate that the Supply Chain Manager manage the S&OP process and responsibility was passed over from manufacturing. The Production Planner remained a key figure in the preparation of monthly reports. The Supply Chain Manager would be responsible for managing the S&OP process, including implementing improvements and chairing the demand pre-S&OP meeting and the executive S&OP meeting.

8.2.3 Integration of Douglas Pharmaceuticals Australia Limited

In November 2001, Douglas Pharmaceuticals' Sydney based operation, Douglas Pharmaceuticals Australia Limited (DPAL), was integrated into the Douglas S&OP process. Historically, DPAL had placed manual orders on Douglas Pharmaceuticals in Auckland for the supply of product. These orders were generally batch size quantities and were often submitted without adequate planning lead-times. This resulted in the 'bullwhip effect' described earlier in this report and insufficient order lead-times resulted in expediting materials and in products running out of stock.

Integration of DPAL into the S&OP planning process involved input from the Logistics Manager at DPAL. DPAL were required to provide monthly updates on stock on hand information and demand forecast changes. At Douglas Auckland, DPAL products, that had historically been managed on a 'make to order' basis, were changed to 'make to stock'. DPAL products had planning parameters set in Protean in consultation with DPAL management. This allowed Douglas to aggregate DPAL demand with products supplied to other customers and supply was then monitored through the S&OP process. This resulted in automated planning for DPAL products and with aggregation of demand this effectively lowered inventory holdings at both sites.

According to Douglas Auckland's Supply Chain Manager, formal aggregation of demand and supply through the S&OP process has allowed Douglas to reduce stockholdings of finished goods at DPAL and to reduce work in progress, raw materials and component inventory at the manufacturing site. In some product lines, average finished goods inventories held at DPAL dropped from levels of four to six months down to average holdings of two to three months. In addition to the above benefits, the supply chain manager also points out that product supplied by Douglas rarely run out of stock at DPAL. Douglas Pharmaceuticals' Procurement Manager cites an additional benefit of integrating DPAL into the Douglas planning and S&OP process being that there are now far fewer material expedites than there were in the past. At times, purchasing staff were embarrassed to contact suppliers as most often orders were urgent and required as soon as possible. Expedites were also impacting on the cost of goods as airfreight became the only option for receiving materials on time.

8.2.4 Presentation of Forecast Accuracy Reports

Forecast accuracy reports have been presented as part of the S&OP executive meeting since its inception. The reports were presented in table format and contained products defined as A class lines. A class lines are products that meet set criteria relating to the product's gross margin contribution or unit sales volume. The forecast reporting format is discussed in greater detail later in this report.

In December 2001, the names of product managers were added to the divisional or product group title. Two columns were also added to the table. The first column was titled 'explanations' and the second 'actions'. These changes were driven by the supply chain manager in an effort to make product managers directly accountable for the level of forecast accuracy achieved in A class products under their control. The explanations column requires an explanation for why the product forecast accuracy error was greater than 20% and the actions column requires the product manager to explain what actions have since been taken to improve forecast accuracy. This change was designed to make product managers clearly accountable and emphasize actions for improving future forecasts. Product managers rarely attend the S&OP meeting so this change also allowed product managers to convey

explanations and actions to participants of the executive S&OP without attending the meeting.

In July 2002, the demand forecast administrator began presenting forecast accuracy results for each product division in graphical form. The graphical presentation allowed product managers, and S&OP meeting participants, to assess overall performance for each product division as the trends in accuracy results show clearly in graphical form.

8.2.5 Tender Products Review

In November 2003, the Marketing Manager Dispensary took over responsibility for attending the S&OP meetings and representing the interests of marketing. This manager introduced a tender products review, as a new agenda item at the executive S&OP meeting. The review was designed to focus attention on products supplied for PHARMAC tender. The company is liable for fines of up to \$50,000 for out of stocks on tender products. The tender product review focused attention on the stock position, and tender expiry dates, of each tender product. The aim of the review was to ensure that stock outs don't occur and to ensure the company is not exposed to overstocking at the end of a tender period. The potential out of stocks report, presented at the executive S&OP meeting, was designed to highlight potential stock outs for all products including tender products. However the potential out of stocks report had limitations that will be discussed later in this report. The tender product review report added a new dimension to reporting, as it formally reported on potential stock surpluses at the end of a tender period. The introduction of the tender product review was considered a key initiative and remains part of the current executive S&OP meeting agenda.

8.2.6 Pre-S&OP Capacity Meeting

In March 2004, Douglas introduced pre S&OP production capacity meetings in order to assess confirmed S&OP product demand against the capacity available. This meeting involves assessment of the plan against capacity line by line. The production planner, technical manager and production manager attend the meeting. In the past, the manufacturing facility would signing off on the S&OP production

plan without full consideration of what capacity constraints the plant was likely to face in meeting the required plan.

8.3 The Current S&OP Process at Douglas Pharmaceuticals

The Supply Chain Manager currently manages the S&OP process with major contributions to preparation for the monthly meetings made by the Demand Forecast Administrator and the Production Planner. The S&OP process is a core component of the company's monthly planning cycle with planning activities undertaken in sequence each month culminating with the executive S&OP meeting. An example of Douglas Pharmaceuticals' monthly planning cycle is shown at Table 4 below.

Table 4. Douglas Pharmaceuticals Ltd Monthly Planning Cycle – April 2004

Date	Activity	Responsible
1 April	Roll over forecast – Demand Solutions	Forecast Administrator
2 –6 April	Confirm forecasts	Forecast Administrator Product Managers
7 April	Import forecast into Protean's MRPII module.	Production Planner
8-14 April	Review and confirm planning recommendations	Production Planner
15-21 April	Review and action purchasing recommendations	Purchasing staff
21 April	Pre-S&OP demand meeting	Supply Chain Manager Procurement Manager Production Planner New Product Introductions Rep
23 April	Pre-S&OP capacity meeting	Production Planner Technical Manager Production Manager
26 April	Executive S&OP meeting	Chair: Supply Chain Manager Attendees: General Manager Production Marketing Manager Dispensary Production Manager Production Planner Technical Manager Procurement Manager Forecast Administrator Purchasing Officer New Product Introductions Rep

Douglas Pharmaceuticals' executive S&OP meeting is held monthly and is chaired by the Supply Chain Manager. The agenda of the monthly executive meeting is

shown below at Table 5. Other managers that currently attend the executive S&OP meeting include the General Manager Manufacturing, Marketing Manager Dispensary, Production Manager, Technical Manager and the Procurement Manager.

The monthly executive meeting agenda is outlined as follows:

Table 5. Executive S&OP Meeting Agenda

Agenda Item	Responsible
Review previous month's production plan attainment/service level performance.	Production Planner
Review previous month's forecast accuracy performance.	Marketing Manager Supply Chain Manager
PHARMAC tender product review.	Marketing Manager
Review forward production plan - next three months.	Production Planner
Review new product introductions vs expected delivery dates.	New Product Introductions Coordinator
Review current out of stocks.	Supply Chain Manager
Review potential out of stocks and future supply ability	Production Planner

In August 2003, a meeting was held to discuss Douglas Pharmaceuticals' S&OP process and what could be done to improve it. Several articles on the topic of S&OP were distributed to staff and managers who were involved in S&OP. During the meeting it became evident that there was strong interest in improving the current S&OP process operating at Douglas Pharmaceuticals. Meeting participants concluded that the current process could be improved as follows:

- Reviewing and clearly defining key metrics and accountabilities.
- Involving senior management.
- Increased emphasis on forecast measurement and accountability.
- The financial plan and budget should be tied into S&OP.
- Reviewing production capacity.
- Including new product development and introductions.
- Improving the accuracy of reports.

Meeting participants expressed the view that an improved S&OP process for Douglas would result in better control over product introductions, better visibility,

clearer lines of responsibility and accountability, improved communication and better financial results.

8.4 Effective S&OP: How Does Douglas Pharmaceuticals Compare?

The critical success factors for S&OP were identified earlier in this report as:

- Senior management focus and support.
- S&OP supports company strategy.
- Monthly executive S&OP meetings.
- Clearly defined responsibilities and accountabilities.
- Establishing an S&OP timetable and agenda that includes key performance metrics.

8.4.1 Senior Management Focus and Support

Senior management at Douglas Pharmaceuticals Limited includes the positions of Managing Director Douglas Pharmaceuticals Limited and Managing Director Douglas Pharmaceuticals Europe Limited. Senior managers at Douglas have always supported the concept of S&OP, but have never been directly involved in the process. Research findings of this report clearly indicate that for S&OP to be successful, senior management must be directly involved in the process. Direct involvement at Cadbury and Johnson and Johnson includes the CEO chairing the executive S&OP meetings. Research findings indicate that S&OP will never be truly effective without the direct involvement of senior management driving the process and keeping subordinate managers accountable for performance.

Douglas managers and staff involved in the S&OP recognise the need to have senior management directly involved in the S&OP process. This was raised as an issue at the August 2003, S&OP review meeting. However, there has also been reluctance by some managers to involve senior management until some aspects of the current S&OP have been improved. For example, there is consensus among participants that the accuracy of some reports need to be improved as well as the general format of the monthly executive S&OP meetings. Managers involved in the current S&OP process agree that these issues need to be resolved so that the S&OP process can be

sold to senior management. S&OP must be presented as a robust process with a strong framework and structured meetings providing worthwhile, timely and accurate information about the business. S&OP must be presented as a process worthy of director involvement.

8.4.2 S&OP Supports Company Strategy

Douglas Pharmaceuticals' company strategy has, until recently, been reviewed on an adhoc basis and has not kept pace with the company's rapidly changing business environment. In addition to this, without senior management involvement in the S&OP process, the S&OP has not been tied in to support company strategy.

The S&OP process should be used to guide the business, balancing supply and demand and ensuring the tactical and operational level activities are supporting Douglas strategy. Caterpillar's business planning model clearly links the strategic plan to S&OP (Correl, 2002). At Johnson and Johnson, key metrics set at strategic level filter down into the S&OP process. For example, the company strategy includes minimum gross margin contribution criteria down to product level. Managers know that if a proposed product introduction does not meet this criterion, then the proposed introduction will be rejected at S&OP level. This is an example of how the S&OP process is used to ensure tactical and operational activities are supporting company strategy.

Douglas management have recently committed to revising the company's strategy statement and objectives on an annual basis and tying in divisional and manager performance to support this strategy. There is now an opportunity for the S&OP process to be tied into support company strategy and be used as a means of tracking company performance on a monthly basis. The S&OP can also provide a valuable insight to performance projections for coming months. Ensuring the S&OP supports company strategy must now become a priority task for Douglas Pharmaceuticals management team.

8.4.3 Monthly Executive S&OP Meetings

This is one key aspect of effective S&OP that Douglas has already implemented. Douglas has also implemented pre-S&OP meetings to consider in detail, demand requirements and production capacity prior to the monthly executive S&OP meeting. However, meeting participation needs to be reviewed to ensure that staff and managers attending various S&OP meetings are capable of contributing at an appropriate level in order to add value at these meetings.

8.4.4 Clearly Defined Responsibilities and Accountabilities

Clearly defined responsibilities and accountabilities are key requirements in the S&OP processes operating at Johnson and Johnson, Cadbury, and at Caterpillar. Douglas Pharmaceuticals' S&OP process does have clearly outlined responsibilities and accountabilities for key performance metrics. The Production Planner is responsible and accountable for plan attainment. Product and marketing managers are responsible and accountable for forecast accuracy. However only one of the four marketing or product managers employed at Douglas regularly attends the S&OP meetings.

The senior manager responsible for product and marketing managers is not present at the S&OP and forecast accuracy is not reported outside of the monthly S&OP meeting. Marketing and product managers are not being held accountable for forecast accuracy. Accountability implies the right to seek information about, and investigate the actions, of another party. To be held fully accountable implies the right of one party to impose remedies and sanctions on another (Mulgan, 2002). This is not possible at the current S&OP as most managers responsible for forecast accuracy don't attend the S&OP meeting and if they did attend, they would only be accountable to peers and colleagues. It is unlikely that peers and colleagues would be able to effectively impose remedies and sanctions on these product managers to improve forecast accuracy performance. There is also a lack of direct accountability to superiors in the cases of the General Manager Manufacturing and the Supply Chain Manager due to the fact that the directors they report to are not present at the meetings. If senior management is not present at the S&OP meetings then they are not privy to the key performance results of departments or divisions as reported at

the executive S&OP meeting. This being the case, managers are not being held fully accountable for performance in key areas.

John Boyer, a past chairman of APICS, management consultant specialising in S&OP implementations, highlights lack of accountability as one of the common mistakes organisations make when applying the S&OP process. As Boyer puts it, without accountability the process has “no guts” (Boyer, 2004, p.7). One of the keys to success in S&OP is making sure each person knows what they are accountable for, are prepared and speak to their numbers (Boyer, 2004).

8.4.5 Establishing an S&OP Timetable and Agenda

Douglas Pharmaceuticals has already established an S&OP timetable and agenda that includes key performance metrics and some of the key timings that must be adhered to. Table 4, above entitled ‘Douglas Pharmaceuticals Ltd Monthly Planning Cycle – April 2004’ provides some of the key timings for report generation required as part of the S&OP and timings of the pre S&OP meetings. However, a more detailed timetable needs to be established detailing the required completion and availability dates/times for all reports generated for both the pre S&OP and executive S&OP meetings. One of the major issues raised by Johnson and Johnson and Cadbury staff was the need to have the necessary reports available on time to prepare for various stages of the S&OP process. Caterpillar documented as ‘lessons learned’, the need to establish a strict timetable as part of the process, to ensure the various functions deliver the required information on time (Correl, 2002).

8.5 Douglas Executive S&OP Meeting Format versus the Generic S&OP Format

The current executive S&OP meeting format at Douglas Pharmaceuticals is shown at Table 5, above. A generic executive S&OP meeting format is presented at Table 3, above and is based on the meeting formats of Caterpillar, Johnson and Johnson and Cadbury. These are successful companies that are obtaining positive results from S&OP. There are significant differences between Douglas Pharmaceuticals’ current meeting format and that presented at Table 3. It is considered important that

comparisons are made between the current meeting format applied at Douglas and the generic format applied by companies included in this research.

8.5.1 Section One: New Product Activities Review

The new product activity review is the first section of the recommended S&OP meeting format. In this format, an NPD manager begins the meeting by providing an overview of what new products are likely to be commercialised over the next 12 months, and provides a progress update on each product. The NPD manager also highlights production capacity requirements for NPD products over the next 12 months and in particular details capacity requirements for the next three to six month period. An example of these capacity requirements may be where a product needs to be scaled up from a pilot batch size to a commercial batch size. This project will require re-allocation of equipment and staff who normally would be employed in commercial production. The executive S&OP meeting provides an ideal forum for highlighting NPD activities, considering how these activities will impact on commercial operations and gaining cooperation and commitment from manufacturing and other divisional managers.

This first section of the S&OP meeting also requires the marketing or product manager to report on new product introductions and launch activities over the next twelve months. Product launch activities occurring over the following three to six months are to be discussed in detail to ensure launch activities are fully understood and supported by the various S&OP meeting participants. According to managers involved in Johnson and Johnson's S&OP, the financial review of each new product, or range of products, is an important part of this section. The financial review includes highlighting the launch stock investment, projected cost of promotional programmes, projected revenues, margins and market share targets. This review ensures that individual products meet financial criteria for product introductions and project positive returns. At Caterpillar, the first step in the process is the new product activities review. This ensures new products and development activities are in line with company strategy, future resources are available and performance metrics are being achieved (Correll, 2002).

Douglas Pharmaceuticals' current S&OP format includes only a limited review of new product introductions, which centres on the product to be introduced and expected availability date from manufacturing. The review includes only those products that are to be manufactured and or packed at Douglas manufacturing and is presented as a single page summary. The summary includes the product code, description, customer name, expected availability date and a comments column. The summary highlights product progress using a colour-coded system. The colour green indicates supply of product is on track as planned. The colour beige indicates that supply of product on the planned date, depends on activities outside of the direct control of manufacturing. Reasons for uncertainty may include, product registration being delayed by regulatory authorities or approved artwork for packaging has not yet been received from the client or customer. The colour red indicates that the product has missed the planned date of supply and has been put on hold for reasons outside of the company's control. Products that are coded red may have been put on hold due to unforeseen delays in the registration process or where a product launch is being re-evaluated. An example of the new product introduction report currently presented at the Douglas executive S&OP meeting is provided at Appendix C.

At Douglas Pharmaceuticals the new product introduction review is currently one of the last agenda items in the executive S&OP meeting agenda. Product introduction is the first stage of the product life cycle and therefore it would be logical to consider product introduction and development as the first stage of the S&OP meeting agenda (Guiltinan et al., 2003). The format of the executive meeting at Douglas should be re-evaluated with a view to conducting the new product review as the first stage of the process. This will provide the meeting with a more logical starting point.

Conclusion. Douglas Pharmaceuticals' executive S&OP meeting currently lacks an effective review of new product introductions and activities. The main limitations are that the review only includes products that are being supplied by Douglas manufacturing, there is no financial data presented and the review is presented by an operations staff member rather than by a product or marketing manager. To improve the current process, Douglas must adopt a formal new product activities review as the first section of the executive S&OP meeting. This section of the meeting should be structured as described above, with the NPD manager providing a summary

review highlighting how development activities are expected to impact on commercial operations. In addition, marketing or product managers should report on new product launch activities and the financial projections on each of these products. The review also needs to include new products purchased as finished goods from third-party suppliers as well as new products supplied from manufacturing.

8.5.2 Section Two: Demand Review

The demand review involves reporting on historical forecast accuracy and current market threats and opportunities. As outlined in the generic S&OP executive meeting format, forecast accuracy should be reported by division or by product group.

At Johnson and Johnson, forecast accuracy is presented as mean absolute percentage error. MAPE is measured across all products. Products with the lowest accuracy scores are highlighted and reported on by exception. At Johnson and Johnson, the CEO and his directors attend the monthly executive S&OP meeting. Product managers provide a verbal presentation to this group of senior managers, explaining variances in forecast accuracy and reporting on actions taken to improve accuracy. Product managers at Johnson and Johnson are held strictly accountable for forecast accuracy.

MAPE is particularly useful for calculating forecast accuracy across a product range or group of products. An example showing how MAPE is calculated is shown below at Table 6. The example uses actual sales and forecast data from Douglas Pharmaceuticals' fastest moving, Pinetarsol products for May 2004.

Table 6. Calculation of Mean Absolute Percentage Error (MAPE)

Code	Product	Forecast (units)	Actual (units)	Error (units)	APE (1) (%)
31090	Pintarsol Gel 100g	1,059	1,077	18	1.7
45031	Pinetarsol Disp Pac 1 litre	2,222	1,999	223	10
45024	Pinetarsol Shower 200ml	600	783	183	30.5
45030	Pinetarsol Disp Pac 500ml	3,120	2,499	621	19.9
45021	Pinetarsol Solution 200ml	428	662	234	54.6

Note 1. APE (Absolute Percentage Error) = Unit error/unit forecast.

MAPE = Sum of APE/No. of Products (University of Idaho, 2004)

MAPE = (1.7+10+30.5+19.9+54.6)/5

MAPE = 23.34%

At Douglas, forecast accuracy is presented using absolute percentage error at product level and at the aggregate or divisional level. Forecast accuracy is measured at as an accuracy percentile, rather than an error percentile or MAPE. Forecast accuracy spreadsheets are circulated prior to the executive S&OP meeting requiring product managers responsible to highlight explanations and actions for accuracy errors greater than 20%. A sample of the divisional forecast accuracy report is attached as Appendix D. The completed reports are published with the executive S&OP notes each month, however, Product managers generally don't attend the monthly meeting to report on the results.

At Douglas, products are categorised using ABC analysis. Products are placed into categories depending on their relative importance to the business. Products are categorised as A items if they meet certain criteria relating to margin contribution, sales volume or if they are considered critical care lines. For example, products will be categorised as A items if they achieve a gross margin in excess of 50% or achieve unit sales in excess of 10,000 units per month. When products of this nature go out of stock, the repercussions for the business are immediate and substantial.

Critical care lines are also categorised as A items. Critical care lines are pharmaceutical products that play a key role in patient safety for example; in post-operative care, where Douglas Pharmaceuticals is the sole market supplier of a particular product. Douglas Pharmaceuticals has a responsibility to the community to ensure uninterrupted supply of such products and operates a zero-tolerance policy

for stock outs on these lines. Current S&OP practice at Douglas is to monitor forecast accuracy on A items only. Monitoring forecast accuracy for A items is important, however A items only make up 15% of the Douglas product range and this leaves forecast accuracy on the remaining 85% of product lines unmonitored.

Douglas Pharmaceuticals uses demand forecasting software Demand Solutions, to generate a company forecast accuracy report that highlights accuracy performance by division. This report is presented at Appendix E. The report provides twelve months history of forecast accuracy results achieved by each product division. Line graphs are generated using the data in this report and product managers find these very useful in identifying trends in accuracy. The report is generated within Demand Solutions and is configured to calculate the forecast accuracy results of A items only. The report presents the raw score and percentage accuracy achieved during each month and also provides a month on month comparison where percentage improvement is calculated over the previous month's results. In addition to this report, the forecast administrator provides a line graph that plots the overall company forecast accuracy results for A items.

Overall, the reporting formats used to assess forecast accuracy at the Douglas executive S&OP meetings are considered adequate. However, forecast reporting should be expanded beyond A items to include all Douglas products. Forecast accuracy reporting could also be simplified at Douglas, by incorporating the MAPE metric rather than the current APE format at product level and accuracy metric at divisional level. MAPE is the most commonly used method of measuring forecast error in manufacturing supply chains. The advantages of MAPE are that it is simple to understand and robust as a computational measure (Chockalingam, 2003).

Conclusion. Douglas Pharmaceuticals' current executive S&OP meeting format would be improved by incorporating a demand review section as outlined in the generic S&OP meeting format. The effectiveness of the S&OP meeting would be significantly improved if product managers were made to report on forecast accuracy each month. Lack of accountability for forecast accuracy results is a major weakness of the current S&OP process operating at Douglas Pharmaceuticals. This weakness was identified as a priority concern during the August 2003, S&OP review meeting and has yet to be resolved.

8.5.3 Section Three: Supply Review

The supply review section of the generic executive S&OP meeting format includes a review of recent supply performance against key performance metrics. The supply review also requires consideration of the production plan for the following months and any capacity constraints, or other production and supply issues that need to be considered. The supply review requires root cause analysis of stock outs and takes a proactive approach to potential stock outs by attempting to predict these and present contingencies to either avoid stock outs or reduce the period of stock out.

Customer Service Level Reporting. As part of the supply review, the supply chain manager is responsible for reporting on CSL achieved over the previous month. This is normally reported as a percentage of customer orders and order lines that have been delivered in full on time. Currently CSL is not reported as part of the S&OP meeting format.

In late 2002, Douglas Pharmaceuticals' Supply Chain Manager recognised the need for a CSL report that could be presented as part of the executive S&OP. The company's information technology department developed a CSL report to the specification requested, that could be generated directly from ERP system Protean. The new report was designed to take the place of the manually generated out of stock report and provide the S&OP meeting with more useful information on service level performance and the impact of stock outs. The report was designed to present order fill rates and order line fill rates, for both retail pharmacy and pharmacy wholesalers over a given period. The CSL report would also provide information about the average sales value of orders and the sales value of backordered items for a given period. Therefore, the report would provide valuable information not only on service level performance, but it would also provide an indication of how stock outs were impacting on the business.

The new CSL report was presented at the S&OP meeting in February 2003. Meeting participants agreed that the format was useful and would provide a valuable ongoing assessment of company performance. However, there were major inaccuracies in the report, caused by the way the report gathered and interpreted information and these

issues were compounded by the company's product backordering policies. To gather information on customer service level the report targeted back ordering activity over a given period. The report was capturing backorders taken for new product launches where launch stock was not yet available, as well as existing products that had gone out of stock. The report also presented 'phantom' back orders for products that had not recently been out of stock. Several attempts to resolve the problems and fully validate the report over the following weeks were unsuccessful. The report was put on hold.

CSL is a key S&OP performance metric at Johnson and Johnson and Cadbury and should be part of Douglas Pharmaceuticals' S&OP process. The Supply Chain Manager should be held accountable to senior management for managing the successful validation of the CSL report and reintroducing this report as part of the executive S&OP meeting. A sample copy of the Douglas CSL report tracking is attached as Appendix F. The sample CSL report is presents data on pharmacy orders received over the reporting period.

Production Plan Attainment. Production plan attainment is currently reported as part of the Douglas executive S&OP. The format currently used by Douglas is attached as Appendix G. The production results report provides a comparison of the planned unit output for the previous month with what was actually achieved. The key metrics presented are the percentage of plan achieved, the percentage DIFOT and the average number of days late for orders that did not meet DIFOT. In addition, the report details the misses for the month along with reasons for misses and also lists extras packed. Extras packed are products that were not planned in the original schedule. Extras normally include planned units carried over from the previous month or products brought forward due to expediting customer requests, or due to unplanned capacity becoming available.

The monthly production results report provides a good assessment of production plan attainment and an adequate analysis of the reasons for misses. This level of S&OP reporting is consistent with that of Cadbury, a company that is also heavily dependant on manufacturing activity. However, Douglas must also work to incorporate capacity utilisation reporting at the S&OP meeting. Capacity utilisation reporting is an important component of S&OP supply reporting at Cadbury and

Caterpillar. This allows management to assess whether adequate resources are available to support demand and to identify areas of under utilisation that need to be addressed (Correll, 2002).

Future Production Plan. The future production-packing plan for the following three-month period is currently presented as part of the Douglas executive S&OP. A sample of this report is provided as Appendix H. For each product listed, the report provides schedule status, schedule number, production model name, product description, quantity to be produced, schedule start date and schedule due date. The report presents products in sections according to what packing line will be utilised. For example, the code 760 indicates product will be packed on tablet blister line 760.

The Douglas management team currently involved in the executive S&OP, find the current production plan format easy to follow and logically presented. However, the report could be further developed to include projected capacity utilisation statistics. This would draw attention to any future production bottlenecks, or areas of constraint, that could be considered and further discussed at the executive S&OP meeting. As part of the generic S&OP meeting format presented at Table 3, the production manager would normally be charged with presenting on immediate and projected capacity constraints. Review of production capacity, and its impact on the production plan, has long been recognised as a weakness in Douglas Pharmaceuticals' current S&OP process. Review of production capacity was identified as an area requiring improvement during the August 2003, S&OP review meeting.

Douglas Pharmaceuticals' production manager should present an overview of not only the monthly packing plan, but also the bulk liquids and tablet manufacturing plan. Both reports should provide an indication of projected capacity utilisation of manufacturing and packaging equipment in line with current demand requirements. This could be presented as a percentage. For example, if at the end of the 760 blister line section the number 87% appeared, this would indicate that the 760 blister line has projected capacity utilisation of 87% during that month.

Out of Stocks. The Douglas executive S&OP meeting includes presentation of the current out of stock report. The report is generated weekly and provides a snapshot of the out of stock position each Friday. A sample of this report is attached as Appendix I. At Johnson and Johnson product group planning staff are responsible for updating the out of stock list daily on the company intranet system. The out of stock report provides root cause analysis and the Supply Chain Manager is responsible for presenting the previous month's report at the executive S&OP meeting. Douglas Pharmaceuticals' current out of stock report generally provides adequate root cause analysis as is evident in the sample at Appendix I.

The content of the out of stock report could be improved by formalising a process of root cause analysis and by changing the column heading from 'comments' to 'root cause'. The method of reporting out of stocks could also be improved by following the Johnson and Johnson model and by producing the report on a daily rather than weekly basis. The current method of reporting leaves gaps and does not accurately reflect the company's position on out of stocks. For example, if a product goes out of stock on a Tuesday, and is back in stock by Friday morning, the product is not included in the out of stock report generated on Friday afternoon.

Forward Stock Position. Companies with highly developed S&OP processes like Johnson and Johnson also take a proactive approach to stock outs by projecting forward stock position. Reporting on the forward stock position at the executive S&OP is the responsibility of the Supply Chain Manager at Johnson and Johnson. The forward stock position report highlights potential out of stocks by exception. The report considers the stock on hand position, demand forecasts and planned supply dates, to identify potential out of stocks. The reporting of potential out of stocks allows for contingency plans to be considered and implemented, prior to the projected out of stock event. This allows product managers to ration stock and postpone promotional activities where possible to help avoid stock outs.

Douglas has attempted to gain a view of forward stock position through the presentation of an Inventory Status Report. A sample of this report is attached at Appendix J. The report presents the current stock on hand position of each product and the forecast quantity for the following month to provide an indication of stock

cover. Douglas Pharmaceuticals' Production Planner uses this report to identify products that are low in stock and compares this against production supply plans.

There are three major limiting factors in the current reporting format for assessing forward stock position. The first issue is that only products manufactured by Douglas Pharmaceuticals are considered and reported on. Although finished goods supplied by other manufacturers appear on the Inventory Status Report, potential out of stock events for these products are not formally reported. The second major limiting factor is that the Inventory Status Report only considers forecast demand for one month ahead. Therefore, the report does not accommodate products subject to seasonal demand, high demand launch phases and conversely, products that are to be discontinued. The one-month forward demand view is not sufficient to adequately assess forward stock position under these circumstances. The third issue relating to this report is that it requires the Production Planner to manually assess the reported data against the production plan. This is cumbersome, time consuming and prone to human error.

To overcome the above-mentioned limitations of the forward stock position report, Douglas must review the current format and reporting methodology. The report can be improved by utilising an extended projection of monthly demand data and with the inclusion of all Douglas products. The report also needs to be linked to production planning and purchasing software so that future supply plans can be assessed against projected demand. Forward stock position is an ever-changing, dynamic metric. To accurately assess forward stock position and aid decision-making, Douglas must work towards developing a fully automated report that can be generated, on-demand from the Protean system.

8.5.4 Section Four: Financial Review

At Caterpillar, the financial review section of the executive S&OP meeting is based on the input from each of the other reviews. The financial review ensures all plans work toward meeting financial commitments in terms of both the company strategy and the annual business plan. As part of a pre-S&OP meeting process, the finance team cost out various options for meeting the production plan so that senior management know the cost of making a change prior to implementing it and can

select the most cost effective method. The S&OP process at Caterpillar is a business review that balances tactical demand and supply and most importantly ensures that the financial numbers are hit (Correll, 2002).

The generic S&OP meeting format recommended at Table 3 includes a detailed financial review as the last section of the S&OP meeting. At Douglas Pharmaceuticals, there is currently no financial review within the S&OP process. In fact, none of the suggested topics for the financial review are currently discussed as part of the S&OP process at Douglas. The concept of tying in financial results at the S&OP meeting is completely foreign to participants of S&OP process at Douglas. Financial results are reported monthly at Douglas but not as part of the S&OP process. The current situation at Douglas is consistent with the results of research into the S&OP process at semiconductor companies where it was found that the financial view was not always adequately integrated. Semiconductor companies were criticised for maintaining S&OP mainly as an operational planning tool. The research concluded that integration of finances into the S&OP process was one of three S&OP related problems that bother most manufacturers (Dwaraknath et al., 2002).

The financial review section of the S&OP is an important agenda item at Caterpillar, Cadbury, and at Johnson and Johnson. The generic S&OP meeting format includes a financial review section that represents an aggregation of the process formats applied at these three highly successful companies.

Conclusion. To develop a truly effective S&OP process Douglas Pharmaceuticals' S&OP process requires major development in this area. A financial review framework should be developed in line with the format suggested in the generic S&OP meeting format. This generic format should be used as a guide to developing a financial review framework and customised to meet the requirements of Douglas Pharmaceuticals. The financial review should contain:

- Inventory Analysis – stock turn at company and divisional level, slow moving and obsolete (SLOB) reporting.

- Gap Analysis – Sales versus budget. Projected revenue and margins incorporating expenses such as advertising, promotions and non-budgeted increases or reductions in COGS or selling price.

The reporting format for the financial review section should be developed by the product and marketing managers who will report on the data and in collaboration with the finance team who will most likely be responsible for providing most of the information and reports. Recommendations on reporting formats should be submitted to Douglas Pharmaceuticals' directors for final approval.

8.5.5 Summary

The initial implementation of S&OP at Douglas Pharmaceuticals was not entirely successful. As outlined in this report, the main barriers to successful implementation were the lack of knowledge about the process at middle management level and the lack of buy-in and participation at senior management level. The process was implemented by a management consultant who left the company shortly afterwards, with no provisions made for following up on progress or ongoing guidance for the management team. This experience is not unique to Douglas. Wallace (2002) strongly advocates having a senior manager, who understands the process, to drive it through the implementation stage. In the absence of internal expertise, Wallace recommends the part-time employment of a consultant with expertise in S&OP to guide the implementation over the first six to eight months (Wallace, 2002).

The lack of S&OP knowledge within the Douglas management team resulted in S&OP beginning as little more than a production scheduling exercise. Initially, the process was not supported by a robust ERP system and the company's demand forecasting system was not integrated with the planning system. The lack of S&OP knowledge, and senior management buy-in, resulted in the process being very slow to develop and four years after implementation the Douglas S&OP process was far from reaching its full potential. The experience at Douglas lends support to the theory that senior management direct involvement and in-house or external expertise for the implementation, is absolutely critical for developing an effective S&OP process.

The S&OP process is a top level planning technique and when operated effectively, the process ensures operational planning is supporting the company's strategy and achievement of the annual business plan. Without direct senior management involvement and participation the Douglas S&OP process has not been tied into company strategy, nor has it operated in support of the annual business plan. Again, theories relating to senior management involvement in the process are supported in an assessment of the Douglas Pharmaceuticals' experience. Douglas senior management has up until now, missed important opportunities to influence key operational decisions taken by middle management. These decisions have not necessarily been aligned to the company's strategic plan and objectives. Most importantly, these decisions directly impact bottom line performance and on achievement of the annual business plan.

The Douglas experience reinforces the view that senior management direct involvement is critical in S&OP. Senior management involvement links to the S&OP success factors as identified earlier in this paper. Senior management involvement impacts on whether S&OP supports company strategy, setting useful key performance metrics and holding management and staff responsible and accountable for results. As Peter Baldwin, Operations Director of Thornton's stated, senior management buy in was key, "Without that, don't even bother starting" (cited in Dwyer, 2000, p.31).

Chapter 9

Results and Discussion

9.1 Improving the S&OP Process at Douglas Pharmaceuticals

Critical success factors in effective S&OP have been identified as senior management focus and support, establishing a process that supports company strategy, defining responsibilities and accountabilities. Also key to the success of S&OP, is an effective monthly timetable and meeting agenda. These requirements should be used as a guide to improving the current S&OP process at Douglas Pharmaceuticals.

Managers and staff currently involved in the Douglas S&OP support the process and display interest in improving it. This level of commitment was confirmed during the S&OP review meeting held on 26 August 2003. There were many positive contributions made during this meeting. At the meeting, staff outlined an ideal S&OP process that included many of the attributes that have been identified as critical to a successful S&OP process. In addition to the staff currently involved in the process, there is also strong interest in the process from senior members of the finance division including the Chief Financial Officer (CFO). There have been discussions between the CFO and Supply Chain Manager as to how financial reporting could be incorporated into the current S&OP process. This positive support for improving the process provides an excellent base for undertaking a major S&OP improvement project.

9.1.1 Gaining Senior Management Support

The findings and recommendations of this report should be presented to the senior management, Executive Committee. This committee includes the Managing Director of Douglas Pharmaceuticals New Zealand Limited and the Managing Director of Douglas Pharmaceuticals Europe Limited. The objective of this presentation will be to provide senior management with an overview of the process and the benefits that can be obtained, if they support a process improvement project and ultimately participate in the monthly executive S&OP meetings. This briefing should match

S&OP capabilities to current business problems thereby establishing a business case for an improved S&OP process (Wallace, 1999).

Assuming senior management support can be gained, the same presentation would then be given to a team of middle managers and senior staff who are likely to be directly involved in the process. This briefing will provide additional detail relating to the operation of the process and the key areas that have been identified for improvement. One of the lessons learned at Caterpillar was to educate early on. The more people know about the process the better. Education should include top management right down to the people collecting the data (Correl, 2002).

9.1.2 Appointing a Project Team Leader

Caterpillar also found during implementation of S&OP that it was important to have a senior executive sponsor, with passion, to drive the process (Correll, 2002). This is also true of any improvement project where one of the keys to success is to have a passionate, focused project leader to drive the process supported by a strong, cross-functional team to make it happen (Voegtli, 2002). A senior manager, knowledgeable in S&OP and with a passion for improving S&OP must be selected to lead the project at Douglas.

9.1.3 Establishing an S&OP Project Improvement Team

The project leader will need to form an S&OP process improvement team. This group should be a cross-functional team, made up of managers, or senior staff, representing the areas of marketing, information technology, supply chain, manufacturing, sales and finance. It is important that the right people are involved and enlisted early on (Voegtli, 2002). Each of the team members selected will bring different skills and experience to the project team. By establishing a cross-functional team with representatives from each of the key divisional areas, this will assist in the change process as the S&OP process is developed and improved. With the guidance of the project manager and the findings and recommendations of this report, the project team will establish and agree upon project objectives and milestones. This will provide all team participants with a clear focus on project objectives and a shared vision moving forward.

9.1.4 Reducing Resistance to Change

Team members will buy into the change if they have been personally involved in developing improvements in the process, have been involved in discussions and have agreed a course of action. The experiences of Caterpillar, Johnson and Johnson and Cadbury, show that the S&OP process involves a lot of up front work for key participants. It is important to maximise buy-in from all participants by involving them from the beginning through the design stage and through implementation (Correll, 2002). A high level of participation from key staff and managers at Douglas from an early stage will have major benefits for the improvement project. The Johnson and Johnson experience shows that, S&OP information presented has to be 100% accurate and in a format that people understand. Participation in all aspects of developing the process and reporting structures will ensure that effective reports are developed, that participants understand and are committed to maintaining and reporting upon month after month.

9.1.5 Developing and Improving Report Formats

In developing new reporting formats and structures the process improvement team should, where possible, attempt to keep the overall approach as simple as possible. The emphasis should be on getting an improved S&OP process up and running as soon as possible with simple, easy to understand reporting formats that provide useful information about company performance. The emphasis should be on simplicity and accuracy rather than complexity and volume of data. At Caterpillar, they recommend sticking to the basics (Correll, 2002). Where possible, reports should be automated, or system generated, to avoid double handling of data from systems into spreadsheets. Automated reports provide less opportunity for data manipulation and reduce the likelihood of data entry errors. At Johnson and Johnson and Cadbury, the time it takes to gather and prepare information for the monthly S&OP meeting is seen as a major weakness of the process. Both companies are working towards automating S&OP reports where possible.

9.1.6 Establishing a Strict Monthly Timetable

When the improved S&OP process has been developed, the implementation team and management involved in S&OP, need to establish and agree a strict monthly timetable that clearly outlines who is responsible for what, and by when. This will ensure that participants understand their monthly obligations and how failure to perform will impact on other participants. At Caterpillar, establishing a strict monthly timetable was listed as one of the lessons learned during implementation. The timetable ensures the various functions deliver required information on time (Correll, 2002). At Johnson and Johnson and Cadbury, S&OP participants described how not having all of the necessary information available on time could become a major frustration when attempting to prepare reports and explanations at the monthly S&OP meetings. Establishing a strict monthly timetable is crucial for the S&OP process.

9.1.7 Documenting S&OP Policy and Procedures

Once the improved S&OP process has been developed and implemented at Douglas it is important that key aspects of the process are clearly documented as S&OP policy. The policy document should include all S&OP definitions, the objectives of the process and the steps in the process. The document should also outline who participates in each step of the process, the actions to be taken at each step, and should be signed off by the Managing Director or CEO. The policy document should be no more than one or two pages in length (Wallace, 1999). At Caterpillar, documenting the process and its goals was an important aspect of the S&OP process. All divisions are fully aware of what is expected of them individually and collectively (Correll, 2002).

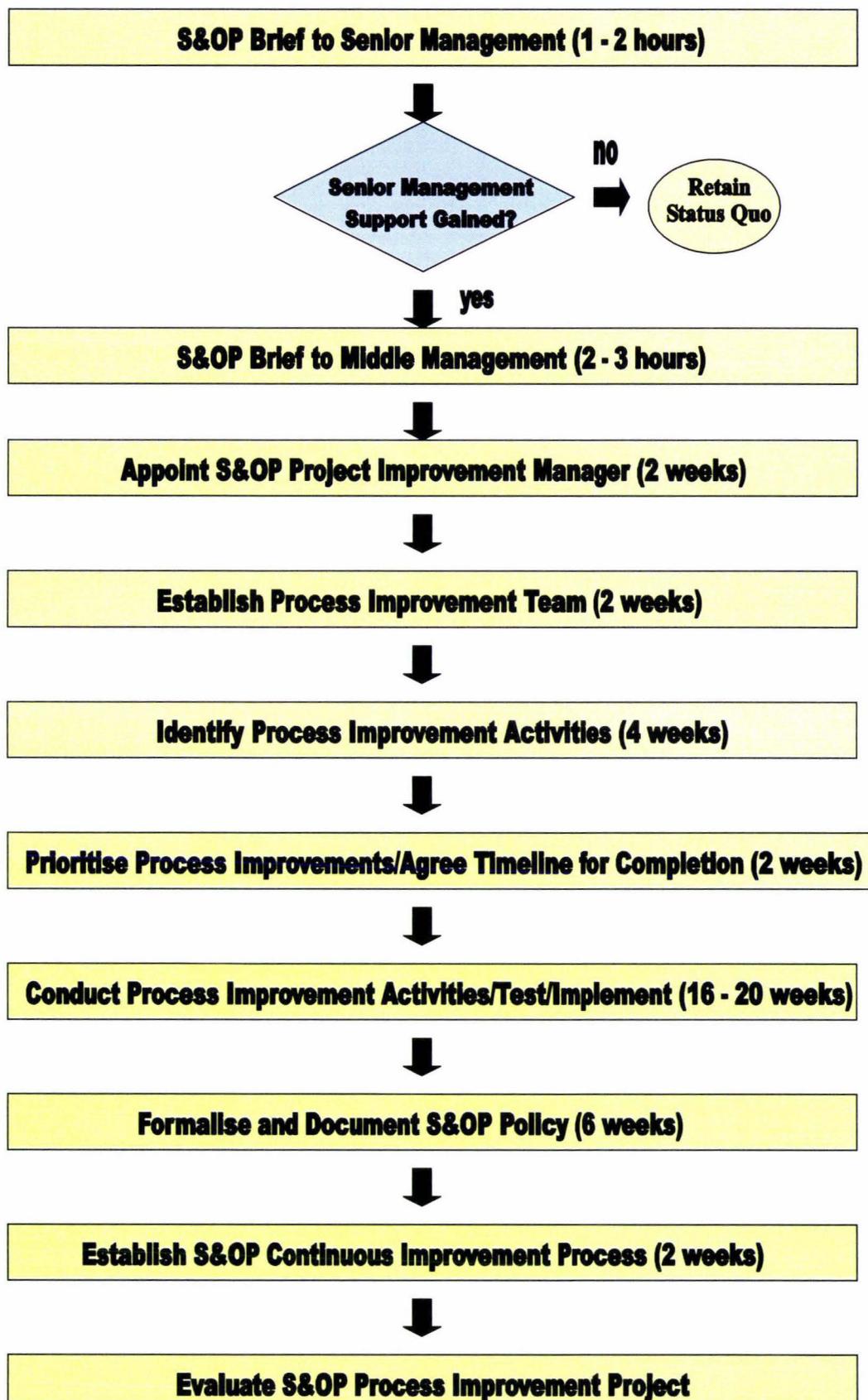
9.1.8 Continuous Improvement in S&OP

A final stage of implementing an improved S&OP process at Douglas should be establishing a programme of continuous improvement in relation to S&OP. To improve business performance it is important to keep improving the underlying processes. For example, to identify areas for improvement in the executive S&OP

meeting, some companies include a meeting critique as the last item on the meeting agenda. This can be done in a few minutes by simply going around the room and asking each person in turn what they thought of the meeting and pointing out areas for improvement. Constructive criticism should be noted in the meeting minutes and addressed prior to the next meeting (Wallace, 1999). Establishing a programme of continuous improvement will ensure the S&OP process continues to develop and evolve to meet the changing needs of Douglas Pharmaceuticals.

The action plan for improving S&OP at Douglas is outlined in Figure 8, presented on the following page.

Figure 8: Action Plan for Improving S&OP at Douglas Pharmaceuticals



Chapter 10

Conclusion and Recommendations

10.1 Conclusion

S&OP is a business planning process used mostly by manufacturing companies to balance supply and demand. S&OP serves to integrate otherwise separate functional divisions and focus their efforts on one set of numbers and one operational plan, that best meets company strategic goals and objectives. S&OP was originally developed in the mid 1980's as a method for getting senior management more involved in the supply and demand process. Over the years, S&OP has developed into an all-inclusive process that ties in financial planning and senior management strategy. According to Richard Ling, pioneer and recognised authority on S&OP, the process provides a framework that companies need to make better decisions and create more predictable financial results (Burke, 2004).

The S&OP process, as it is now recognised, is a relatively recent phenomena with most literature on the subject dating back less than ten years. S&OP helps businesses meet the challenge of supporting changeable market demand, supplying the right product at the right time and at the least possible cost. Large multi-divisional companies face the difficulty of bringing available functional skills to bear on the decision making process at the right time in the right place (Howard, 1983). Recognising the need to coordinate and communicate details of supply and demand across multiple divisions, many successful companies have adopted the S&OP process.

Douglas Pharmaceuticals implemented the S&OP process in May 2000 with the assistance of an external consultant. However, by mid 2003, it had become evident to the management team participating in S&OP at Douglas, that the process required substantial improvement. This paper identified several examples of how companies have implemented an effective S&OP process and obtained positive results. Results generally included improved customer service, better forecast accuracy, reduced inventories and alignment of operational decision making with the company's strategy.

10.1.1 Application of Effective S&OP at Manufacturing Companies

To identify how manufacturing companies apply the S&OP process for optimal results, the researcher gained access to key management staff at Cadbury Confectionery Limited and Johnson and Johnson Pacific Pty Limited. The aim of this research was to identify how these companies operate S&OP, what were the benefits of the process, what issues S&OP participants had with the process and what did they consider were the critical success factors of an effective S&OP process. The researcher also examined a case study of Caterpillar's S&OP process (Correll, 2002) and the results of a survey into the S&OP practices of semiconductor companies (Dwaraknath et al., 2002).

The report found there were similarities in the ways in which S&OP was applied at companies that were operating the process successfully. All of the companies reviewed operated S&OP on a monthly cycle, which generally involved a phase of report generation, followed by demand and supply pre-S&OP meetings and culminating in an executive S&OP meeting. All companies that were operating effective S&OP reported benefits such as stability in production schedules, reduction of finished goods inventory, improved customer service performance and improved forecast accuracy. One of the weaknesses identified in S&OP processes operated by these companies was the time it took to prepare reports and prepare for the meetings. It was considered important that S&OP reports and performance metrics were automated where possible. System generated reports would allow for easy retrieval each month.

10.1.2 Critical Success Factors in S&OP

Critical success factors in S&OP were identified in companies researched and in literature published on the subject. Critical success factors are:

- Senior management focus and support.
- S&OP must support company strategy.
- S&OP meetings to be held monthly.
- Responsibilities and accountabilities must be clearly defined.

- Establishing a monthly timetable and agenda that includes key performance metrics.

Senior management focus and support is critical. As Peter Baldwin, Operations Director for Thornton's Confectionery stated, "Without that, don't even bother starting" (cited in Dwyer, 2000, p. 31). Senior management support and involvement, keeps the process on track ensuring S&OP decisions support company strategy and keeps managers accountable for their results in key performance metrics. Meetings should be held monthly. More than once monthly is considered too frequent, considering the time it takes to prepare for S&OP and less than once monthly is not considered appropriate due to the volatile, changeable market conditions most companies work within. It is critical that all S&OP participants understand their role, responsibilities and what they are accountable for as part of the S&OP process. Establishing a monthly timetable keeps participants on track, providing S&OP outputs as required. Reporting on standard key performance metrics ensures S&OP remains focused on what is important to the business and contributes to overall company performance and achievement of the annual business plan.

10.1.3 Generic S&OP Executive Meeting Format

In 2003 researchers at North Carolina State University identified Caterpillar's S&OP process as a best practice example for implementation of S&OP at Bayer Biological Products (Andrews, 2003). A generic executive S&OP meeting format has been developed and presented in this paper. The meeting format is broadly based on that of Caterpillar where the meeting is conducted in four sections being the new product/activities review, demand review, supply review and the financial review. Within each section the meeting relevant key performance metrics are presented. For example, under the supply review section, customer service level performance is presented and discussed. In other words, how well is a company supplying its markets and customers? The metrics presented under each section are based on the approaches taken by successful companies operating effective S&OP processes. The generic meeting format provides a good starting point for Douglas to compare its current process against.

10.1.4 Evaluation of Douglas Pharmaceuticals' S&OP Process

The initial implementation of S&OP at Douglas Pharmaceuticals was not entirely successful. As outlined in this report, the main barriers to successful implementation were the lack of knowledge about the process at middle management level and the lack of buy-in and participation, at senior management level. The process was implemented by a management consultant who left the company shortly afterwards with no provisions made for following up on progress or ongoing guidance for the management team.

The lack of S&OP knowledge within the Douglas management team resulted in the S&OP beginning as little more than a production scheduling exercise. Initially, the process was not supported by a robust ERP system and the company's demand forecasting system was not integrated with an automated planning system. The lack of S&OP knowledge and senior management buy-in, resulted in the process being very slow to develop and four years after implementation the Douglas S&OP process remained far from reaching its full potential. The experience at Douglas supports the theory that senior management direct involvement and in-house or external expertise for the implementation, is absolutely critical for developing an effective S&OP process.

Senior management involvement impacts on whether S&OP supports company strategy, setting useful key performance metrics and holding management and staff responsible and accountable for results. Without direct senior management involvement and participation, the Douglas S&OP process has not been tied into company strategy, nor has it operated in support of the annual business plan. Douglas senior management has up until now, missed important opportunities to influence key operational decisions taken by middle management. These decisions have not necessarily been aligned to the company's strategic plan and objectives. Most importantly, these decisions directly impact bottom line performance and on achievement of the annual business plan.

The researcher used the generic executive S&OP meeting format to compare against the current format used by Douglas. Douglas Pharmaceuticals' meeting format was found to be lacking in detail and coverage of relevant areas. For example, at Douglas

the new product activities section of the current Douglas meeting format was found to include only a limited review of new product introductions. The current Douglas approach was also criticised for not presenting financial projections of new products and for the fact that it only included new products supplied by Douglas manufacturing and did not include finished goods sourced externally. The Douglas approach to new products was also criticised as it was presented by an operations staff member with an operational focus, rather than by a marketing manager and with input from the new product development manager.

10.1.5 Improving Douglas Pharmaceuticals' S&OP Process

To address the current shortfalls in Douglas Pharmaceuticals' S&OP process, the researcher has presented an action plan for improving the current S&OP process. This plan includes briefing the senior and middle management teams on the findings and recommendations of this report. Assuming senior management support is gained for improving S&OP, a project team leader and project team, will be established to set about improving the current S&OP process. The project team will agree upon process improvement activities using the recommendations of this report as a guideline and will also establish timeframes for completing improvement activities. Improvement activities in most cases involve the development of new reporting formats and changing the structure and composition of the executive S&OP meeting. Where possible, reports should be automated, or system generated, with an emphasis on relevance, simplicity and accuracy of data.

Once S&OP process improvements have been completed, the Douglas project team will be responsible for documenting S&OP procedures and policy. Establishing S&OP policy is important as it provides participants with clear guidelines on who is responsible and accountable for what part of the S&OP process. The final stages of the S&OP improvement project also involved establishing a continuous improvement process and a formal evaluation of the improvement project. The continuous improvement process ensures that participants remain focused on the ongoing improvement of the S&OP process and the evaluation establishes how successful the improvement project has been. The continuous improvement process and the evaluation, give project participants time to reflect and constructively criticise the process, identify shortfalls and implement improvements.

10.2 Recommendations

To develop a more effective S&OP process at Douglas Pharmaceuticals it is recommended that:

1. The findings and recommendations of this report are presented to Douglas Pharmaceuticals' senior management team, followed by a brief to middle managers.
2. A senior management sponsor within Douglas is appointed to drive the S&OP process and lead a process improvement project team.
3. An S&OP project improvement team is established to drive improvements in the current S&OP process as outlined in this report.
4. The Managing Director attends and participates, in the monthly executive S&OP meetings as soon as structural process improvements have been completed.
5. The executive S&OP meeting is reformatted to include a new product activities review, demand, supply and financial review, consistent with the format presented at Table 3.
6. The S&OP process and performance metrics are aligned to support company strategy.
7. A review of staff and management participation at the executive S&OP meeting and pre-S&OP meetings is conducted.
8. Forecast accuracy reporting methods are reviewed to incorporate MAPE as a primary performance indicator and reporting is extended to include all products.
9. Production capacity utilisation metrics are incorporated into the monthly production plan attainment report.

10. Projected capacity utilisation reporting is included with the presentation of the production, packing plan.
11. An aggregate level, projected production plan for manufactured tablet and liquid batches is presented at the executive S&OP meeting in addition to the packing plan.
12. The existing customer service level report is improved and incorporated into the executive S&OP meeting format as soon as possible.
13. Forward stock position reporting is improved as described in this paper and the report is automated.
14. Inventory stock turns are reported as part of a financial review that will include exception reporting on slow moving or obsolete inventory and short shelf life inventory.
15. A monthly S&OP timetable is agreed to ensure all parties deliver their monthly S&OP obligations on time.
16. Douglas S&OP management team agrees and then publishes S&OP information definitions, formats and policy.
17. On completion, the success of the S&OP improvement project is formally evaluated.
18. A programme of continuous improvement is developed for the S&OP process.

10.3 Recommendations for Further Research

There is significant scope for further research into sales and operations planning. As mentioned in the literature search of this report, the researcher failed to locate any published, New Zealand-based research on the topic of S&OP. Internationally, S&OP, as a subject, is widely covered and reported upon in business journals and in management resource articles. However, the articles are generally short documents that describe the process in broad detail and describe the benefits of operating S&OP. Most international research available in the public arena, fails to provide real detail of how the process can be operated and what reporting and meeting agenda formats work well.

Many of New Zealand's, large, successful manufacturing and product processing companies operate S&OP. The researcher is of the view, that there would be significant benefit in conducting research into S&OP in these companies, with the objective of identifying best practice in S&OP. The research should concentrate on benchmarking the processes of companies operating S&OP and present a detailed account of how the process operates. In particular, the research should identify and analyse S&OP meeting agendas, timelines, reports that are generated and presented, the responsibilities and accountabilities of participants and the dynamics involved in the process. The research should provide a detailed account of what really works in S&OP, what does not work so well and attempt to explain why this is the case.

This report on the application of S&OP at Douglas Pharmaceuticals highlights the need for further research into systems and reporting capabilities required at Douglas Pharmaceuticals. This report highlights system-reporting improvements that need to be implemented in the areas of projected out of stocks, customer service level reporting and other key areas. These reporting improvements are all considered to be well within the capabilities and functionality of the current ERP system Protean. However, what is not clear, is whether the system has the ability to provide real-time production capacity modeling data and the ability to project capacity requirements.

The researcher considers capacity projection information to be critical for presentation at the monthly executive S&OP meeting. Production capacity modeling software allows key decision makers to conduct what if analysis and provides them

with instant feedback on the implications of making changes to production schedules, marketing programmes, product launch dates and many other variables. Without this functionality, the executive S&OP meeting at Douglas will not be provided with accurate projections of production capacity and will not be forewarned of capacity constraints or bottlenecks occurring at the plant.

It is recommended that further research be conducted into obtaining production capacity modeling and capacity projection functionality. If this functionality is not available through the current Protean system or a Protean upgrade, then further research must be conducted to locate suitable supplementary software that will interface with Protean.

10.4 Summary

S&OP has proved to be a truly fascinating subject. There remains much scope for further research into this important process. The really exciting thing about S&OP is that it is not rocket science and does not require substantial financial investment. As Dale Roberts of Caterpillar says, “its institutionalised common sense” (IOMA, 2003, p.11). The process yields significant benefit for companies that adopt effective S&OP practices and operate a disciplined process.

Douglas Pharmaceuticals Ltd provided an excellent model for analysing an S&OP process that had been implemented, but where the company was mostly just going through the motions. It is hoped that this report provides Douglas management with a clear understanding of what S&OP is, how it should be operated and the benefits of effective S&OP. Most importantly, it is hoped the report provides sufficient guidance on how Douglas can implement a vastly improved S&OP process and reap the rewards

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Appendices

- Appendix A: S&OP Company Representative Interview: General Questions
- Appendix B: S&OP Participant Interview
- Appendix C: S&OP New Product Introduction
- Appendix D: Divisional Forecast Accuracy Report: A Items
- Appendix E: Company Forecast Accuracy Report: A Items
- Appendix F: Customer Service Level Report
- Appendix G: Monthly Production Results
- Appendix H: Production Packing Plan
- Appendix I: Out of Stock List
- Appendix J: Inventory Status Report

**Sales and Operations Planning (S&OP)
Company Representative Interview: General Questions**

This research is being conducted under the supervision of Professor Bill Bailey of Massey University in Palmerston North, New Zealand. The researcher Sean Stewart is a student of the Masters of Applied Science programme majoring in Logistics and Supply Chain Management. Findings will be reported in thesis format and will not be disseminated outside of the University. All responses will be held in strict confidence. A summary of research findings is offered to all participants.

Name.....

Date.....

Position.....

Company.....

1. How long has the S&OP process been operating here?
2. How was the process implemented? Was it self initiated, initiated by consultants, by corporate head office or other?
3. Multinationals only. Is the process implemented and standardised globally?
4. Describe the process.
 - a. Main sections or components of the process. What is considered/reported?
 - b. Key metrics. What are they and what results are being achieved?
 - c. Responsibilities. Who reports, who controls?
 - d. Timings.
5. What changes have occurred (to the process) along the way? How has it evolved?
6. Issues with the process.
7. General comments.

**Would you like to be provided with a summary of research findings?
Yes/No. Contact address/email address.**

Thank You

Sales and Operations Planning (S&OP) Participant Interview

This research is being conducted under the supervision of Professor Bill Bailey of Massey University in Palmerston North, New Zealand. The researcher Sean Stewart is a student of the Masters of Applied Science programme majoring in Logistics and Supply Chain Management. Findings will be reported in thesis format and will not be disseminated outside of the University. All responses will be held in strict confidence. A summary of research findings is offered to all participants.

Name..... **Date**..... **Summary Y/N**

Position..... **Company/Division**.....

1. How long have you been involved with the S&OP process?
2. What do you see as being the major strengths and weaknesses of the process?

Strengths (list then prioritise)

Weaknesses (list then prioritise)

3. What is the key to success in the S&OP process? Why?
4. What main issues (if any) does your division have with S&OP?
5. What conflicts occur during the S&OP process? How are these overcome?
6. What changes would you make to the process if you were able to and why?
7. How would you rate the importance of the S&OP process in relation to the ongoing success of your company? Choose one.
 - a. Critical
 - b. Important
 - c. Reasonably important
 - d. Not important
 - e. Irrelevant

Thank You

S&OP New Product Introduction: May 2004

Key to Progress:



Supply of product to head office on track.

Supply of date stated depends on certain tasks happening on time, eg artwork received.

Product has missed the communicated date of supply to head office.

Code	Product	Summary	Customer	Stock Required	Progress	Comments
51570	Oratane 10mg 15's	New presentation	HK/Sing	30-Apr	Miss	Held up due to artwork. Currently 3wks behind.
50125	Acnemin 10mg 50's	Isot for Spain	Lab Vinas	7-May	Miss	No bulk available due to delays at Swiss Caps.
50126	Acnemin 20mg 50's	Isot for Spain	Lab Vinas	7-May	Miss	Delayed due to 10mg delay, now due out 29 May.
51124	Atomase 50mcg	New for DPAL	DPAL	29-May		Awaiting results of testing.
51034	Bellgyn 21 sale	New for Austria	Ratiopharm	15-Aug		Awaiting bulk, artwork complete.
51035	Bellgyn 21 smp	New for Austria	Ratiopharm	15-Aug		Awaiting bulk, artwork complete.
51033	Bellgyn 63's sale	New for Austria	Ratiopharm	15-Aug		Awaiting bulk, artwork complete.
40005	Lacdol 1litre	Tender win	DPL	22-Sep		Volume 150,000 units pa. Bottle and cap to be sourced.
42044	Codalax Forte	Tender win	DPL	22-Sep		Volume 13,000 units pa. Amcor to supply bot and cap.
42043	Codalax Susp	Tender win	DPL	22-Sep		Volume 13,000 units pa. Amcor to supply bot and cap.
50211	Procur 50mg 20's	NPD Development	DPAL	13-Oct	Reg	Dossier submitted to TGA, launch expected Nov 04.
50212	Procur 50mg 50's	NPD Development	DPAL	13-Oct	Reg	Dossier submitted to TGA, launch expected Nov 04.
50173	Procur 100mg 50's	NPD Development	DPAL	13-Oct	Reg	Dossier submitted to TGA, launch expected Nov 04.

Divisional Forecast Accuracy Report: A Items**GENERIC - CLINT / PATRICK**

		F/CAST	ACTUAL	DIFF	%ERROR		EXPLANATION	ACTION
40282	PYTAZEN SR 150MG 60'S	13000	13256	-256	-1.9	A		
40208	NAPAMIDE TABS 2.5MG 100'S	2600	2682	-82	-3.1	A		
41050	DEXAMETHASONE 4MG 100'S	561	588	-27	-4.6	A		
40099	DP LOTION HC 1% 250ML	3797	3606	191	5.3	A		
41091	HYDROCORTISONE 5MG 100'S	1437	1579	-142	-9	A		
40156	SEBIZOLE 2% SHAMPOO 200ML	1000	910	90	9.9	A		
36010	FLUCLOXIN INJECTION 250	200	173	27	15.6	A		
36022	IBIAMOX INJECTION 1G	1400	1889	-489	-25.9	A		Revise forecast up
30023	PALLIDONE 5MG TABLET 10'S	1279	1750	-471	-26.9	A		
41086	HISTAFEN ELIXIR 500ML	756	1100	-344	-31.3	A		
36012	FLUCLOXIN INJECTION 1G	5500	8729	-3229	-37	A		Revise forecast up
40069	DILZEM TABLETS 30MG 100'S	500	818	-318	-38.9	A		
40230	OX-PAM TABLETS 100'S 10MG	1915	1350	565	41.9	A		
36011	FLUCLOXIN INJECTION 500MG	450	826	-376	-45.5	A		Revise forecast up
40084	DICLAX SR 100MG TAB 30 B	200	390	-190	-48.7	A	Too high, need to slow this - no retail sell	
40070	DILZEM TABLETS 100'S 60MG	940	624	316	50.6	A	F/cast o/s sales - check with Murray	
36021	IBIAMOX INJECTION 500MG	320	664	-344	-51.8	A		Revise forecast up
41092	HYDROCORTISONE 20MG 100'S	46	102	-56	-54.9	A		
40210	NITRADOS TABLETS 100'S 5M	500	316	184	58.2	A		
42242	UMINE TIMED CAPS 100'S 30	175	101	74	73.3	A	Review f/cast	No action
40086	DICLAX SR 75MG TAB 30 BPK	1000	4250	-3250	-76.5	A	Bonus sales as tender period begins	Sample! Drs
40215	NYEFAX RTD 20MG TAB 100'S	1241	660	581	88	A	Check f/cast	No action

Appendix E

Company Forecast Accuracy Report - A Items

		May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04
Consumer Division	Over 80%	9	13	15	12	12	18	21	19	22	22	13	13
	50% - 79%	10	6	8	11	8	12	18	18	7	17	18	10
	Under 50%	8	8	4	6	9	17	7	9	17	7	10	18
	Total no of A's	27	27	27	29	29	47	46	46	46	46	41	41
Raw Score		140	160	190	175	160	240	300	280	255	305	220	180
% Achieved		52%	59%	70%	60%	55%	51%	65%	61%	55%	66%	54%	44%
% Improvement		#REF!	14%	19%	-8%	-9%	50%	25%	-7%	-9%	20%	-28%	-18%
Generic Division	Over 80%	10	7	9	5	7	9	8	13	8	13	8	7
	50% - 79%	5	7	6	13	4	5	6	6	7	3	8	8
	Under 50%	9	11	10	7	14	11	11	6	10	9	9	7
	Total no of A's	24	25	22									
Raw Score		125	105	120	115	90	115	110	160	115	145	120	110
% Achieved		52%	42%	48%	46%	33%	46%	44%	64%	46%	58%	48%	50%
% Improvement		#REF!	-16%	14%	-4%	-22%	28%	-4%	45%	-28%	26%	-17%	-8%
Medical/Lincoln	Over 80%	11	15	6	5	3	3	6	6	1	5	7	7
	50% - 79%	2	2	7	8	5	5	2	2	5	3	1	1
	Under 50%	0	3	7	7	7	0	0	0	2	0	0	0
	Total no of A's	13	20	20	20	15	8						
Raw Score		120	160	95	90	55	55	70	70	35	65	75	75
% Achieved		92%	80%	48%	45%	37%	69%	88%	88%	44%	81%	94%	94%
% Improvement		#REF!	33%	-41%	-5%	-39%	0%	27%	0%	-50%	86%	15%	0%
Export	Over 80%	17	12	10	15	21	18	16	17	14	17	13	13
	50% - 79%	2	2	1	0	0	2	1	1	0	2	0	0
	Under 50%	4	8	12	10	6	7	12	13	14	9	14	14
	Total no of A's	23	22	23	26	27	27	29	31	28	28	27	27
Raw Score		180	130	105	150	210	190	165	175	140	180	130	130
% Achieved		78%	59%	46%	58%	78%	70%	57%	56%	50%	64%	48%	48%

Customer Service Level Report
3/05/2004 12:00:00a.m. to 7/05/2004 11:59:59p.m.

Summary for DEBTOR PHARMACY							
No Shipped Orders		No Orders DIFOT		No Shipped Lines		No Lines DIFOT	
321		309		2,091		2,064	
Performance		96.26%		98.70%		Average Order Value	
						342.81	
				Items On Backorder			
Resource						Qty	Value (\$)
22005	PURE WHITE 1STEP WHITENING GEL			B		6.00	47.62
30012	HAIRY LEMON 10's			A		90.00	349.12
30014	IRON MELTS 50			B		82.00	228.60
37717	T/STRAP BGE THUMB/WRIST			C		6.00	96.31
37740	THERMA-ICE WRAP			C		31.00	818.84
37741	THERMA-ICE GEL PACK			C		8.00	77.82
38033	PERF SIDE LABELS			A		5.00	368.00
40022	AT-EZE 0.5MG/ML N/SPRAY 12ML			A		273.00	1,099.98
40027	AZAMUN TABS BLISTER 100's 50MG			A		18.00	460.34
42140	LITHIUM CARB CAPS 100's 250MG			B		11.00	71.83
							3,618.46

Monthly production results							
Apr-04							
Packing							
Total quantity	1,044,870	Weekly Schedule Misses					
		Manufacturing	Solids				
Actual Quantity pack	556,310		Liquids				
			Packing				
% achieved	53%						
DIFOT	85%						
Average number of days late	7						
Products not delivered		Extra's packed					
Item	Description	Qty	Reason	Item	Description	Qty	Reason
40022	AT-EZE 0.5MG/ML NSPRY 12ML	7,579	Capacity in the Nasal area	51760	TAMOXIFEN 20MG TAB 60 CHM	1,022	
40075	TOPICIL 1% SOLN 28ML EXPORT	11,433	Capacity in the Nasal area	51761	TAMOXIFEN 20MG TAB 60 GENI	4,322	
40035E	ATOMASE 50MCG 20ML	5,472	Capacity in the Nasal area	51763	TAMOXIFEN 20MG TAB 60 TER	995	
51124	ATOMASE 50MCG 200 SPRY AUS	5,472	Capacity in the Nasal area	40232	OX-PAM 15MG TAB 100	2,871	
51124	ATOMASE 50MCG 200 SPRY AUS	5,472	Capacity in the Nasal area	61007	SEVREDOL 10MG TAB 10	33,111	
50059	AIRCORT 100MCG NASAL SPY 200SP	10,998	Capacity in the Nasal area	67115	KC VITADOL C 10ML	5,855	
50059	AIRCORT 100MCG NASAL SPY 200SP	10,998	Capacity in the Nasal area	50023	AIRCORT 50MCG NASAL SPY 20	10,554	
65540	LUBAFAX 60G	4,129	LL707 Tubes arrived 24/4/04	50072	SEBORAL 1% SHAMPOO 20ML	1,114	
5L210	DOXY 50MG TAB 25 AUS BPK	8,000	Manufacturing bulk	65310	LANOLIN CREAM 50G	10,482	
50326	TAMOXEN 20MG TAB 60 AUS	3,838	Manufacturing bulk	67002	MONISTAT 3-PREFILLED APPL	1,944	
4*027	AZAMUN 50MG TAB 100 BPK	4,787	Manufacturing bulk	REPACK_GEN		1,300	
40027	AZAMUN 50MG TAB 100 BPK	4,787	Manufacturing bulk			73,570	
40027	AZAMUN 50MG TAB 100 BPK	4,787	Manufacturing bulk				
80005	NEO NACLEX 2.5MG TAB 500 GLAXO	9,238	Manufacturing bulk				
80002	MAREVAN 1MG TAB 100 GLAXO	29,402	Manufacturing bulk				
50010	DOXSIG 100MG TAB 7	15,000	Manufacturing bulk				
80004	MAREVAN 5MG TAB 100 GLAXO	7,201	Manufacturing bulk				
40210E	NAPAMIDE 2.5MG TAB 90 SEA BPK	11,310	Manufacturing new batch				
50161	FRUSID 20MG TAB 50 AUS	4,000	Manufacturing new batch				
51270	FRUSEMIDE 20MG TAB 100 CHMART	5,000	Manufacturing new batch				
51271	FRUSEMIDE 20MG TAB 100 GENRX	9,000	Manufacturing new batch				
51273	FRUSEM 20MG TAB 100 TERRY WHT	2,000	Manufacturing new batch				
50162	FRUSID 40MG TABS AUS 100'S	29,372	Manufacturing new batch				
51277	FRUSEMIDE 40MG TAB 100 GENRX	26,536	Manufacturing new batch				
51271	FRUSEMIDE 20MG TAB 100 GENRX	9,000	Manufacturing new batch				
51273	FRUSEM 20MG TAB 100 TERRY WHT	2,000	Manufacturing new batch				
51380	GENRX AZATHIOPR 50MG TAB 100	3,000	Next campaign				
50125	ACNEMIN 10MG CAP 50	5,000	No Bulk				
50126	ACNEMIN 20MG CAP 50	10,000	No Bulk				
50068	IMFLAC 25MG TAB 30 AUS	4,483	No Bulk				
42056	DILZEM LA 240MG TAB 30	11,144	Pulled forward into March				
51005	FEMINIL MITE	7,300	Not req'd then req'd				
67312	ALOE VERA JUICE 500ML AUS	6,950	Not required				
MON4 5G	MONISTAT 4%CREAM 5G APPLICATOR	103,359	Not starting in April				
51351	ISO MON 60MG TAB 30 GENRX	13,404	Problem with bulk. Douglas regularity specs.				
50752	PEPZAN 20MG TAB 120 HK	21,671	Still packing on the Uhlmann				
50752	PEPZAN 20MG TAB 120 HK	28,000	To be manufactured				
50752	PEPZAN 20MG TAB 120 HK	28,000	To be manufactured				
50752	PEPZAN 20MG TAB 120 HK	28,000	To be manufactured				
50000	CLOMENT 25MG TAB 100	1,750					
40099	DP 1% HC LTN 250ML	7,861					
		526,733					

Production Packing Plan (Sample page only)

June

Status	Schedule	Code	Description	Qty	UM	Start date	Finish date	Line
Firm Planned	SCD47795	51360	GENRX AZATHIOPR 50MG TAB 100	1,392	EA	2/04/2004	3/04/2004	760
Firm Planned	SCD44298	51286	AISOSKIN 10MG CAP 10	5,000	EA	20/04/2004	22/04/2004	760
Firm Planned	SCD44299	51287	AISOSKIN 10MG CAP 30	6,666	EA	20/04/2004	22/04/2004	760
Firm Planned	SCD44300	51288	AISOSKIN 20MG CAP 10	5,000	EA	20/04/2004	22/04/2004	760
Firm Planned	SCD44301	51289	AISOSKIN 20MG CAP 30	6,666	EA	20/04/2004	22/04/2004	760
Firm Planned	SCD51377	51760	TAMOXIFEN 20MG TAB 60 CHMART	2,000	EA	29/04/2004	1/05/2004	760
Firm Planned	SCD51379	51761	TAMOXIFEN 20MG TAB 60 GENRX	5,642	EA	29/04/2004	1/05/2004	760
Firm Planned	SCD51382	51763	TAMOXIFEN 20MG TAB 60 TER WHT	1,000	EA	29/04/2004	1/05/2004	760
Firm Planned	SCD51148	40266E	PEPZAN 20MG TAB 30 BPK	6,418	EA	12/05/2004	12/05/2004	760
Firm Planned	SCD41528	43039	DYZOLE 500MG TAB 40 BPK	2,793	EA	21/05/2004	26/05/2004	760
Firm Planned	SCD47552	40210E	NAPAMIDE 2.5MG TAB 90 SEA BPK	14,000	EA	26/05/2004	30/05/2004	760
Firm Planned	SCD51081	40029	ANSELOL 50MG TAB 30 BPK	12,054	EA	3/06/2004	8/06/2004	760
Firm Planned	SCD51247	50049	DILZEM 60MG TABS B/P 90'S AUST	3,556	EA	4/06/2004	8/06/2004	760
Firm Planned	SCD51262	50079	DOXY-100 TAB 7 AUS BPK	44,286	EA	4/06/2004	8/06/2004	760
Firm Planned	SCD44206	50326	TAMOXEN 20MG TAB 60 AUS	5,110	EA	4/06/2004	8/06/2004	760
Firm Planned	SCD51290	50550	IMTRATE 60MG TAB 30 AUS BPK	6,500	EA	9/06/2004	11/06/2004	760
Firm Planned	SCD47636	50006	DECUTAN 10MG CAP 50	2,000	EA	17/06/2004	22/06/2004	760
Firm Planned	SCD44241	51000	AZATHIOPRIN 50MG TAB COPYFARM	1,196	EA	17/06/2004	22/06/2004	760
Firm Planned	SCD47785	51287	AISOSKIN 10MG CAP 30	8,333	EA	17/06/2004	22/06/2004	760
Firm Planned	SCD47787	51289	AISOSKIN 20MG CAP 30	8,333	EA	17/06/2004	22/06/2004	760
Firm Planned	SCD47796	51360	GENRX AZATHIOPR 50MG TAB 100	3,000	EA	21/06/2004	22/06/2004	760
				150,945				
Firm Planned	SCD51245	50029	ESTELLE 35-ED 28 HONGKONG	5,000	EA	27/04/2004	1/05/2004	866
Firm Planned	SCD37795	40089	ESTELLE-35 ED 84	20,947	EA	30/04/2004	20/05/2004	866
Firm Planned	SCD44026	40089	ESTELLE-35 ED 84	20,947	EA	13/05/2004	20/06/2004	866
Firm Planned	SCD37998	51115	CLOPINE 100MG TAB 100 MAYNE	5,000	EA	18/05/2004	22/05/2004	866
Firm Planned	SCD47751	51030	CYPRO-EE 63 KATWIJK	21,366	EA	20/05/2004	23/05/2004	866
Firm Planned	SCD47684	50323	EUNICE 35-ED 28	12,000	EA	10/06/2004	22/06/2004	866
Firm Planned	SCD47767	51115	CLOPINE 100MG TAB 100 MAYNE	5,000	EA	16/06/2004	22/06/2004	866
Firm Planned	SCD47671	50116	CLOPINE 50MG TABS 100 AUS	1,000	EA	17/06/2004	22/06/2004	866
Firm Planned	SCD47763	51114	CLOPINE 25MG TAB 100 AUS	1,700	EA	17/06/2004	22/06/2004	866
				92,960				
Firm Planned	SCD38109	80005	NEO NACLEX 2.5MG TAB 500 GLAXO	9,238	EA	23/04/2003	25/04/2003	BosPak
Firm Planned	SCD38091	80002	MAREVAN 1MG TAB 100 GLAXO	29,402	EA	13/04/2004	16/04/2004	BosPak
Firm Planned	SCD38001	51277	FRUSEMIDE 40MG TAB 100 GENRX	34,610	EA	16/04/2004	22/04/2004	BosPak
Firm Planned	SCD41652	51271	FRUSEMIDE 20MG TAB 100 GENRX	9,000	EA	20/04/2004	21/04/2004	BosPak
Firm Planned	SCD41653	51273	FRUSEM 20MG TAB 100 TERRY WHT	2,000	EA	21/04/2004	21/04/2004	BosPak
Firm Planned	SCD51119	40200	NAXEN 250MG TAB 100	5,000	EA	7/05/2004	7/05/2004	BosPak
Firm Planned	SCD47508	40076E	DILEM 30MG TAB 1000 HONGKONG	1,800	EA	17/05/2004	21/05/2004	BosPak
Firm Planned	SCD41743	80005	NEO NACLEX 2.5MG TAB 500 GLAXO	9,238	EA	19/05/2004	21/05/2004	BosPak
Firm Planned	SCD44146	50003	MAREVAN 3MG TAB 100 SGP	7,201	EA	20/05/2004	21/05/2004	BosPak
Firm Planned	SCD41748	80006	NEO NACLEX 5MG TAB 500 GLAXO	1,930	EA	20/05/2004	21/05/2004	BosPak
Firm Planned	SCD51284	50162	FRUSID 40MG TABS AUS 100'S	10,000	EA	1/06/2004	7/06/2004	BosPak
Firm Planned	SCD51283	50161	FRUSID 20MG TAB 50 AUS	9,552	EA	4/06/2004	7/06/2004	BosPak
Firm Planned	SCD44103	41091	HYDROCORTISONE 5MG TAB 100	7,785	EA	8/06/2004	9/06/2004	BosPak
Firm Planned	SCD44318	61007	SEVREDOL 10MG TAB 10	32,984	EA	9/06/2004	11/06/2004	BosPak
Firm Planned	SCD44185	50096	LIPAZIL 600MG TAB 60 AUS	2,363	EA	10/06/2004	10/06/2004	BosPak
Firm Planned	SCD44071	40230	OX-PAM 10MG TABS 100	4,850	EA	11/06/2004	11/06/2004	BosPak
Firm Planned	SCD44081	40282	PYTAZEN SR 150MG TAB 60	4,700	EA	11/06/2004	11/06/2004	BosPak
Firm Planned	SCD44082	40282	PYTAZEN SR 150MG TAB 60	4,700	EA	11/06/2004	11/06/2004	BosPak
Firm Planned	SCD37836	40282	PYTAZEN SR 150MG TAB 60	4,700	EA	11/06/2004	11/06/2004	BosPak
Firm Planned	SCD43970	30150	DHC CONTINUS 60MG TAB 60	9,949	EA	18/06/2004	21/06/2004	BosPak
Firm Planned	SCD44151	50010	DOXSIG 100MG TAB 7	15,000	EA	18/06/2004	21/06/2004	BosPak
Firm Planned	SCD47876	80002	MAREVAN 1MG TAB 100 GLAXO	29,402	EA	18/06/2004	23/06/2004	BosPak
Firm Planned	SCD44053	40208	NAPAMIDE 2.5MG TAB 100	7,800	EA	21/06/2004	21/06/2004	BosPak
Firm Planned	SCD44097	41051	DEXAMETHASONE 1MG TAB 100	2,800	EA	21/06/2004	21/06/2004	BosPak
Firm Planned	SCD44392	80003	MAREVAN 3MG TAB 100 GLAXO	7,201	EA	21/06/2004	22/06/2004	BosPak
Firm Planned	SCD44397	80004	MAREVAN 5MG TAB 100 GLAXO	7,201	EA	21/06/2004	22/06/2004	BosPak
Firm Planned	SCD37871	42049	DILZEM SR 90MG CAPS 60	15,206	EA	23/06/2004	24/06/2004	BosPak
Firm Planned	SCD51128	40209E	NAPAMIDE 2.5MG TAB 500 SGP	72	EA	28/06/2004	28/06/2004	BosPak
				285,684				

OUT OF STOCK LIST AS AT 19TH APRIL 2004

CODE	PRODUCT	ETA	COMMENT	BACK- ORDER QTY	W/S PRICE	VALUE	CLASS
30014	IRON MELTS 50'S	29/04/2004	SALES EXCEEDED EXPECTATIONS (9844 IN 6 WEEKS)	2,034	\$6.35	\$12,915.90	B
31154	LOVIR CREAM 2G	END APRIL	PRODUCT DIVERTED TO COMBO PACK	93	\$3.24	\$301.32	B
40022	AT-EZE 0.5MG/ML N/SPRAY 12ML	7/05/2004	COMPETITOR OUT OF STOCK/SALES EXCEEDED FORECAST	1,193	\$4.13	\$4,927.09	A
31040	RESOLVE TOPICAL SOLUTION 25ML	7/05/2004	HIGH SALES	58	\$4.10	\$237.80	B
31214	SKIN-PREP WIPES 50	21/04/2004	ORDER ARRIVING WEDNESDAY	6	\$17.59	\$105.54	C
31198	MINIMS ALTROPINE SULPHATE 1%	21/04/2004	SOLD 16 IN MARCH/FORECASTING 1	2	\$32.72	\$65.44	C
31118	TIGER BALM (RED) 18G	TBA	SUPPLY PROBLEMS	1,078	\$4.93	\$5,314.54	B
37700	T/STRAP BLK BACK ONE SIZE	1/05/2004	SUPPLIER EXTENDED LEADTIME FROM 6 WEEKS TO 12 WEEKS	125	\$29.36	\$3,670.00	C
37716	T/STRAP BGE THUMB/WRIST	1/05/2004	SUPPLIER EXTENDED LEADTIME FROM 6 WEEKS TO 12 WEEKS	129	\$15.76	\$2,033.04	C
37716	T/STRAP BLK THUMB/WRIST	1/05/2004	SUPPLIER EXTENDED LEADTIME FROM 6 WEEKS TO 12 WEEKS	129	\$15.01	\$1,936.29	C

TOTAL \$31,506.96

Inventory Status Report as at 3/07/2004

Code	Description	Forecast Month	Forecast Quantity	Qty on hand	Ratio (on hand/forecast)
45024	PINETARSOL SHOWER PACK 200ML	August	600	-455	-0.76
31145	SOOV BURN 125ML	August	80	-58	-0.73
43039	DYZOLE 500MG TAB 40 BPK	August	260	-155	-0.60
31233	H/CARE JELONET 10 X 10CM 3	August	26	-5	-0.19
38022	COMBO COLD SEAL (100)	August	500	-88	-0.18
31017	COLD CR SOAP FREE GEL 400ML	August	60	-2	-0.03
31242	OPSITE FLEXIGRID 10 X 12CM 10	August	43	0	0.00
67314	ALOE VERA JUICE 1250ML AUS	August	2,780	14	0.01
31137	TIGER MUSCLE RUB 30G	August	558	10	0.02
30015	H/ LEMON 20x12 (DO NOT USE)	August	400	7	0.02
45010	EGOCORT 1% CRE15G (DISC)	August	800	16	0.02
31045	DERM-AID 0.5% CREAM 15G	August	411	7	0.02
50212	PROCUR 50MG TAB 50	August	118	4	0.03
40268	FOLIC ACID 0.8MG TABS 120'S	August	1,558	40	0.03
30011	H/ LEMON 10x12 (DO NOT USE)	August	300	9	0.03
45011	EGOCORT 1% 30G	August	643	65	0.10
51276	FRUSEMIDE 40MG 100's C-MART	August	15,000	1,638	0.11
31100	SEBITAR 250ML	August	1,037	131	0.13
31049	DERM-AID 1% CREAM 30G	August	747	131	0.18
31312	CUTIFILM PLUS 8 X 10CM 5	August	126	25	0.20
31232	H/CARE MELOLIN 10 X 10CM 3	August	40	8	0.20
31040	RESOLVE TOPICAL SOLUTION 25ML	August	250	50	0.20
45025	PINETARSOL GEL 500G	August	178	39	0.22
31197	AMETHOCAINE HCL 1% .5MLx20	August	52	23	0.44
45026	PINETARSOL BAR 100G	August	577	268	0.46
40210E	NAPAMIDE 2.5MG TAB 90 SEA BPK	August	600	284	0.47
22002	CRYSTAL MIDSTREAM PREG TEST	August	523	246	0.47
31313	C/FILM PLUS SKINTONE 8 X12CM 5	1/08/2004	18	18	1.00
31309	C/FILM PLUS S/TONE 7 .X 5CM 5	1/08/2004	18	18	1.00
31319	CUTINOVA HYDRO 10 X 10CM 5	1/08/2004	4	4	1.00
31342	I/POSE LITE 7.5 X 20CM 100	1/08/2004	1	1	1.00
45021	PINETARSOL SOLUTION 200ML	1/08/2004	878	875	1.00
31326	CUTINOVA HYDR0 5 X 6CM 10	1/08/2004	2	2	1.00