

School of Information Systems

Strategic Supply Management practices in the WA mining industry

A study of four companies

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This thesis is presented for the Degree of
Master of Philosophy (Information Systems)
of
Curtin University

March 2016

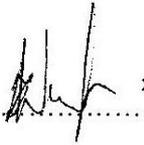
Declaration

I hereby declare that:

- i) To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

- ii) This thesis contains no material which has been accepted for the award of any other degree or diploma at any university.

- iii) The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee, Approval Number IS_11_20.

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Title: Strategic Supply Management practices in the WA mining industry: a study of four companies

ABSTRACT

Competition, fuelled by globalization and technological advances, has increased exponentially in the last two decades. At the same time, companies are recognising that they can significantly increase strategic benefits by developing their supply management function.

A substantial amount of research has focused on supply management as a key contributor to companies' competitive advantage across multiple industries, but few research studies have addressed supply management in the mining industry from a strategic perspective or otherwise.

There are two distinct schools of thought relating to strategic supply management, one side viewing it as the next step up the ladder of supply management evolution, the other considering strategic practices as a subset of supply management. However, both agree on the characteristics inherent to achieve strategic benefits through more intelligent supply management.

This research investigates: 1) the degree to which supply management is regarded as a strategic activity in the Western Australian mining industry; and 2) the alignment of practices and decision-making with strategic direction and with existing frameworks/models in supply management.

A case study strategy was adopted with qualitative data being collated through semi-structured interviews. In addition, a conceptual matrix was used to evaluate the level of congruency between strategic supply management adoption and actual practices and decision-making. Further analysis compared industry practices to existing models to determine whether these are suitable to the mining industry or whether expansion may be required to suit circumstance unique to this industry.

The major outcomes from this study are:

- The WA mining industry is well on its way as far as the development and implementation of SSM are concerned.

- It appears that the WA mining industry is approaching SSM fairly methodically, although the sequence of establishing the right structures vs implementing SM practices may be lacking in efficiency.
- The size of a company impacts not only the pace at which it pursues SSM, but also the extent to which it can efficiently adopt SSM enablers, strategies and approaches.
- Although the WA mining industry appears aligned with existing models and frameworks, it is still lacking in some areas. Specifically, its maturity level of SSM adoption can be improved by paying more attention to the guidelines given by these models/frameworks and by being more pro-active.

ACKNOWLEDGEMENTS

To my supervisor and mentor, Dr Paul Alexander: words can't express how grateful I am for your unwavering support, guidance and subtle prodding towards the finish line, which at times looked like a mirage never to realise.

To my family, specifically my dear husband, Ben and my two beautiful children, Robert and Nadine: I thank you from the bottom of my heart for putting up with absence in mind and spirit, if not body, while writing, impatience at interruptions, many evenings with dinners unprepared and a dinner table more often than not buried under books and documents. Rob, at last we can open that Magnum champagne that's been awaiting the submission of this thesis far longer than it should have!

To all my friends (you know who you are): thank you for your encouragement over this interminable period of research and thesis writing, even though some of your methods were highly questionable. I'm proud to say that, after all, you will not need to appeal to the university to grant me an honorary degree on the basis of age - this falls or flies on its own!

I know I don't have to put it on paper, but. Thank you, Lord, for helping me get to this point.

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CHAPTER 1: INTRODUCTION

1.1 OVERVIEW OF THIS CHAPTER

This chapter provides an introduction to the study: it states the objectives of the study as well as the research questions to be answered through the study. It provides a brief background, introduces the relational conceptual framework proposed to support the analysis and highlights the significance of the study. An overview of the research method and approach is also provided and an outline of the rest of the thesis concludes this chapter.

1.2 OBJECTIVES OF THIS STUDY

This research explores the adoption of Supply Management (SM) as a strategic discipline in the Western Australian mining industry and the alignment / conformance of the industry's Strategic Supply Management (SSM) practices to existing models and frameworks. The aim of this study is (i) to examine the degree to which SM is regarded as a strategic activity in this industry; and (ii) to provide guidelines to improve SSM practices and decision-making. These aims are addressed through the following questions:

1. Which Strategic Supply Management (SSM) practices are evident in the WA mining industry (i.e. the maturity level of SSM development and the reflection of this in practice); and
2. How do these practices align with existing SSM frameworks and models?

1.3 BACKGROUND

This section provides a brief description of the evolution of SM from being a purely transactional activity up to the strategic position it holds today. This section also explores the concept of SM and its adoption in the mining industry and takes a closer look at the concept of economic cycles and its impact on SM within this industry.

1.3.1 The evolution of supply management

Traditionally, the purchasing function was seen as a purely supporting activity in the business organization, fulfilling a passive, administrative role. When Porter (1979) identified the power of buyers and suppliers as two of the five critical forces governing industry competition in his influential Five Forces model, the role of the purchasing function heightened in importance and was then referred to as 'Procurement' to encompass the sourcing process from requirement specification through supplier evaluation and selection to the ongoing management of the buyer-supplier relationship.

Supply management as a discipline was first suggested in 1983, when Kraljic (1983, p109) argued that "purchasing must become supply management".

Most companies have come a long way since then, moving beyond simple buyer-supplier relationships, engaging in SM practices like Early Supplier Involvement (Knoppen, Christiaanse and Huysman 2010), Cost Management, Supplier Performance Measurement and Relationship Management to name a few (Cousins 2008; Leenders 2006; Lysons 2006; Monczka 2009; Trent 2007; Keough 1993). However, SM incorporates a lot more than just renaming the traditional purchasing area and adopting advanced methodologies: supply management is seen as a core component to organizations' competitive advantage and as strategically important to supply chain performance (Paulraj, Chen and Flynn 2006; Ryals 2006; Tassabehji and Moorhouse 2008). As noted by Ryals and Rogers (2006, p41): "Procurement has grown up". With the buyer-seller relationship attracting the most research by far, various models for the development of buyer-seller relationships over time have been documented, with reference to reasons for success or failure and benefits derived by all parties (Ford 1980; Narayandas and Rangan 2004).

Strategic Supply Management

With the growing recognition of supply management's impact on companies' financial performance and its impact on the overall supply chain performance (Burt 2003; Chen, Paulraj and Lado 2004; Day and Lichtenstein 2006; Rajagopal and Bernard 1993), more and more companies are striving to achieve an even higher level of SM competency, namely

strategic supply management. As Cox (1996, p66) stated: “strategic procurement management (SPM) can never be reactive, it must always be proactive”¹.

The ultimate role of a company is the engineering of a sustainable position on its supply and value chain, thus providing opportunities for the development of an acceptable margin or profit. Degraeve, Roodhooft and Van Doveren (2005) indicate that typical problems in respect of existing SM practices include inadequate planning, poor communication between departments involved in the sourcing of materials and equipment and inappropriate performance measurement – all of which is detrimental to an organisation’s bottom line. Specifically, co-measurement and consultations of performance, including trust building and both sides’ perceptions of fairness, are essential to sustain the mutual benefits to be gained from the relationship (Degraeve 2005) .

However, there is a clear divide in schools of thought around the concept of supply management evolving into strategic supply management / procurement / purchasing: while many authors (Burt 2003; Leenders 2006; Lysons 2006; Monczka 2009; Tassabehji and Moorhouse 2008; Cousins 2008) advocate the concept of SM with SSM focus areas as a subsection thereof, others (Chen, Paulraj and Lado 2004; Cousins and Spekman 2003; Cousins 2008; Day and Lichtenstein 2006; Trent 2007; Keough 1993) specifically distinguish between SM and SSM, claiming the latter as the next step up the evolution ladder.

Irrespective of which school of thought SM leaders support, a 2004 survey (Kearney 2004) amongst senior executives revealed that they expect procurement to go well beyond its traditional role. Not discarding the cost reduction focus, they see procurement’s greatest challenge as capturing value from the supply market – a huge step forward from traditional perspectives!

¹ The terms ‘purchasing’, ‘procurement’ and ‘supply management’ are used interchangeably, although somewhat imprecisely, in most literature and many business organizations. ‘Supply Management’ is used increasingly today to encompass the purchasing department, the cross-functional, proactive procurement process and more.

1.3.2 Supply management in the mining industry

Traditionally, supply chain management in the extractive industry (companies that prospect, explore and produce non-regenerative natural resources from the earth (McCracken 2005)) is viewed as being predominantly one-way, i.e. outbound, (Langley 2008) with very little academic research available on strategic procurement in this industry. As reiterated by Walker (2005, p1): "... there is a relative paucity of studies that explore the backward linkages arising from the mining sector" – 'backward linkages' referring to the supply sector of the mining industry. Walker (2005) based the importance of enhanced supplier linkages on three main factors:

- i) An advanced and internationally-competitive supplier industry provides competitive strength to its customers. For suppliers to the mining industry a main driver of the R&D (research and development) process is demand from the mines, thereby stimulating innovation;
- ii) Given the volume, scale and range of products required by mining companies during set-up and operations, the supplier network becomes a significant generator of output, employment, skills and foreign exchange in own right; and
- iii) Countries need to leverage of the know-how of the manufacturing sector supplying resource-based industries to enable the move from low-valued primary-based activities to high-tech, knowledge-based expansion.

1.3.3 Economic cycles and their impact on supply management and the mining industry

Traditionally, SM within the organisation was directly impacted by economic cycles: in prosperous times (boom cycles), SM would be less constrained, with budgets providing for expansion, growth, training, research and development; during economic downturns (bust cycles), SM would be one of the first areas the organisation looks towards for cost-cutting exercises, internally as well as externally. In seeking to understand the impact of economic cycles on SSM, the concept of economic cycles needs to be investigated first. As far back as 1917, research attempted to explain the economic cycles of supply and demand and one of the dynamic laws of

demand as identified by Clark (1917) then, is as true today as it was then, i.e. consistent (or even increased) demand for goods is not only dependent on price, but also on the perceived future price of the goods.

Looking at more recent observations, Brian Gilbertson (2002), the then incoming CEO of BHP Billiton, mentioned in his strategic framework speech (about nine months after the merger of BHP and Billiton) the 'boom-to-bust' pattern is very typical in the resource industry with commodity prices going up and down. This typical 'boom-to-bust' pattern gets exacerbated by macro-economic fluctuations as witnessed with the recent Global Financial Crisis.

One of the major risks supply management organizations (SMO) face in an economic downturn is dealing with financially struggling suppliers. On the one hand, SMO need to mitigate supply risks for their own companies, but on the other hand this strategy can directly lead to supplier failure. When under pressure, most companies look towards the SM function first for cost savings through reduced prices from suppliers and this can literally push struggling suppliers over the edge, which bears the question: does strategic supply management practices (with long term planning at its foundation) fly out the window in tough economic times?

1.3.4 Concluding comments

In conclusion, it is recognized that not all organizations progress the evolution of their SM function at the same rate and not all organizations need to evolve this function to the highest development stage. However, the literature suggests that the value to be derived from adopting SSM (in principle *and* practice) are multitude and progressive organizations are breaking new ground and laying new foundations for SM with benefit gains that their competitors should ignore at own peril.

From an industry perspective, it is clear that the positioning of the mining industry's supply management development, as well as the importance the industry leaders attach to supply management, requires further research, especially in light of the increased importance attached to SM and its potential significant contribution to economic performance.

1.4 CONCEPTUAL FRAMEWORK

For companies to get the full benefit of transforming their supply organizations into a “powerful, competitive weapon that adds value far beyond cost savings” (Hardt 2007, p124), executives need to take supply management to the next level. Drawing on extant literature, a conceptual framework in the form of a matrix is proposed to express the degree to which SSM has been adopted in the WA mining industry, (i.e. the level of maturity of SSM development) against the strategicness of practices through changing economic conditions. The matrix provides a simple framework for visually presenting the findings of the study.

1.5 SIGNIFICANCE OF THIS RESEARCH

Considering that natural resources are limited, that a vast number of supply chains originate in the resources industry and that SM has gained significant importance in recent years across industries, research specific to SM and the mining industry is extremely limited. Overall, this research contributes by providing new insights about the importance that mining companies in Western Australia attach to the role of SM in their organizations and how SSM strategies and approaches are reflected in practice.

From an academic perspective, this research attempts to interpret the degree to which SSM characteristics have been adopted in the mining industry. It also explores the consistency of practices and decision-making within SM, with specific reference to the mining industry of Western Australia. (In the 2009-10 financial year, Western Australia’s Minerals & Energy sector produced an output to the value of \$70,906 million (DMP 2009), while the 2014-15 financial year delivered an output of \$99,523 million (DMP 2015)). Furthermore, comparisons are made to existing SSM models and frameworks to determine whether these are suitable for the mining industry or whether an expanded model is required in order to address the circumstance that may be unique to this industry.

From a practical perspective and within the mining sector, the research yields useful insights in respect of role defining for SM and how “walking the talk” of SSM creates value in the longer term. It is also useful as an indication of how the SM practices of the mining industry in Western

Australia compares with those of other industries, and whether the evolution of SM in this industry is on par, lacking or leading against other industries.

1.6 OVERVIEW OF RESEARCH METHOD

A qualitative approach is proposed as being more appropriate for this research, where qualitative research aims to understand “phenomena in context-specific settings” as opposed to quantitative research which emphasizes facts and causes of behavior while seeking to generalize findings (Golafshani 2003, p600). A positivist paradigm is applied and the research includes deductive aspects (comparing practice with existing frameworks/models). This is an explanatory study to establish how closely the degree of SSM adoption matches practical reality of decisions made and a case study strategy is used (a specific contemporary trend being investigated in real-life context (Saunders 2009)). Three stages have been identified:

Stage 1: Literature review - identify key SSM features from frameworks and models established through literature.

Stage 2: Evaluating secondary data to identify potential WA mining companies at different stages of adopting SSM, based on above features, specifically the position and reporting line of the supply leader in the organisation structure.

Stage 3: Semi-structured interviews with representatives from four participant companies followed by analysis of data and mapping the positions of the participant companies on the conceptual framework.

1.6.1 Sample population and instrument development

The Western Australian mining sector was chosen for a combination of reasons. First, there is a distinct lack of research regarding SM in the mining industry. Second, choosing a single industry has the advantage of controlling for the multitude of confounding factors that may impact in cross-sectional investigations (Mahama 2006; Walton 1998) such as supply chain positioning, process differences and industry outlook. Third, WA mining industry is a major contributor to Western Australia’s economic performance (representing 84% of all WA merchandise exports, 58% of the Australian

minerals exploration value and approximately 54% of the minerals and energy export for Australia (DMP 2015)), with considerable impact on manufacturing, construction, financial, property and transport sectors ((ACA 2005; DMP 2009, 2015). Fourth, this selection is most appropriate considering the time constraints and access requirements.

Furthermore, the sample selection is non-probabilistic, purposive sampling to ensure inclusion of companies at different stages of SSM adoption.

Following the initial identification of candidate companies, the participant companies confirmed their willingness to participate. Questions developed during stages 1 and 2 mentioned above formed the basis of semi-structured interviews conducted with representatives (individuals in SM leadership positions) from the four companies.

1.6.2 Data Collection and analysis

Semi-structured interviews were conducted with the SM leader(s) in each company. Data collection in the form of intensive note-taking during the interviews was followed by data transcription to assist with analysis. The required statistical analysis was not intensive and was conducted using Excel.

1.7 OUTLINE OF THESIS

This thesis is organised into six chapters:

This chapter (Chapter 1) provides an introduction to the study which includes its objectives, the research question, background, the relational conceptual framework proposed to support the analysis, the significance of the study and an overview of the research method and approach.

Chapter 2 presents a review of literature covering the following key focus areas: i) strategic supply management and its main characteristics; ii) economic cycles with attention to supply management and to the mining industry; iii) the supply chain for the mining industry, strategic supply management in the mining industry and an assessment of the gaps / failure points in these practices.

Chapter 3 focuses on research design and approach. It includes the rationale behind the sampling selection, the method of data collection and the data analysis.

Chapter 4 presents the key findings from this research using the conceptual framework.

Chapter 5 covers a discussion of the key findings derived and links these back to the relevant literature and models.

Chapter 6 delivers the study's conclusions and recommendations for further research to improve understanding in this area.

CHAPTER 2: LITERATURE REVIEW

This literature review provides a brief description of the evolution of SM from being a purely transactional activity up to the current schism surrounding SSM. The key characteristics of SM as a strategic function as extracted from extant literature are succinctly summarised. This section also explores SSM as a discipline and its adoption in the WA mining industry, followed by a closer look at the concept of economic cycles and its impact on SM within this industry.

2.1 THE EVOLUTION OF STRATEGIC SUPPLY MANAGEMENT: FROM PURCHASING TO SUPPLY MANAGEMENT, AND THEN TO STRATEGIC SUPPLY MANAGEMENT (?)

Back in 1983 (in an article cited 2007 times according to Google), Kraljic (1983, p109) argued that “purchasing must become supply management” and emphasized that the purchasing function within organizations could not be allowed to lag behind in adjusting to environmental and economic changes. Kraljic is seen as one of the major contributors to the modern view of SM and hardly any textbook today covers the subject of SM without referring to Kraljic’s portfolio matrix in one form or another.

Most companies have come a long way since then, with their Procurement departments (also referred to as SM organizations) engaging in SM practices like Early Supplier Involvement (Knoppen, Christiaanse and Huysman 2010) Cost Management, Supplier Performance Measurement and Relationship Management to name a few.

However, SM incorporates a lot more than just the renaming of the traditional purchasing area and adopting advanced methodologies: in the literature, SM (alternatively named procurement) is seen as a core component to organizations’ competitive advantage and is considered to be strategically important to supply chain performance (Paulraj, Chen and Flynn 2006; Ryals 2006; Tassabehji and Moorhouse 2008). As Tassabehji and Moorhouse (2008, p55) note: “the evolution in the procurement function is well documented”.

The move away from purely transactional, administrative activities towards a more proactive approach focused on value-adding benefits and involving

supplier sourcing and selection, supplier development, longer-term agreements and e-procurement is a common thread through the literature (Burt 2003; Cousins 2008; Lysons 2006; Monczka 2009; Paulraj, Chen and Flynn 2006; Ryals 2006; Tassabehji and Moorhouse 2008; Trent 2007). With the buyer-seller relationship attracting the most research by far, various models for the development of buyer-seller relationships over time have been documented, with reference to reasons for success or failure and benefits derived by all parties (Ford 1980; Narayandas and Rangan 2004).

Strategic Supply Management – the next step?

With the growing recognition of supply management's impact on the company bottom line (i.e. its financial performance) and its impact on the overall supply chain performance (Burt 2003; Chen, Paulraj and Lado 2004; Day and Lichtenstein 2006; Rajagopal and Bernard 1993), more and more companies are striving to achieve an even higher level of procurement competency, namely SSM (or strategic procurement). As Cox (1996, p66) stated: "strategic procurement management (SPM) can never be reactive, it must always be proactive".

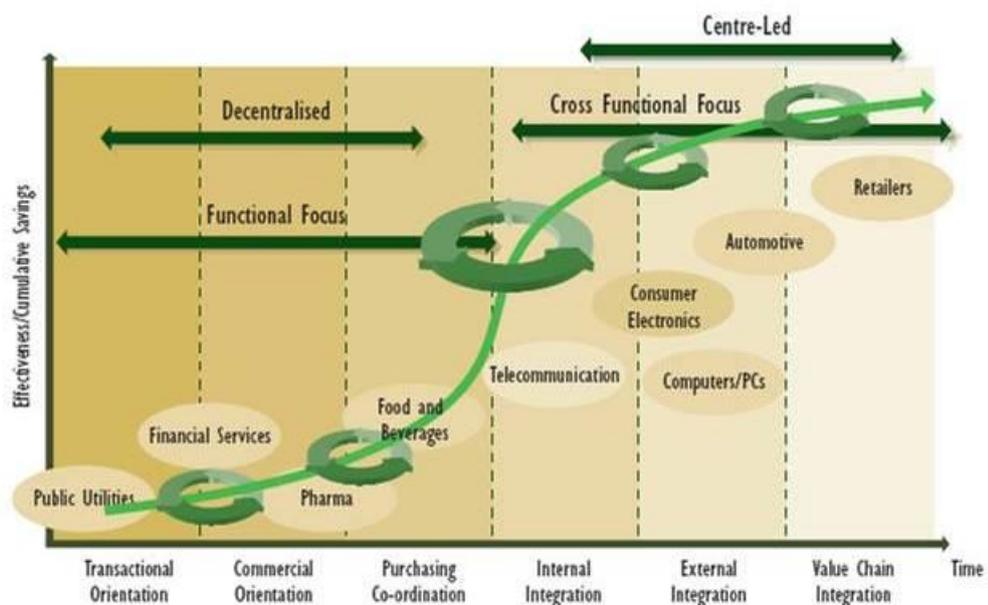
The ultimate role of a company is the engineering of a sustainable position for the company on its supply and value chain, thus providing opportunities for the development of an acceptable margin or profit. "In the final analysis, the goal of SPM is about making money, nothing else" (Cox 1996, p66). Degraeve, Roodhooft and Van Doveren (2005, p51) state that "procurement has been an undervalued activity in terms of its contribution to corporate performance improvement and value for money management." They indicate that typical problems relating to existing procurement practices includes inadequate planning, poor communication between departments involved in the procurement of materials and equipment and inappropriate performance measurement. SM, conversely, includes not only supply base optimisation and collaborative interaction with suppliers, but also focus on longer term relationships with quality suppliers. They go on to state that both parties in strategic supplier/customer relationships needs to understand the new tools and ways of working together. Specifically, co-measurement and consultations of performance, including trust building and both sides'

perceptions of fairness, is essential to sustained mutual benefits gained from the relationship.

However, there is a clear divide in schools of thought around the concept of SM evolving into SSM. On the one side, there are many authors advocating the concept of SM with specific strategic focus areas only included as a subsection thereof (Burt 2003; Leenders 2006; Lysons 2006; Monczka 2009; Tassabehji and Moorhouse 2008; Cousins 2008). On the other side, there is a group of authors specifically distinguish between SM and SSM, citing SSM as the next step up the evolution ladder (Chen, Paulraj and Lado 2004; Cousins and Spekman 2003; Cousins 2008; Day and Lichtenstein 2006; Trent 2007; Keough 1993).

Based on the analysis of documented work from revered authors such as Reck and Long, Syson, Bhote, Cavinato, Monczka et al, Van Weele and Rozemeijer defined the six stage purchasing developmental model shown below, which they believed paved the way towards a coherent purchasing and supply development model (Van Weele 1998a). This model describes a stage-wise development of SM from its traditional transactional roots to being integrated into corporate strategy, with a direct relationship to its efficacy.

Figure 1 Six stages of purchasing development (van Weele 1998b)

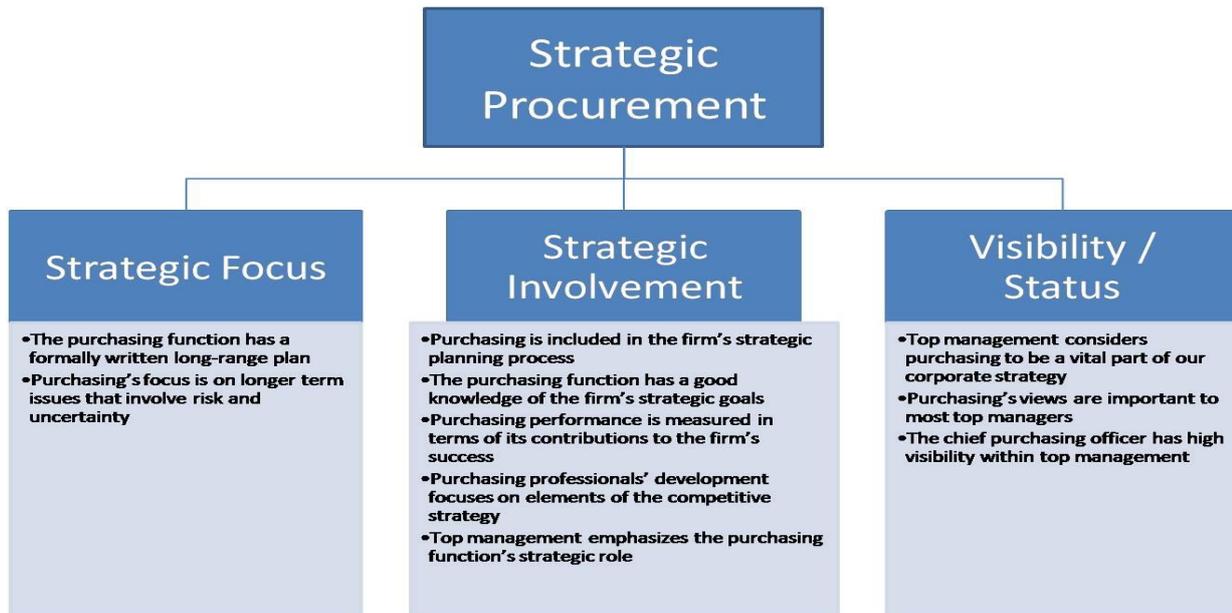


This model is less controversial than many others in that its highest competency is described as 'Centre-Led Value Chain Integration', thereby

conveniently sidestepping the Supply Management vs. Strategic Supply Management debate.

Similarly, Paulraj et al (2006, p107) identified purchasing within different companies to be “at different stages of strategic development or evolution, with its role ranging from clerical to integrative”. These authors defined three levels of progress / development in strategic procurement, based on “its underlining dimensions of strategic focus, strategic involvement, and visibility” (Paulraj, Chen and Flynn 2006, p118), which were then operationally expanded. They defined level 1 as the emerging stage of the strategic purchasing within companies. Level 2 defined companies that are more advanced when compared to the companies at level 1, but as the purchasing function in these companies lacked long-term proactive actions, it could not be seen as highly strategic yet. Paulraj et al (2006, p115) considered companies at level 2 to be “*tactical* in nature”. Companies at level 3 were considered to be the most evolved and advanced in terms of strategic purchasing. Within these companies “purchasing influences the competitive factors including quality, cost/price, timely and reliable delivery, and cycle time reduction” (Paulraj, Chen and Flynn 2006, p116), achieving this through strategic integration with the supply base and by nurturing effective collaboration with suppliers. Paulraj et al’s (2006) perspective of the properties of level 3 strategic purchasing are shown in the diagram below.

Figure 2 Characteristics of Strategic Procurement (Paulraj, Chen and Flynn 2006)



Similarly, Trent (2007) defines SSM as featuring strategies that result from an aggressive improvement drive and presents the framework below.

Figure 3 Strategic supply management framework (Trent 2007)

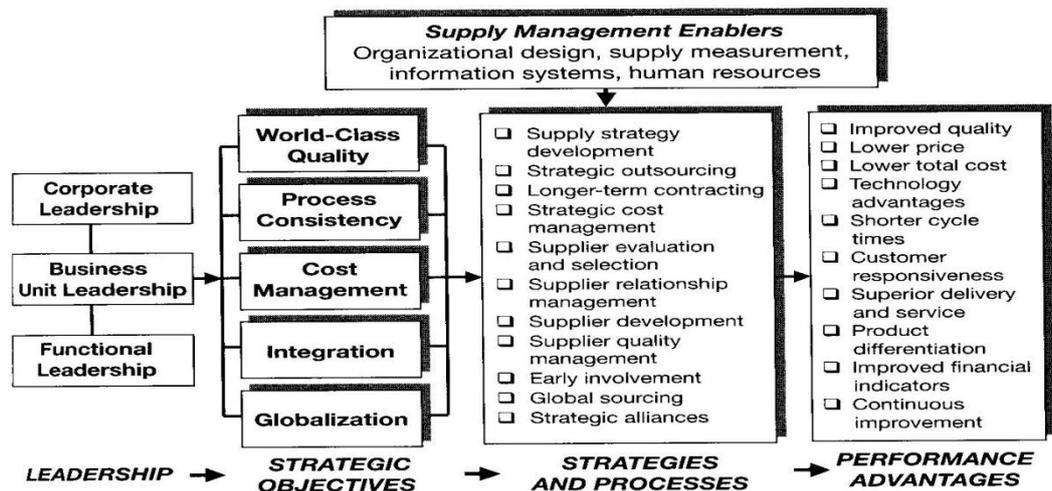


Figure 1.2 Strategic supply management framework. (Adapted from *The Global Electronic Benchmarking Network*, Michigan State University.)

Trent (2007) puts forward that, in order to become successful at SSM and thus gain the performance advantages it can deliver, a company's leadership, from executive level through business unit leadership to the

leaders at functional level has to become involved in the company's overall strategic objectives as it relates to SSM.

Starting from that base, a company needs to put into place the necessary SM enablers in terms of structures relating to human resources, systems and design. This foundation will enable the company to successfully implement and support SM strategies and processes which in turn will deliver the sought-after benefits, increasing the company's competitiveness. Importantly, Trent (2007, p) also states that all organisations should not sanction SSM at equal levels and that it's the responsibility of the supply leader (typically the Chief Procurement Officer or CPO) to recognize the SM model that best fits a company's needs. Supporting the view of SSM as a next level of procurement, Cousins and Spekman (2003) state that there is a clear-cut distinction between SM implementing strategies and SM being strategic in execution. According to Ellram and Carr (1994) , it is of the utmost importance to distinguish between SM strategy and SM performing as a strategic function. When recognised as a strategic function, SM participates in a company's strategic planning process and is regarded as a key decision maker.

Key characteristics of SSM

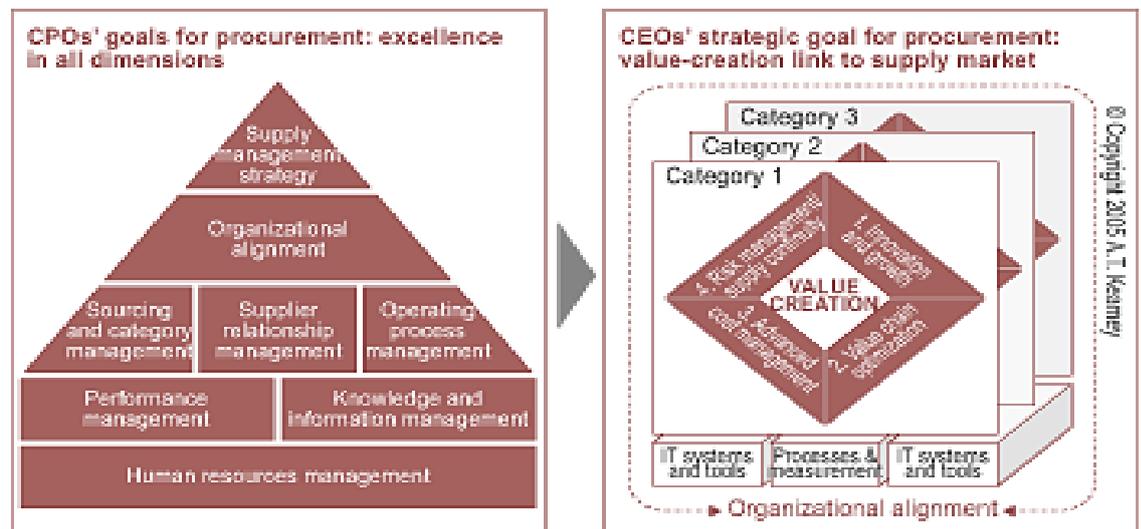
Irrespective of which school of thought researchers belong to, they are all in agreement that, for SM to contribute on a strategic level, the following is required:

- a central decision-making procurement organisational structure;
- a high-profile leader (often called 'Chief Procurement Officer' or CPO, to denote a comparable level of importance to the CFO) with general business skills and functional credibility;
- cross-functional and cross-organizational teams of people with appropriate skills and competencies;
- a portfolio of supplier relationships;
- ongoing cost analysis; and
- the necessary information technology and performance measurement systems to support decision making on all levels.

In their very first global study of the subject, A.T. Kearney's (2004) Assessment of Excellence in Procurement Survey (involving more than 275

participants worldwide) revealed that senior executives expect procurement to go well beyond its traditional role. Not discarding the cost reduction focus, they see procurement’s greatest challenge as capturing value from the supply market. “This view represents a huge advance in understanding procurement’s potential: In 1999, 28 percent of supply management organizations had goals in the area of value creation, but by 2004 that figure increased to 66 percent” (Blascovich 2004, p1). The study indicates that company leaders and their CPO’s are creating value and gaining competitive advantage by focusing on four areas: innovation and growth, value chain optimization, advanced cost management and risk management & supply continuity, as shown below.

Figure 4 “From procurement skills to value creation” (Kearney 2004, p2)



Source: A.T. Kearney

A more recent follow up survey by the same company (Kearney 2014) found that companies leading in SSM activities increase their competitive advantage through supplier-driven innovation and risk management (amongst others), gaining more than double the cost reduction benefits than their more complacent counterparts.

2.2 ECONOMIC CYCLES WITH PARTICULAR ATTENTION TO ITS IMPACT ON SUPPLY MANAGEMENT AND THE MINING INDUSTRY

Traditionally, SM within the organisation was directly impacted by economic cycles: during prosperous times (boom cycles), SM would be less

constrained, with more focus on expansion, growth, training, research and development; during economic downturns (bust cycles), SM would be one of the first areas organisations look towards for cost-cutting exercises, internally – by reducing manpower and cutting development projects for example - as well as externally – by pressuring suppliers to cut margins without cognisance of the long term effect on the relationship. In endeavouring to understand the impact of economic cycles on SSM, the concept of economic cycles needs to be investigated first.

As far back as 1917, research has been done to attempt explanation of the economic cycles of supply and demand. One of the “dynamic laws of demand” as identified by Clark (1917, p235) then, is as true today as it was then: “We have seen that the demand for durable goods depends, not merely on the price, but on the direction in which the price is expected to move in the near future, as judged chiefly by the direction in which it has been moving in the immediate past”. Looking at more recent observations, Brian Gilbertson (2002), the then incoming CEO of BHP Billiton, mentioned in his strategic framework speech (about nine months after the merger of BHP and Billiton) the ‘boom-to-bust’ pattern is very typical in the resource industry with commodity prices going up and down, leading to poor investment performance and in turn, driving “shareholders to distraction. This typical ‘boom-to-bust’ pattern gets exacerbated by macro-economic fluctuations as witnessed with the recent Global Financial Crisis. Rostagno (2008, p1) define the “boom-bust cycle” as “a period in which stock prices, consumption, investment and employment all rise and then crash”. The views of some major companies in dealing with SSM in a ‘down economy’ are reflected in table 1 (SCDigest 2009a).

Table 1 Strategic Supply Management in practice during economic downturns (SCDigest 2009a, 2009b; Mackenzie 2010)

<u>Person (position, Company)</u>	<u>Viewpoint</u>
Rick Hughes (Vice-president of Global Purchasing, Procter & Gamble)	It is a perilous proposition for the short and long term to insist on unilateral cost reductions to try to improve a company's financial situation. Such an approach may <i>cause</i> suppliers to have financial or liquidity problems, thereby increasing risk for their customers.
Tony Hayward (CEO, BP)	Prices reductions for metals and energy take too long to be reflected in suppliers' prices – BP's challenge is to “drive deflation” in its supply chain, thereby “accelerating that flow-through” of price reductions.
Tom Rae (Group Director of Procurement, NSG Group)	A “price-attack approach” will never be applied to their strategic suppliers, but alternative ways will be found to cut costs without damaging relationships. However, in the energy and commodities market and for non-critical categories, they will push for price reductions.
Alistair MacKenzie (Director - Oil & Gas, Achilles Group Ltd)	Although short term gain may be tempting, a better solution is to draw on collaborative relationships, built for mutual longer term value, to level out fluctuations and “wild swings” in the market.

When under pressure, most companies look towards the procurement function first for cost savings through reduced prices from suppliers. According to Rick Hughes, vice-president of global purchasing at Procter & Gamble, P&G is “taking a less aggressive approach this time. Insisting on unilateral price cuts in an attempt to improve your company's financial position is a very dangerous proposition in the short term as well as in the long term” (SCDigest 2009b, p1). According to the article, P&G had tried that approach during tough times in the late 1990s – and only achieved about 5% of the initially expected savings. He concluded that it wasn't very advantageous and that the approach may cause suppliers to have financial or liquidity problems. Tony Hayward, chief executive of energy giant BP, said

he wanted to “drive deflation into the supply chain”. “He told analysts prices for metals and energy had fallen 60-70 percent, which would eventually flow through to suppliers’ prices, adding: “Our challenge is to accelerate that flow-through as rapidly as possible.”” (SCDigest 2009b). Tom Rae, group director of procurement at NSG Group, one of the world’s leading glass makers stressed that they would never lead with an attack on price to their strategic suppliers, but will have to find ways to cut costs without damaging relationships. As Alistair MacKenzie (2010, p12) observes: “It may be tempting to leverage market advantage for short-term gain; however, a more satisfactory solution may be to draw strength from collaborative partnerships that are built for the long-term delivery of value to both parties, by aiming to smooth out fluctuations and wild swings in the market.”

These approaches are supported by revered authors on SM, who argue that suppliers easily replaced, are not cause for in-depth deliberations and collaborative considerations, but those with long term strategic value definitely are (Kraljic 1983; Trent 2007). As Kraljic (1983, p109) mentions, “supply and demand patterns can be upset virtually overnight”. Companies need to guard against threats of supply depletion or interruptions and need to cope with the changing economics and new opportunities brought by technological advances.

2.3 SUPPLY OR VALUE CHAIN FOR THE MINING INDUSTRY AND STRATEGIC SUPPLY MANAGEMENT IN THE MINING SECTOR

According to Vorster (2001), the value chain concept reflects the possibility of gaining competitive advantage by arranging value adding activities sequentially in a ‘chain’ with the objective of satisfying the requirements of the end customer. In this scenario, both the value adding activities and the methods for connecting / linking these activities may be sources of competitive advantage. One of the outputs from his research was a high level process model of the generic mining value chain, depicting the direction of value accrual as seen below.

Figure 5 Vorster’s generic mining value chain (Vorster 2001)



In his abstract depiction of the mining value chain as mapped to the Porter value chain concept, Vorster (2001) lists procurement, human resource management, risk management and research and development as supporting activities for the primary mining activities. These activities are essential components of strategic procurement as noted above. According to McCosker (2002), the mining industry needs to move away from pre-conceived ideas on delivery procedures. He further indicates that there needs to be a commitment to critically review how a project outcome can best be optimized for both client and contractor by the assessment and selection of the best procurement method. This will require a change in attitude to both the process of tendering and the evaluation of tenders as tender and contract practices have moved away from purely cost based assessments with a trend towards relationship contracting.

As Azapagic (2004, p642) elucidates: “although at the bottom of the supply chain, the mining and minerals sector still has a number of suppliers, including providers of energy, chemicals and other materials. Like contractors, they will in general be interested in economic viability of the company they are supplying to and whether their contracts will be paid in accordance with terms.” Azapagic (2004) also asserts that the mining and mineral industry need to broaden the traditional system boundaries and consider sustainability issues along the whole supply chains if this sector wants to be able to respond appropriately to the challenge of sustainable development – “the mining and minerals industry faces some of the most difficult sustainability challenges of any industrial sector”.

Traditionally, supply chain management in the extractive industry is viewed as being predominantly one-way, i.e. outbound, (Langley 2008) with very little academic research available on strategic procurement in this industry. As reiterated by Walker (2005, p1):“... there is a relative paucity of studies that explore the backward linkages arising from the mining sector” – ‘backward linkages’ referring to the supply sector of the mining industry.

Walker (2005) is very clear on how enhanced supplier linkages can positively benefit the mining industry: “From a policy perspective, strengthening and enhancing existing (and rejuvenating “lost”) linkages between the mines and the supplier industry and leveraging the know-how and expertise embodied in the products and services exchanged to stimulate

new linkages, is considered important” (Walker 2005, p1). He continues to list three reasons for its importance: “First, a sophisticated and internationally-competitive supplier industry provides competitive strength to the underlying industries which purchase its inputs. Inputs enable producers to undertake productivity enhancements as well as commission new plants/mines. However, this only becomes possible with the advent of new technology in capital goods and service inputs.” (Walker 2005, p1) A main driver of the R&D (research and development) process is demand from the mines, thereby stimulating innovation. “Second, given the volume, scale and range of products required by mining companies during the construction and operation of primary activities, the supplier network has emerged to become a significant generator of output, employment, skills and foreign exchange in its own right.....Lastly, as manufacturing sectors exhibit greater learning effects than do primary sectors, (countries need to) leveraged off the know-how embodied in the capital goods and services supporting resource-based industries to facilitate the transition away from low-valued primary-based activities to high-tech, knowledge-based export-oriented growth.” (Walker 2005, p1-2). To elaborate: although Walker’s (2005) paper focused on analysis within the platinum group metals (PGM) industry, the reasoning behind the potential benefits to be gained from stronger supplier linkages is applicable to the wider mining industry as well: the structure of the PGM supply chain as discussed and the type of product groups listed as used by this industry, can just as well be applied to other mining industry sectors.

A further point to note in respect of shortcomings in existing literature relates to the purchasing developmental model shown earlier, which also reflects Keough’s (1993) assumption of a causal relationship between a company’s industry and the stage of development in purchasing: the mining or resources sector is noticeably absent (Van Weele 1998a).

Additional research investigating the impact of the environment on Brazilian companies’ purchasing and supply strategies, focused on four dimensions: munificence – the extent to which competitive and growth opportunities are presented by the environment; hostility – the extent to which competitors’ behaviour influence the company; dynamism – the extent of environmental instability and turbulence; and complexity – the extent of similarity or diversity in respect of activities or situations faced by the company

(Gonzalez-Benito 2009). Two of these dimensions stood out with regard to their impact on the development of advanced purchasing and supply practices, i.e. hostility and complexity. This implies that companies operating in very competitive markets with high rivalry see the adoption of advanced purchasing practices as protection against competitors' threats. Furthermore, it suggests that companies working with great product, customer or strategy diversity tend to delegate and seek support from their suppliers more. Although the second dimension may be of relatively low significance to the mining industry, the first dimension is very much evident in this industry and could be specifically researched.

It is worthwhile pointing out that although the mining industry is considered to have low levels of information intensity on product level (compared to banking or financial industries) (Hu and Quan 2005), the complex inbound logistics and internal materials flow and control necessary to support and maintain the ongoing, operational activities defines it as having a high level of information intensity on value-chain level (Hu and Quan 2005). To illustrate: a car manufacturer may be considered to have a fairly high level of information intensity on both product level (with a single car having 30 000+ parts, according to the question room for children on Toyota Japan's website (<http://www.toyota.co.jp/en/kids/faq/d/01/04/>)) and value-chain level (with complex inbound and outbound logistics and internal materials flow and control). In comparison, a mining operation is considered to have a low level of information intensity on product level (consider the 'Bill of Materials' for raw ore). However, when consideration is given to the complexity of the inbound logistics and material management, the mining industry has a high level of information intensity on value-chain level – one of the interview participants commented that in a Senior SM role at a previous company (a gold mine), he controlled and managed inventory for 42 000 SKU's. These covered supply categories such as:

- Electrical & lighting
- Filters/HVAC
- Power Transmission & Bearings
- Pipes, Valves, Fittings & Fasteners
- Safety Products
- Cylinders, Gas & Welding
- Tools & Hardware
- Material Handling Equipment
- Maintenance (Surface & underground vehicles)
- Lab & Office Supplies
- Plant & Equipment Maintenance & Supplies
- Janitorial/Sanitation Supplies

- Abrasives
- General Industrial

Thus, SM and SSM are key contributors to the efficiency of the mining operation with reference to maintaining a continuous, minimal downtime environment.

Some positive and some not so positive indicators with regards to SM in the Metals and Mining industry came from the 2009 Metals and Mining Industry Benchmarking Metric Report (CAPS Research 2009). A few key metrics to note: “

- the reversal in the average percent of supply management organizational recruiting: 71 percent internal and 29 percent external in this report, and 27 percent internal, 73 percent external, in the 2007 report. The average percent of external recruiting that was word-of-mouth was 50 percent in this report and only 1 percent in the 2007 report.
- 71 percent of organizations reported that training spend decreased over the last 2 years vs. 25 percent in the 2007 report.
- On average 22 percent of total spend was reported for capital equipment and 1 percent total repair warranty dollars were recovered as a percent of capital equipment spend.
- 43 percent of participating supply management organizations is engaged in hedging the purchase of commodities or products.
- 43 percent of organizations reported participating in strategic alliances vs. 77 percent in the 2007 report.
- 57 percent of participating organizations have dedicated staff for their asset disposable programs.”

2.4 CONCLUSION

It is clear that the positioning of the mining industry’s purchasing development, as well as the importance the industry leaders attach to supply management, requires further research. Considering that natural resources are limited and that most supply chains originate in this industry, this research should attempt to interpret the application of strategic procurement

characteristics to the mining industry (the extractive industry) and how its application changes in boom vs. bust times, with specific reference to the mining industry of Western Australia. Comparisons should be made with existing strategic supply management models and frameworks to determine whether (one or more) of these is suitable for the mining industry or whether an expanded model is required. This research should further explore the impact of procurement strategies in pre and mid economic downturn and address the need for more flexibility in pursuing strategic procurement initiatives to nurture supply chain relationships in the mining industry.

CHAPTER 3: RESEARCH APPROACH AND DESIGN

This chapter explains the reasons for adopting a qualitative approach, the purposive sample selection process and the data collection process from recruitment of participants through data collection and analysis to the reporting of findings. The end of the chapter is dedicated to address the reliability and validity of this study.

3.1 RESEARCH OBJECTIVE

This research explores the adoption of SM as a strategic discipline in the Western Australian mining industry and the alignment / conformance of the industry's SSM practices to existing models and frameworks. The objective of this research is two-fold:

Firstly, it aims to examine the degree to which SM is regarded as a strategic activity in this industry. To achieve this, the question of how important SM is deemed to be in the WA mining industry, needs to be answered. This relates to the level of maturity that has been reached with regards to SM development and the way in which this is reflected in decision-making, if at all.

Secondly, it aims to provide direction to improve SSM practices and decision-making by exploring SSM practices as presented in extant literature. Specifically, the aim is to compare the WA mining industry's SSM practices to existing frameworks and models to assess alignment of these to this industry, with three potential outcomes: the WA mining industry's practices

- i) align with existing frameworks and models
- ii) align to a certain extent, but require expansion of existing frameworks or models
- iii) do not align with existing frameworks and models, but require a separate framework or model.

In short, this research objective is addressed by answering the following research questions:

1. Which Strategic Supply Management (SSM) practices are evident in the WA mining industry? (i.e. the maturity level of SSM development and the reflection of this in practice); and
2. How do these practices align with existing SSM frameworks and models?

It is important to note that this study will focus on SSM as it is represented in the ongoing operational activities within the WA mining industry and not on the construction phase of the mining industry. The construction phase within the mining industry is finite with a variety of strategies implemented based on the kind and varieties of ore to be mined, the geographic location, the economic strength of the owner company, projected ore prices and various other factors – worthy of its own research project. The ongoing operational and maintenance activities in the mining industry are longer term than those during the construction phase and as this research aims to investigate not only the SSM practices in the industry, but also the maturity level of these, it was deemed prudent to focus on the longer term ongoing activities.

3.2 RESEARCH APPROACH

According to Golafshani (2003, p600), qualitative research aims to understand “phenomena in context-specific settings” as opposed to quantitative research which emphasizes facts and causes of behaviour while seeking to generalise findings. Thus, a qualitative approach is proposed as being more appropriate for this research. Furthermore, a positivist paradigm is applied and the research includes deductive aspects insofar as it compares practice with existing frameworks and models.

Explanatory studies lay emphasis on investigating a situation in order to explain the relationship between variables (Saunders 2009). The creation of explanatory theory is part of gaining knowledge and understanding through research (Stuart et al. 2002). Both of the last two statements link back to the aim of this research study, which is to understand how far the WA mining industry has progressed in terms of SSM and to investigate how that progress is reflected in practical strategies and approaches implemented. Thus, this is an explanatory study to establish how closely the degree of SSM adoption matches practical reality of decision-making and strategy

execution during day-to-day operations as well as within a changing economic environment.

3.3 RESEARCH DESIGN

According to Stuart et al (2002), the contribution of case studies to theory building is based on observing real-life situations and circumstances that have not been empirically tested. As mentioned in chapter 1 under the section on the research significance, comparisons are made to existing SSM models and frameworks to determine whether these are suitable for the mining industry or whether an expanded model is required in order to address the circumstance that may be unique to this industry. Stuart et al (2002, p423) also indicates three situations where case research is both appropriate and indispensable:

- where theory is as yet non-existent or not likely to be applicable “(e.g. the study of new service design processes)”
- where extant theory applies to a different environmental context “(e.g. technology adoption theory as applied to environmental issues)”
- where cause and effect are in doubt or involve time lags “(e.g. the time dependent relationship between R&D spending and new product introductions)”

Meredith (1998) submits that case studies are an excellent conduit for other aspects of research, e.g. developing understanding, an area that may have particular significance in a field where the subject matter is very complex. Handfield et al's (1998) table showing how to match research strategy to theory-building activities and Stuart et al's (2002) adaptation thereof, further indicates contextual case studies as a preferred research structure for the purpose of theory extension or refinement. Case study strategy is advised where a specific contemporary trend is being investigated in real-life context (Saunders 2009).

In addition, the development of propositions are advocated to enhance focus and ultimate success in a case study (Stuart et al. 2002), and also to guide the research in the right direction (Yin 2009).

The choice of case-based research for this study is thus indicated by the above, especially as it fits both the second and third situations described by

Stuart et al (2002) above. This research contributes to theory building through theory extension or refinement and the table below shows how the selected research strategy compares with the relevant content from Handfield et al (1998) and Stuart et al (2002).

Table 2 Comparison between research strategies to support theory-building activities and the selected strategy for this research

<u>Research strategy framework</u>	<u>Extract from Handfield et al's (1998) table and Stuart et al's (2002) adaptation thereof</u>	<u>This research study</u>
Purpose	Theory Extension/Refinement to: <ul style="list-style-type: none"> • expand the map of the theory • better structure the theories in light of the observed results 	To compare existing SSM models and frameworks with practice in the WA mining industry to determine their suitability and/or the need for expansion to address unique circumstances
Research questions	How widely applicable / generalisable are the developed theories? Where do these theories apply? Where don't these theories apply?	What are the SSM practices in the WA mining industry; and how do these practices align with existing frameworks and models?
Research structure	Experiment Quasi-experiment Large scale sample of population Contextual case studies	Contextual case-based study

E.g. of data collection techniques	Structured Interviews Open and closed-ended questionnaires Lab experiments Field experiments Quasi-experiments Surveys Documentation Archival Research	Semi-structured interviews (open and closed-ended questions)
E.g. of data analysis procedures	Triangulation Analysis of variance Regression Analysis Path analysis Survival analysis Multiple comparison procedures Nonparametric statistics Meta analysis	Non-parametric modelling

Due to the paucity of research on SM in the resource industry, a case-based research strategy with multi-sites (as multiple sources of evidence (Yin 2009)) was adopted to compare key features and practices of SSM identified from existing literature with those currently employed in the WA mining industry (the specific contemporary trend being investigated).

To provide focus and direction throughout the study, the research questions were translated into the following two propositions:

Firstly, to successfully pursue SSM in an organisation (i.e. to achieve a more mature level of SSM), certain enablers/facilitators need to be in place, namely the right organisational design and leadership, supply measurement, information systems and human resources.

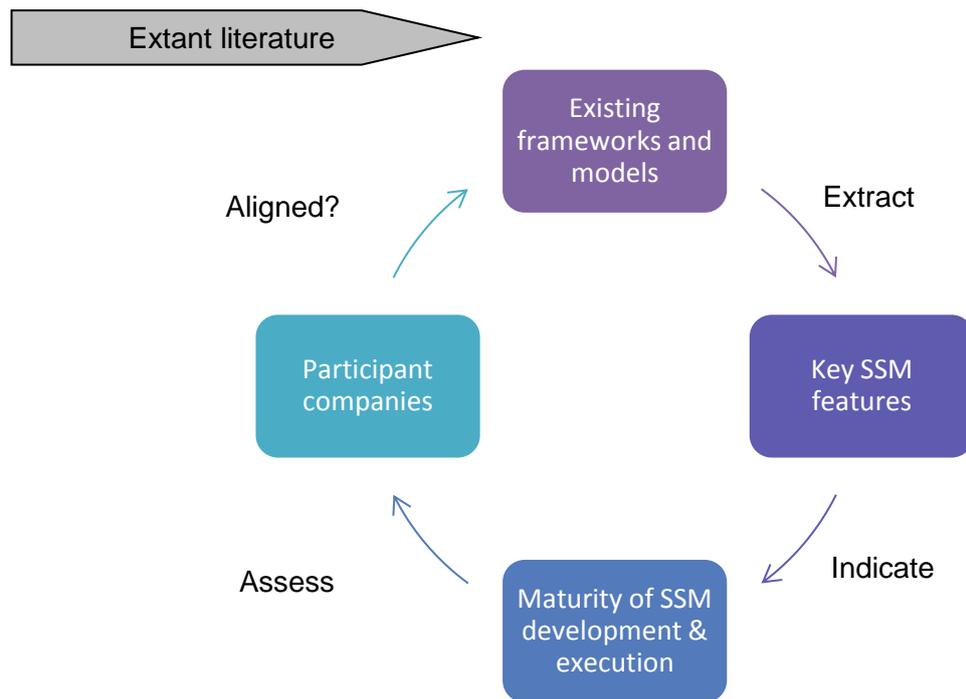
Secondly, to successfully pursue SSM, organisations have to implement and execute the strategies and approaches of SSM consistently and enduringly, even in a changing environment – this is the reflection of a company’s SSM maturity in practice.

These propositions, which are an extension of the research questions, serve the purpose of elaborating the concepts being investigated during this research project.

3.4 THE RESEARCH PROCESS

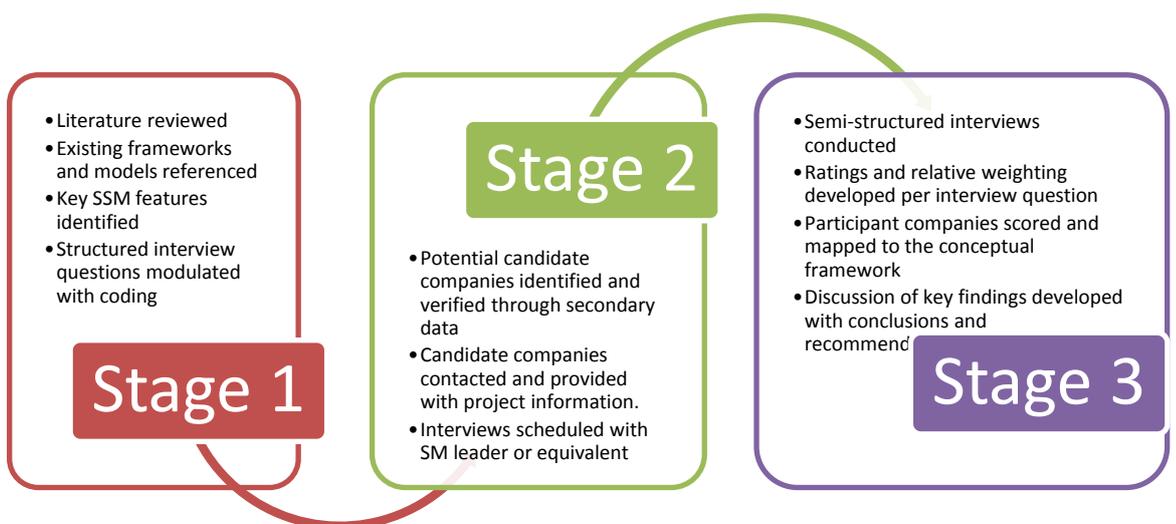
In order to satisfy the research questions of identifying SSM practices in the WA mining industry and their alignment with existing frameworks and models, the first step in this case-based method involved a review of the literature to extract the key SSM features that indicate an advanced or mature level of development of SSM in the company.. The purpose of identifying these key features was to enable assessment of a) the participant companies’ level of maturity of SSM; and b) the extent to which this is reflected in practice, i.e. day-to-day operation – this is discussed in depth under Data analysis. The outcome of these assessments provides the basis for assessing how well SSM practices in the WA mining industry align with the existing frameworks and models. The research process was set up to present a closed cycle evaluation as illustrated below.

Figure 6 Research process



To execute the research, three distinct stages were identified. The diagram below sets out the three separate stages of the study with the outputs of each.

Figure 7 The three stages of the study



Stage 1 consisted of identifying key SSM features from existing frameworks and models and integrating them into questions to be posed during the semi-structured interviews. During the literature review, two main themes evolved from the existing frameworks and models. Fittingly, these two themes underpin the two propositions stated at the end of section 3.3:

Theme 1

The level of maturity of SSM development can be ascertained by the importance the company attaches to SSM. This in turn gets reflected by the extent to which the company has set-up its structure to drive and support SSM. This can be appraised by reviewing the leadership, organisation design, IT support systems and metrics established by the company with regard to SM.

Theme 2

On the other hand, the execution of SSM in practice can be assessed based on the presence of key strategies and approaches implemented by companies viewed as having mature SM organisations. These features envelope a wide range of aspects, e.g. progression to category or portfolio management, triggers for and approach to supply base optimisation, the approach to cost management and dealing with diversity while protecting the company's core competency.

Once the key features from both themes were extracted, they were translated into questions to be posed in the semi-structured interviews. These key features or *attributes* also formed the basis for the subsequent data analysis as discussed in detail in section 3.7.

Stage 2 addressed the selection of potential candidate companies. The aim was to include companies at different stages of SSM adoption and to that affect, the second stage of the multi stage purposive sampling focused on identifying target companies through evaluation of secondary data such as number of operations in Western Australia (to establish size range) and organisational structure, specifically the position and reporting line of the supply leader, from companies' websites as well as the researcher's professional experience and exposure within the mining industry. Interviews were scheduled with the SM leader or equivalent of each participating company.

Stage 3 represented data collection through the interview process, data analysis through scoring participants answers to the interview questions subsequent to developing an appropriate scoring scale and mapping the results on the conceptual matrix model. This led to identification and discussion of the key findings, drawing relevant conclusions and developing recommendations for further research. The data collection process and data analysis rationale are discussed in more details in the rest of this chapter. The two remaining outputs from stage 3, namely the key findings and the discussion thereof as well as the conclusions and recommendations, each warrants a chapter of their own and are covered in chapters 4 and 5 respectively.

3.4.1 Instrument development

Saunders et al (2009) state that where it is necessary for the researcher to understand the reasoning behind certain decisions or behind certain attitudes and opinions, the researcher will likely need to conduct a qualitative interview. There are three categories of interviews, related to the level of structure and formality: structured interviews, semi-structured interviews and unstructured or in-depth interviews. Saunders et al (2009) point out that qualitative (non-standardised) interviews may be advantageous as a method of data collection where the following four aspects point towards it: the purpose of the research, the importance of personal contact with participants, the nature of the questions to be asked for data collection and the length of time required and comprehensiveness of the process. According to Saunders et al (2009), semi-structured interviews are used more frequently than structured interviews in explanatory studies, with unstructured interviews not really featuring. Handfield et al's (1998) framework for matching research strategy to theory-building activities (refer to Table 2) also bears out Saunders et al's (2009) summary on the types of interviews used for explanatory research. With semi-structured interviews, a list of themes and open-ended questions are used to direct the interview, with additional probing questions asked to explore the responses and to get interviewees to expand on their answers – this makes semi-structured interviews an appropriate option given the nature of events within organisations. As Stuart et al (2002) points out, anyone with some experience in interviewing managers, knows that interview formats that are

too restrictive or an interviewer that adheres to the formulated questions no matter what, may be getting less than the best information.

Drawing on the experience of these and other researchers and based on, it was decided that semi-structured interviews will be the right choice for this study, specifically for the following reasons:

- This is an explanatory study aimed at explaining the relationship between organisations' level of maturity of SSM and their day-to-day practices and the potential effect of company size.
- Personal contact with the interviewees was considered of high importance to clarify the meaning of questions and ask follow up questions where necessary, to establish credibility of the researcher and the research (e.g. it was important to get the responses from the leader of the SM function in the company, which could not be guaranteed with questionnaires) and to assure participants of anonymity and confidentiality (especially considering that the questions consider strategies and approaches that may be integral to the company's competitive advantage).
- The questions fall into the categories of close-ended and open-ended questions, with the close-ended questions followed up by open-ended probes to allow expansion on specific areas of interest. As such, this is deemed to be the best approach to get the most meaningful data.
- Considering the value of time from the interviewees' perspective (at senior management level or above), semi-structured interviews were regarded as the best use of their time without sacrificing information quality. An indicative timeframe was provided early on in the negotiation of interview arrangements, which allowed enough time to get the data necessary for answering the research questions.

The number of questions was limited to fifteen due to consideration for the professional, time-structured environment the interviewees are subject to in the business world and the fact that their participation was voluntary and non-remunerated. Prior to finalizing the questions for the semi-structured interviews, the original set of questions (twenty six in total) underwent a couple of iterations to, in essence, establish a one-to-one ratio for key features to questions. During this iterative process, the literature was also

revisited to ensure that only the most important features were extracted and that those of lesser or slight importance to SSM success were omitted. The interview schedule can be viewed under the research protocol (see appendix A). To assist subsequent analysis, the questions were coded according to the two main themes identified in stage 1, i.e. to assess level of maturity of SSM at the company and to ascertain the strategies and approaches that have been developed or implemented. Six of the fifteen questions related exclusively to the first theme and seven were exclusively dedicated to the second theme, two of the questions had impact on both themes and were rated accordingly. The structure of the questions for the two themes differed slightly: questions relating to the first theme were open-ended to invite participants to expand as little or as much as was relevant to the specific company's situation. The initial questions relating to the second theme were more closed-ended to facilitate early identification of the strategies and/or approaches already established within the SM organization at the company. Once identified, probing questions could then be asked to encourage the interviewee to elaborate on those specifically.

3.4.2 Sampling design

Sampling size

As Onwuegbuzie and Leech explain, as opposed to quantitative research, where the aim is to generalise findings to populations by using large representative samples, in qualitative research it is more appropriate to use purposive sampling of one or a few cases (Onwuegbuzie and Leech 2007b). As a result, there is a distinct difference between qualitative and quantitative research relating to the importance attached to the decision on sample size. Onwuegbuzie and Leech (2007) postulate that the basis for this relative lack of attention to sample size appears sound: the objective of qualitative research is obtaining understandings of the workings of didactic, social and familial matters prevalent to a specific area. According to Saunders et al (2009, p233), for non-probability sampling techniques, the of sample size is ambiguous and "there are no rules". However, some researchers have attempted to develop guidelines around sample size for qualitative research. Eisenhardt suggests that while there is no ideal number, four to ten sites work well for case research, which is supported by Stuart et al's experience,

although they acknowledge that they have conducted a number of successful case research studies using as little as one to three companies (Eisenhardt, 1989; Stuart et al., 2002). Onwuegbuzie and Collins (2007) state that the choice of sample size is just as important as the choice of sampling scheme and should be guided primarily by the research objective, research question(s), and, following from that, the research design. Onwuegbuzie and Collins (2007) progressed their research in order to develop recommendations for minimum sample sizes for several of the most common research designs. Their recommended minimum sample sizes represents sizes for detecting moderate effect sizes with .80 statistical power at the 5% level of significance. For case study research, their recommendation is 3-5 participants which incorporated research from Creswell (2002).

Based on the above recommendations, time constraints and access limitations, a sample size of four participants were chosen.

Sampling scheme

As Stuart et al (2002) postulate, case based research is often the chosen strategy where the aim is to identify a relationship or effect and not to describe an average effect. To achieve this, purposive sampling (also referred to as judgemental sampling) was selected as the sampling scheme to identify potential candidates that will support the aim as described, where this type of sample enables the researcher to select cases that will best answer the research question and meet the objectives, based on the researcher judgement (Saunders 2009). Furthermore, as stated by Onwuegbuzie and Leech (2007), the aim in qualitative research is typically not to generalise to a population, but to obtain insights into a phenomenon or events, therefore the researcher specifically selects (i.e. on purpose) individual, groups and settings that maximise comprehension of the phenomenon. Consequently, Onwuegbuzie and Leech (2007) characterise purposeful sampling as the most common method of sampling in qualitative research. In purposive sampling, individuals, groups and settings are deemed suitable for selection if they are considered a wealth of information (Patton 2002).

The specific purposive sampling strategy followed was multi-stage purposeful sampling, defined by Onwuegbuzie and Leech (2007) as a

sampling strategy that includes selecting a sample in two or more stages with both stages incorporating purposive sampling.

In this instance the two stages consisted of firstly applying homogenous sampling, which involves a sample with similar characteristics or attributes (Onwuegbuzie and Leech 2007b). The similar characteristics for this case-based research were a) mining companies from the WA mining industry and b) companies that have progressed the role of SM in their organisations. The first attribute was easy enough to establish by looking at companies' profiles on the internet, i.e. making use of secondary data. However, though it was originally envisaged that the second attribute could be obtained in the same way by looking at companies' organisational structures on their websites, very few of the companies displayed that information. Thus it was decided to use another approach, i.e. to use the researcher's professional network to identify companies that fit these two attributes. This first stage of strategy produced nine potential candidates.

The second stage involved applying a heterogeneous (or maximum variation) sampling strategy, which enables the collecting of data to explain the central subjects (Saunders 2009). Although selecting heterogeneous samples to explain key themes may seem contradictory, Patton argues that this is in fact a strength: any patterns that do emerge are likely to be of particular interest and value and represent the key themes (Patton 2002). The maximum variant for this research was defined as the sizes of the range of companies targeted. This was based on company or organisation size as it relates to the number of operations based in Western Australia. As data collection and early data analysis were exercised as an interactive process to ensure inclusion of the right participants and covering negative data elements, this second stage of purposive sampling stretched over a period of four months (Saunders 2009; Morse 2002).

Though the two strategies chosen to represent the sampling design may seem contradictory, they complement each other by allowing very specific purposive sampling to cover the key themes within a specific industry.

3.5 DEVELOPMENT OF A CONCEPTUAL MATRIX/Framework

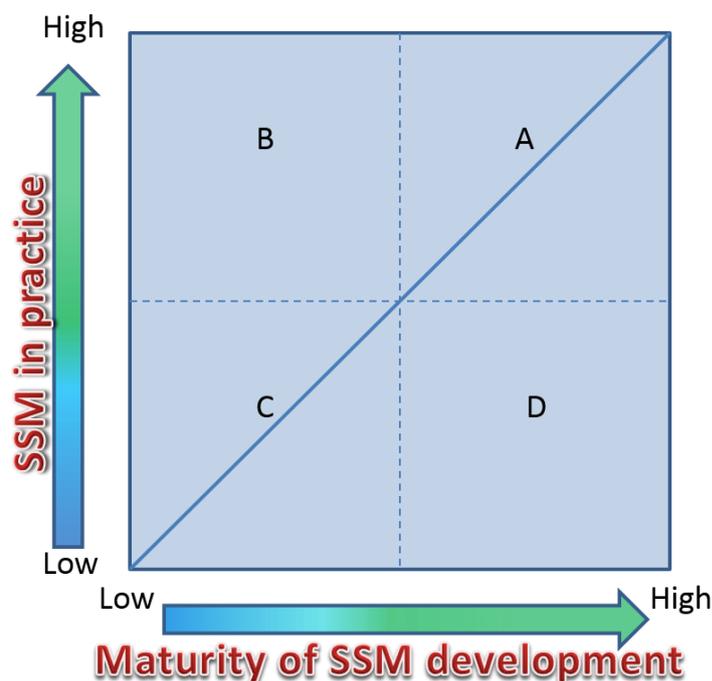
For companies to get the full benefit of transforming their supply organizations into a "powerful, competitive weapon that adds value far

beyond cost savings” (Hardt 2007, p124), executives need to take SM to the next level.

Drawing on extant literature, with cognisance of the two themes identified earlier and under direction of the two stated propositions, a two-dimensional matrix is proposed, with each of the themes (points 1 and 2 below) represented on an axis. The aim of the conceptual framework is to get an understanding, through visual presentation, of:

- 1) how mature / advanced companies in the WA mining industry are in terms of their adoption of key SSM features, i.e. how well are they set up to pursue SSM
- 2) the strategicness of practices, i.e. which of the key strategies and approaches identified have been integrated in their SM operation
- 3) the relationship between SSM adoption and applying it in practice

Figure 8 Conceptual framework



This matrix provides a simple framework for mapping factors 1 and 2 above as well as for exploring the relationship (if any) between the level of maturity of SSM development and applying SSM strategies and approaches in practice. The horizontal axis represents Theme 1: the level of maturity of SSM development in an organisation, ranging from low to high, i.e. to what

extent has a company adopted the necessary enablers or facilitators of SSM. The vertical axis represents Theme 2: the “strategicness” of practices and/or decisions made, i.e. which key SSM strategies and approaches have been put in place to support the SM operation consistently for longer term benefit. The diagonal in the diagram may be seen as a congruency or “practice what you preach” line, where practices / decisions are aligned with the level of maturity of SSM adoption.

An “ideal position”, based on supposedly achieved top scores for each attribute assessed, was mapped on the matrix. This ideal position does not necessarily present the target to strive for, but just represents the comparative position on the two-dimensional model of a company that has achieved advanced maturity in terms of its SSM adoption and that has integrated the key strategies and approaches in its operation. It is worth noting that although the conceptual matrix is two-dimensional, there is no presumption of a linear relationship between the two themes being tracked - this is the primary reason for not utilising the more commonly used linear model. Similar to Van Weele et al's (1998) Six Stages of Purchasing Development model, a number of maturity models across various domains reflect stages or phases of maturity development against the benefits / advantages gained or progress made towards a goal, i.e. there is a presumption of a direct linear relationship. As mentioned, this study does not presume a linear relationship between SSM maturity level and SSM in practice and aims to look at both these elements using the conceptual matrix. Should this study have focused only on gauging the maturity level of the WA mining industry, a linear model may have sufficed.

In addition, points on the axes should not be interpreted as absolute measurement for that theme, i.e. if a participant company halfway on the scale of an axis; it does not mean that they scored 50% for that theme. However, it does allow comparison between companies' relative positions - to each other and to the ideal position.

3.6 DATA COLLECTION

3.6.1 Getting access

Saunders et al (2009) found that rather than complete a questionnaire, individuals at management level are more likely to agree to be interviewed.

This is especially true when they consider the interview topic to be interesting and relevant to their work. Not only does an interview provide them with the chance to reflect on events and situations without requiring them to document, but it also provides the researcher with the opportunity to personally assure the interviewees about the way the information will be used and any confidentiality issues they may be concerned about. Okumus et al (2007, p14) state that “Inevitably it is the project, the researcher's personality and skills, and the internal dynamics of the participant organization, which all influence gaining and maintaining research access”. Saunders et al (2009) also promote a strategy of using existing contacts to gain access, a strategy that is supported by Kramer et al (2010) who recommend seeking a third party's assistance in promoting access.

By making use of the researcher's professional network, introductions were made by someone they've had professional dealings with. These “introductions” were made following two approaches. The first approach involved the mutual contact extending an introduction by e-mail, including a brief description of the research and its relevance to the targeted company. Alternatively, contact was made via email with the right person at the company with reference to the mutual professional contact who was willing to provide contact details. The initial introduction was then followed up by another e-mail providing some more information about the purpose of the research and what would be expected of participants.

Another strategy recommended by Saunders et al (2009) to assist gaining of access is to overcome organisational concerns at the outset. To achieve this, Saunders et al (2009, p179-180) recommend addressing the three categories of potential concern, namely the amount of time that will be required (“where you wish to conduct an interview you may be more likely to gain access if the time requested is kept within reason”), sensitivity to the topic (“ organizations are less likely to cooperate where the topic of the research has negative implications”) and confidentiality of the data that would be collected as well as the anonymity of the participating company and individual (“need to provide clear assurance about these aspects” and need to “be sure that you will be able to keep to your agreement”). Furthermore, highlighting possible benefits of participation to the organisation may also assist in gaining access; such as offering to share

research findings of specific value to the individual participating organisations (Saunders et al 2009).

All three of the above types of concerns were addressed by following up the initial contact or introduction by another e-mail providing more information to the intended participants. The communiqué included the time requested from participants, i.e. that the interview process involved participants agreeing to a face-to-face interview of 40 minutes to one hour's duration – this time limit was self-imposed based on professional courtesy and cognisance of the value of time relative to the leadership position fulfilled by the individuals. The sensitivity aspect was addressed by explaining the purpose of the research, i.e. to investigate the level of maturity of SSM in the *industry* and how it is applied in practice. Targeted participants were assured of anonymity, both for the company and the individual and confidentiality of data was addressed through explaining the process of dealing with the data during the research as well as subsequent to finalising the research. Each potential participant was also provided with a written description of their rights pertaining to the use of the data, withdrawal at any time without prejudice as well as an informed consent document.

To highlight possible benefits to be gained by participating organisations, more detail of the research was shared with participants, explaining that one of the tools to be used in the data analysis phase will be the conceptual framework on which companies' position will be mapped to illustrate the level of maturity of SSM and to what extent it is reflected in practice. Participants were offered a modified version of the final report which will show them their company's position on the model. However, to still comply with issues of confidentiality and anonymity, this will be a hand-written indication for their eyes only.

Following the approach discussed above to assist with gaining access, the original six companies identified using the multi-stage purposive sampling scheme, were contacted in order of preference to ascertain willingness to participate in this study. Out of the first five candidates contacted, four agreed to become participants and the necessary project information and consent forms were provided and completed.

3.6.2 Interview preparation

As Yin (2009) states, case-based research creates a completely different situation from an experiment or a survey questionnaire, for example: when interviewing key persons, the researcher has to accommodate the interviewee's schedule and availability. The nature of the interview is also much more fluid and an interviewee may not necessarily stick strictly to the line of questions being asked. As a result the behaviour of the researcher is likely to be somewhat constrained. However, with the necessary preparation and by understanding how to integrate real-world circumstances with the data collection process, the researcher should be able to fulfill the data collection requirements through conducting a successful interview. As Saunders et al (2009, p328) put it "the five Ps are a useful mantra" when using semi- or unstructured interviews: "prior planning prevents poor performance". Part of the planning must focus on showing credibility and gaining the confidence of the participants. Saunders et al (2009) discuss detailed areas for preparation and also provide a checklist to assist preparation for the semi-structured interview. Each area of preparation is addressed below.

Level of knowledge

Saunders et al (2009) contend that the researcher not only needs to be knowledgeable on the research topic, but also on the organization participating in the research. Drawing on this knowledge during the interview should help to build credibility, to assess the accuracy of responses and to encourage interviewees to expand on their initial responses.

Exploring secondary data on companies' websites during the first phase of the multi-stage purposive sampling provided the researcher with some background to the participating companies. In addition, by making use of the researcher's professional network for introductions to the specifically targeted individuals, the researcher was provided with the opportunity to discover more about the individuals in reference to their professional backgrounds.

Level of information supplied to the interviewee

Saunders et al (2009) state that credibility may also be improved by supplying the participants with relevant information prior to the interview. Saunders et al (2009) continue that validity and reliability should also be promoted by providing the research themes upfront to the interviewees as this will enable them to reflect on the information being requested and allow them to gather supporting documentation as they see fit.

Following this suggestion, interviewees were provided with a copy of the interview schedule which included a range of questions with prompts for subsequent discussion. The interview and data gathering process during this research undeniably concurred with Saunders et al's (2009) experience, as all participants prepared prior to the interview (some extensively), even though they were assured that it was not necessary to do any work upfront. In addition, all of the participants supplemented their responses to the theme one questions with hand-drawn diagrams of organization structure without any prompting – some had the organization chart with them, but for confidentiality and anonymity purposes, the hand-drawn versions were considered more appropriate. As further evidence of the effectiveness of this approach, three of the four participants expressed their appreciation about the opportunity to take time to reflect on the organizational situation relating to SM.

Appropriateness of location

Saunders et al (2009) contend that the location of the interview may influence the data collected as well as the participants' responses and suggests four considerations: personal safety, interviewee comfort, minimal opportunity for disturbance and minimal external noise (that may impact the audio recording quality).

For this research, the setting for the interviews were not considered to be particularly different from that required for a standard business meeting and was negotiated with each participant to suit their preference. Two of the interviews were conducted at the participants' place of business while the other two were conducted in informal settings nearby. The last of Saunders et al's (2009) suggestions didn't have an impact on this study as the method

of data recording during the interview was selected to be intensive note-taking throughout the interview.

The researcher's appearance at the interview

According to Saunders et al (2009), the researcher's appearance may affect the interviewees' perception to the extent that it negates the interviewer's efforts at establishing credibility and building a level of trust with the interviewee. This may result in interviewee bias that could impact the reliability of the data gathered. Robson (2011) makes the suggestion that researchers conform to a similar style of dress than that of the interviewees.

In line with the perspective on the location of the interview, the style of dress was considered to be similar to that required for a standard business meeting as the interviewees were all taking time out from their normal day-to-day business to be interviewed, i.e. they considered the interview as more or less another business meeting to attend. Thus, in line with the age-old saying of "first impressions count", the researcher was dressed appropriately in business attire.

Opening comments

The outcome of the interview will be significantly impacted by the first few minutes of interaction, specifically as it relates to the researcher's credibility and the level of the interviewee's confidence and comfort with proceedings (Saunders 2009). Saunders et al (2009) stress that the responsibility for shaping the start of the discussion lies with the researcher and that this opportunity should be used to address any qualms from the interviewee about providing information, to establish the participant's rights and following from that, to attain the informed consent. Saunders et al (2009) further contend that assurances about confidentiality and anonymity should make the interviewee more relaxed and open to the discussion and that this should increase the level of confidence in the researcher's trustworthiness and reduce the potential for interviewee or response bias.

To break the ice at the start of the interviews, the first couple of minutes were dedicated to the informal exchange of brief professional details and backgrounds of both parties. Participants were thanked for agreeing to the

interview and again assured of confidentiality and anonymity. To demonstrate this, none of the other participants were mentioned by name, even when the discussion turned to the progress status of the research. The nature of the research's intended output and how the data will be dealt with were discussed and the participants were offered the option of receiving a summary of the report with handwritten indication to distinguish their own company apart from the others. Participants were again provided with the project information sheet and consent form except where they have brought the previously provided forms with them or already returned the signed form. After the consent forms were signed, the discussion progressed to the semi-structured interview schedule and participants' responses were recorded through intensive note-taking.

Questioning approach

According to Yin (2009), the case study researcher's ability to pose and ask good questions is indispensable. Saunders et al (2009) contend that the correct approach to questioning reduce the possibility for bias during the interview and increase the reliability of the data obtained. This *correct* or *appropriate* approach includes using open-ended questions to avoid bias, followed by appropriately worded probing questions which allow more completed exploration of the topic.

The interview schedule developed for this research included both open- and closed-ended questions as explained earlier. Both types of questions were followed up with probing questions to get a fuller explanation of the real-life circumstances from participants.

Interviewer's behaviour during the course of the interview

According to Saunders et al (2009), behaving appropriately in terms of comments made, gestures and other body language should reduce the possibility for bias during the interview. The researcher should project a neutral interest to the participants' responses to answers. Robson (2011) suggests that the interviewer should enjoy the interview opportunity or at least seem to do so.

During the course of the interviews conducted for this research, the researcher displayed a posture of interest in what the interviewees had to say and encouraged the flow of the discussion throughout. Rapport between interviewer and interviewees was established early in the discussion based on mutual professional respect and acknowledgement of common ground. In general the interviews were characterised by easy flowing conversation without detracting from the seriousness of the interview schedule or the organisational circumstances.

Exhibiting good listening skills

As Yin (2009, p75) so eloquently puts it: “For case studies, “listening” means receiving information through multiple modalities – for example, making keen observations or sensing what might be going on – not just using the aural modality. Being a good listener means being able to assimilate large amount of new information without bias”. Saunders et al (2009) concur that the purpose of a semi-structured interview is to understand the participant’s explanations and meanings, therefore the interviewer should be on the lookout for signals, be willing to take the time to explore and probe explanations and meanings and give the interviewee enough time to think about and express their answers without interruption or projection of the interviewer’s own perspectives.

The most difficult aspect to manage during the interviews conducted for this research was to maintain good listening behaviour while staying within the time limit allocated for the interviews. This was resolved by asking participants at the beginning of the interview whether it will be acceptable to arrange follow-up discussions (face-to-face, telephonically or via e-mail) if necessary for further clarification on any aspects covered. By getting agreement for this upfront, the necessary time and attention could be given to interviewees’ responses to the questions asked.

Ensuring understanding of responses

A powerful tool to avoid bias and to further explore and probe participants’ responses is to test understanding of an explanation provided by reflecting it back to the participant (Saunders 2009).

Although most responses were straightforward and unambiguous for interpretation, where necessary the researcher asked follow-up questions or prompted the interviewee to expand on their initial explanation or add additional points for clarification.

Data recording

Saunders et al (2009) suggest that in addition to the actual interview notes, the following contextual data should also be recorded:

- the interview location, i.e. both the organisation involved as well as the actual place
- the date and time of the interview
- the interview setting, also noting any difficulty in hearing each other, any interruptions, possibility of being overheard
- background information about the participant
- immediate impressions of the interview, e.g. how well or bad it went, the participant's openness, wordiness, interest and attitude.

The researcher took intensive notes during the interview, asking for clarification where necessary and also made some contextual notes. All interview notes were marked with a code that only the researcher understood to maintain confidentiality and anonymity. The notes were subsequently captured electronically and contextual data added as recommended by Saunders et al (2009).

Cultural differences and bias

Saunders et al (2009) furthermore note that it is not always possible to attempt to control bias, such as different interpretations of what's under discussion due to cultural differences – an issue not only related to interviews but to a number of other data gathering methods as well. However, as Saunders et al (2009) note, at least an interview provides the opportunity to clarify meanings, including those that are culturally specific.

As the topic and themes of this research are universally receiving attention in business as a potential source of competitive advantage and as there were some common ground between the researcher and the participants based on professional backgrounds, cultural differences were not perceived to be an issue of high importance in interpreting the discussion from both sides. The only potential issue for cultural bias was that except for one participant, the participants and the researcher came from different cultural backgrounds. However, the researcher perceived the common ground between the parties to outweigh any potential negative associations with or feelings towards the other culture.

3.6.3 Interview dates

The interviews with the Supply Leaders of the four participating companies took place over a four month period from Nov 2013 to February 2014, guided by the participants' work pressures, availability and companies' end-of-year arrangements.

3.6.4 Company profiles

Table 3 presents a brief overview of the companies included in this study. Although this overview references the type of ore being mined by each of the participant companies, this has negligible impact on this research for the following reasons:

- a) Firstly, this research is focused on investigating SSM in the ongoing operational mining environment. As such, the supply management activities do not differ significantly depending on the type of ore mined, but is focused on ensuring efficient portfolio management within all subcategories to support ongoing day-to-day activities.
- b) Secondly, the emphasis of this research is on *Strategic* Supply Management, both on the level of maturity of this in the participant companies and how it reflects in practice. Therefore, although the type of items within the SM portfolio may differ slightly depending on the ore mined, the focus here is on the support structures, strategies and approaches adopted by these companies.

Table 3 Summary of company profiles

Company / Trait		Company 1	Company 2	Company 3	Company 4
Width of Operations		Multi-national	Multi-national	National	National
Equity type		Listed	Listed	Listed	Listed
Main approach to operations		Owner operated	Owner operated	Owner operated	Outsourced
Ore mined		Gold	Gold	Copper, Zinc, Nickel, Gold	Magnetite, Hematite
Number of WA mining operations	1				X
	3			X	
	4+	X	X		

3.7 DATA ANALYSIS

This section of the report aims to link the data gathered to the two previously stated propositions relating to the research questions, that is:

- to successfully pursue SSM in an organisation, certain enablers or “facilitators” need to be in place, namely the right organisational design and leadership, supply measurement, information systems and human resources.
- to successfully pursue SSM, organisations have to follow the strategies and approaches of SSM consistently and enduringly, even during changing economic circumstances (refer to section 3.1).

Congruent with each of these two propositions, are the two key themes identified during the literature review earlier, i.e. assessing the level of maturity of SSM at the participant companies and ascertaining the strategies and approaches that have been developed or implemented.

Together these concepts lay the foundation for looking at the data within the WA mining industry as the unit of analysis (Yin 2009) for this case based research.

Saunders et al (2009, p488) emphasise the interactive nature of the qualitative data analysis process: "Data collection, data analysis and the development and verification of propositions are very much an interrelated and interactive set of processes". Due to this interactive nature of data collection and analysis, not only can the researcher test a theoretical framework or propositions by comparing them against the data collected, but also recognise significant themes, patterns and relationships that emerge from the process (Saunders 2009).

The first step in the data analysis process was to establish a set of measures for the key features or attributes identified during the first stage of the research process (refer to section 3.4). This was achieved by developing a scoring system to convert the qualitative data into an index that can be presented on the conceptual framework and to enable fair comparison between the participants' responses. Thus a more structured and deductive analysis procedure was followed (Saunders 2009). The set of measures consisted of a weighting for each of the attributes and a rating for each attribute according to each participant's response.

3.7.1 Weight elicitation

As this study is dealing with a multi attribute analysis, a method for weighting the attributes had to be selected. According to Jia et al (1998, p86), weight assessment methods differ "in terms of the kind of information they preserve from the decision maker's judgments". Jia et al (1998, p86) distinguish between three methods that can be used: ratio weight methods (which preserve the "ratio scale properties of the decision maker's judgments"), rank-order methods (which preserve "only ordinal properties of the decision maker's judgments") and the equal weights method (which preserves "only categorical information from a decision maker's judgments").

Rank-order methods

In designing the semi-structured interview questions, any question addressing a SSM feature that was of lesser or slight importance was excluded. The result is that the key features (attributes) addressed via the questions are all of more or higher importance. This meant that rank-order methods of weighting could not be applied effectively, as it purely ranks the criteria from highest to lowest importance. Bearing in mind that the attributes in this case, are all of either considerable or extreme importance, rank-order methods would distort the relative importance of the attributes and was discarded as a possible approach.

Equal weights method

Although the attributes are all considered of higher importance, in this study, there is inherently more value to be derived from interpreting the attribute than just whether it matters or not (the nominal scale of the equal weights method). Thus the equal weights method was also discarded as a possible approach.

Ratio weight methods

From analysing the potential fit to the other two method types, it became clear that this was the best approach to use in eliciting weights for the attributes. In selecting a specific method, an important consideration was that the aim of this multi attribute analysis was not to enable 'choice' between the participants, i.e. not to reach an absolute decision on which of the participants is 'best' at SSM and which is the 'worst'. Rather, this analysis aims to identify the range of proficiency in SSM of the whole group. Thus, most of the ratio weight methods were considered too complex for this application and it was decided to use a simplified interval scale to weight the attributes. Although an interval scale is considered a measurement scale distinct from a ratio scale, under Jia et al's (1998) classification, the closest fit is the ratio weight methods category. The interval type scale allows for the degree of difference between items but not the ratio between them; furthermore the ratio scale possesses a true zero point, which is not applicable to the interval scale (Sreejesh, Mohapatra and Anusree 2014).

The interval scale defined

To enable the weight elicitation for the defined attributes, the importance of each attribute was assessed on a five point scale according to the importance of each attribute. This importance refers to how necessary this attribute is to be successful in SSM, which is the desired goal. Each weight and its meaning is set out in Table 4.

Table 4 The interval scale

Weight	Meaning
4	Extreme importance
3	Considerable importance
2	Average importance
1	Slight importance
0	No importance

As mentioned before, in this research the attributes measured are mostly of considerable or extreme importance. A weight of four was given if an attribute was considered to be absolutely essential for effective SSM. A weight of three was given if it was considered that SSM could still be successful albeit slightly hampered without the specific attribute in place. A weight of two was given where the attribute was equally important for SSM and SM. As this study relates to purposive sampling, the weight factors assigned were all two or above – mostly threes and fours. For this reason, the weight factors were subsequently normalised using the min-max normalisation method to facilitate improved modeling. The normalised scale used was from 0 to 1.

3.7.2 Rating scale of participants on each attribute

For data analysis it was important to attach a value or rating to the responses of the participants. In order to achieve this for each of the attributes, a scale of zero to three was defined where a rating of three was considered as performing at the desired or ideal level of an attribute (as derived from extant literature) and a rating of zero meant that performance

against a specific attribute was non-existent. This rating scale is an arbitrary scale used a) to simplify the rating; and b) due to it being comparison-based against the ideal positions for each of the key features identified before. Although ratings such as “high”, “low” and “average”/“medium” may be considered more simplistic, in this instance performance levels could not be covered by such generalized terms. . It is important to note that this scale is non-linear, that is a rating of three does not imply a performance level three times as good/strong as a rating of one. In fact, the performance rating scale is specifically defined for each of the key features identified before, detailing the requirements to achieve each specific performance level for the corresponding feature. This is presented in Table 5 and Table 6 below. A high level overview of the ratings across all features presents as follows:

- For the key features/attributes indicating the presence of the necessary enablers or “facilitators” in the organization, i.e. linked to the first proposition, a rating of three indicates an advanced level of maturity or adoption of SSM, whereas a rating of two indicates that the company is moving towards maturity and a rating of one signifies that the company is not attaching a lot of significance to SSM adoption or that it’s not seen as a priority for the company at this stage.
- For the key features/attributes indicating the practice of SSM strategies and approaches in the organization, i.e. linked to the second proposition, a rating of three indicates an advanced level of strategies and approaches of SSM being applied in practice, whereas a rating of two indicates that the company is moving towards adopting the necessary strategies and approaches and a rating of one signifies that the company is not applying the significant strategies and approaches attached to SSM adoption or that it’s not seen as a priority for the company at this stage.
- For all the relevant attributes, a rating of zero has been defined for the sake of completeness, however, for the purpose of this study with its purposive sampling, the rating of zero (referring to no progress at all towards adopting SSM) would not apply to any of the participating companies.

Table 5 Rating scale for level of SSM adoption, i.e. level of maturity of SSM in the organisation

Attribute name	Performance levels defined	Ideal position
Leadership: Skills & experience	<p>3 – Majority of people in SM group has formal SM or SC qualification as well as more than 2 years appropriate experience; leader has formal qualification and 5+ yrs</p> <p>2 –Some formal SM/SC qualifications in group, most have SM experience</p> <p>1 – No formal SM/SC qualifications, few have SM experience</p> <p>0 – No formal SM/SC qualifications in SM group, only 'on the job' training</p>	<p>SM group is led by a leader with substantial experience and formal SM/SC qualification(s) / advanced skills. The SM group is made up of people with formal SM/SC qualifications and all have two or more years of experience within the SM discipline (Tassabehji and Moorhouse 2008)</p>
Leadership: Reporting line & job title	<p>3 – Reporting to 1st or 2nd tier in company & job title includes 'Procurement'/SM/SC</p> <p>2 – Reporting to 3rd/4th tier, job title includes 'Procurement'/SM/SC</p> <p>1 – Reports to 3rd tier or lower , job title doesn't refer to 'Procurement'/SM/SC</p> <p>0 – No concept of 'Procurement' /SM/SC in org structure</p>	<p>SM leader is seen as influential at company strategic level and has reporting line to 1st or 2nd tier executive. His/her job title reflects the importance the company attaches to the SM function (Johnson 2006).</p>

Attribute name	Performance levels defined	Ideal position
<p>Organisation design: Position & decision making style</p>	<p>3 – Hybrid positioning. Centre-led integration with decentralised decision making and clearly defined authority levels</p> <p>2 – Decentralised positioning. Participative or consultative decision making</p> <p>1 – At HQ, with mostly consultative decision making</p> <p>0 – At HQ with centralised dictatorial or authoritative decision making</p>	<p>Centre-led integration with decentralised decision-making within clearly defined guidelines (Van Weele 1998a) (Blascovich 2004)</p>
<p>Organisation: integration internal & external</p>	<p>3 – Co-location common, SM staff part of cross-functional team(s), cross-organisational participation as required, SM involved from start at new initiatives</p> <p>2 – No co-location, SM staff part of cross-functional team(s), limited cross-organisational participation, new initiatives joined only after direction has been set</p> <p>1 – Interact with cross-functional team(s) on a ‘as needed’ base, no cross-organisational input, limited involvement in new initiatives</p> <p>0 – No integration with other business units, only recipient of decisions / outcomes from new initiatives if impacted</p>	<p>Cross-functional focus with SM members co-located with other business units. SM involved from early initiative identification stage. Value chain integration with collaborative cooperation with suppliers (Trent 2007; van Weele 1998b; Rajagopal and Bernard 1993; Schildhouse 2005).</p>

Attribute name	Performance levels defined	Ideal position
<p>Organisation: development programs & succession planning</p>	<p>3 – Formal/planned exposure to all business area, mentor program in place, formal leadership development program, succession planning in place and reviewed annually</p> <p>2 – Limited formal development programs in place, succession planning in place</p> <p>1 – Informal development programs as needed, succession planning in place</p> <p>0 – No development or succession planning in place</p>	<p>Formal development programs for all levels within the SM group (Trent 2007). Focused formal succession planning exist for SM leader(s) (Johnson and Leenders 2009).</p>
<p>IT support: SM systems</p>	<p>3 – Supplier collaboration system, CRM/SRM, e-procurement with automated replenishment, info sharing in place</p> <p>2 – E-procurement with automated replenishment, CRM/SRM in place</p> <p>1 – Limited e-procurement in place</p> <p>0 – Limited e-comms (email/efax)</p>	<p>Advanced systems in place to a) support improved SM processes; b) relief SM group from mundane activities (Trent and Monczka 1998; Papazoglou 2006)</p>
<p>SM metrics: for SM group & suppliers</p>	<p>3 – rated 3 for both of next</p> <p>2 – rated a combination of 3 & 2</p> <p>1 – rated a combination of 3, 2, 1</p> <p>0 - rated a combination of 3, 2, 1, 0</p>	<p>Standardised metrics are in place across the supply network; both suppliers and SM group are being measured ongoing, last mentioned both internally and externally (Monczka 2009; Burt 2003)</p>

Table 6 Rating scale for SSM strategies and approaches in practice

Attribute name	Performance levels defined	Ideal position
SM metrics: supplier	<p>3 – Standardised processes and metrics in place for supplier evaluation & selection as well as monitoring ongoing performance and non-compliance with communication to supplier</p> <p>2 – Standardised processes and metrics in place for either evaluation & selection or ongoing performance.</p> <p>1 – Ongoing performance only measured against non-compliance</p> <p>0 – No standardised processes for supplier measurement in place</p>	<p>Standardised measurement practices in place for supplier evaluation & selection as well as for ongoing performance management. Non-compliance issues are measured as well. Metrics are communicated and followed up regularly between company and supplier. (Carter et al. 2000; Ogden et al. 2005)</p>

Attribute name	Performance levels defined	Ideal position
SM metrics: SM group	<p>3 – SM team and individuals have KPI's. Supplier feedback is sought on SM team and individual performance</p> <p>2 – SM team and individual have KPI's. External measurement limited to complaints/unsatisfied suppliers' feedback</p> <p>1 – Individuals have established KPI's, no external measurement</p> <p>0 – No internal or external measurement of SM team or individuals</p>	<p>Standardised measurement practices in place for the SM group and individual SM members.</p> <p>Measurements include internal as well as external measure, e.g. feedback from suppliers (Trent 2007; Monczka 2009)</p>
SM metrics: continuous improvement	<p>3 – Reviewed during contract period and updated as required. For SM team annually or sooner if required</p> <p>2 – Only reviewed and updated as contract renewal date approach. SM team's annually</p> <p>1 – Individual KPI's reviewed and updated annually</p> <p>0 – Never been reviewed or updated</p>	<p>Internal (for SM group) and external (for supplier) metrics reviewed and updated at appropriate time intervals (Trent 2007)</p>

Attribute name	Performance levels defined	Ideal position
Category management	<p>3 – Full portfolio management in place across all items. Different strategies have been developed, are documented and followed for different categories, SM team is clear on method of categorisation and can separate new items into correct categories</p> <p>2 – Portfolio management in place across all items. Differences in strategy not defined or documented</p> <p>1 – Limited portfolio management in place</p> <p>0 – No category management in place, all items dealt with in similar manner</p>	<p>Portfolio / categories established across product range. Different procurement strategies in place for different categories (Blascovich 2004; Burt 2003; Leenders 2006).</p>
Longer-term contracting & outsourcing	<p>3 – 20/80 principle in place: these contracts are all on long term contract. Selective outsourcing has happened</p> <p>2 – Limited longer term contracting, limited outsourcing</p> <p>1 – No outsourcing, limited longer term contracting</p> <p>0 – No outsourcing and no longer term contracting</p>	<p>The approximate 20% of contracts contributing approximate 80% of business value and others that are strategic in nature are all longer-term contracts (Carter et al. 2000; Trent and Monczka 1998). Outsourcing of non-core competencies for competitive advantage (Vagadia 2012)</p>

Attribute name	Performance levels defined	Ideal position
Global supply	<p>3 – Global supply incorporated in strategy and included on merit for higher value categories</p> <p>2- Global supply incorporated in an ad hoc fashion and not addressed in strategy</p> <p>1 – Global supply only considered where there is no alternative</p> <p>0 – Global supply not considered at all</p>	<p>Strategy allows for global supply / sourcing based on merit with regular review of existing global sourcing practice(s) (Trent and Monczka 2003; Sollish 2011)</p>
Supply base optimization	<p>3 – Supply base optimisation ongoing based on triage evaluation 2- Limited ongoing supply base optimisation</p> <p>1 – Supply base optimisation as knee-jerk reaction to changing external environment</p> <p>0 – No concept of supply base evaluation</p>	<p>Supply base optimisation is focused on finding the right mix and number of suppliers, identifying suppliers for elimination, development and retention respectively to support advanced supply activities (Trent 2007; Ogden et al. 2005; Dubois 2003).</p>

Attribute name	Performance levels defined	Ideal position
Cost management	<p>3 – Cost management receives ongoing attention supported by collaborative efforts with key suppliers</p> <p>2 – Cost management considered as internal and external responsibility</p> <p>1 – Cost management practiced in reaction to other factors</p> <p>0 – Cost saving seen as supplier's domain to be achieved as directed</p>	<p>There is an ongoing cost management focus within SM. Different cost management strategies are in place for different product categories. Collaborative cost saving efforts with key suppliers, especially where longer term contracts exists (Smytka 1993; Dubois 2003)</p>
Sustainability actions	<p>3 – Selective collaborative cost-saving effort with focus on sustainable SC, internal cost-saving effort initiated</p> <p>2 – Some collaboration cost-saving effort with focus on longer term relations/ higher value & risk supply</p> <p>1 – Focus on internal cost-savings, suppliers 'business as usual'</p> <p>0 – Edict type cost-saving directives issued to suppliers with penalties (threats) for non-compliance</p>	<p>Companies approach cost-saving efforts intelligently without eroding hard-won relationship trust with key suppliers. Collaborative cost-saving efforts are initiated and these efforts are focused both internally and externally (Carter, Carter and Monczka 2009).</p>

The next step in the data analysis was to capture the converted data in a data matrix presenting the score of each of the participants against the attributes as defined. Within the data matrix, each row represents an attribute assessed and each of the columns represents the score of the individual participant against that attribute. These scores formed the basis for the final step in the data analysis.

The final step in the data analysis was calculating the outcome of performance of each participating company for the two themes identified, i.e. a) the participant companies' level of maturity of SSM based on key features adopted; and b) the extent to which this is reflected in practice, i.e. the strategies and approaches followed within SM. This was accomplished in two steps: firstly the normalised weight factor of each attribute was multiplied with the corresponding rating for each company against that attribute. This gave the score for each company against each attribute. The second step was to sum each company's score for the questions relating to the first and second theme separately. This gave the two values required for each company to enable its mapping on the conceptual framework, which is covered in the next section.

3.8 ADDRESSING QUALITY ISSUES

The ongoing debate about how to rate credibility (quality) of qualitative research is summarised by Rolfe (2006, p304) as follows: "After a quarter of a century of debate about how best to judge the quality of qualitative research, we appear to be no closer to a consensus, or even to deciding whether it is appropriate to try to achieve a consensus", a view also shared by Morse et al (2002). Rolfe (2006, p304) continues "The literature ... can be broadly divided into three positions: those writers who wish qualitative research to be judged according to the same criteria as quantitative research; those who believe that a different set of criteria is required; and those who question the appropriateness of any predetermined criteria for judging qualitative research." Morse et al (2002, p14) take a more assertive position: "Without rigor, research is worthless, becomes fiction, and loses its utility. Hence, a great deal of attention is applied to reliability and validity in all research methods". Morse et al (2002, p15) further argue that "constructive (during the process)" methods of establishing reliability and

validity are superior to “evaluative (post hoc)” procedures where the researcher runs the risk of only identifying serious threats to rigor when it’s too late to amend them. They are adamant that the responsibility for establishing reliability and validity should be placed squarely on the shoulders of qualitative researchers and should be fulfilled by implementing basic self-correcting verification strategies during the study itself.

Although it is established that both quantitative and qualitative researchers need to test and demonstrate that their research is credible or of high quality, Golafshani (2003) reiterates that methods of demonstrating reliability and validity (and maximising these) may differ from study to study in qualitative research and that there are multiple alternative ways/methods.

Yin (2009) expresses that there are four tests commonly used to establish the quality of research and that these are, namely construct validity, internal validity, external validity and reliability. Saunders et al (2009) add different forms of bias to this list.

In this research report, Morse et al’s (2002) verification strategies, the four common tests and forms of bias are addressed individually.

Morse et al’s (2002) verification strategies

Methodological coherence: this refers to the importance of ensuring that the research design is congruent with the research question. Due to the interdependence of qualitative research not only does the research question dictate the research method, in turn the method also has to match the data and analytic procedure.

Reviewing the design of the components of the research method, the data and the analysis thereof, it is believed to comply with Morse et al’s (2002) verification strategy of methodological coherence.

The research design also complies with Morse et al’s (2002, p18) verification strategy that the “*sample must be appropriate*, consisting of participants who best represent or have knowledge of the research topic” and that negative cases are essential to ensure validity.

The sample chosen for this research covers the size range of companies in the WA mining industry from big to small, with the smaller companies eventuating the negative data elements during data analysis. Additionally,

within this sample the specific individuals selected to be interviewed had the most knowledge of the research topic within their respective companies.

Collecting and analysing data concurrently as an iterative interaction that ensures reliability and validity. This was done as referred to paragraph 3.4.2 to support the selection of the right participants and as well as in paragraph 3.7 where it led to the development of two further propositions.

Theory development: this relates to the conscious transition from analysing the data at a micro level to understanding the conceptual or theoretical outcome at a macro level. Thus theory is expanded “through two mechanisms: (1) as an outcome of the research process,....and (2) as a template for comparison and further development of the theory” (Morse 2002, p18).

This verification strategy was adopted during this research and is clearly demonstrated in Chapter 4: and Chapter 5: of this report.

The last aspect, namely *thinking theoretically* where new ideas from data analysis are reconfirmed with fresh data, which in turn then creates more ideas that must be checked against data already collected. This verification strategy requires slow progress forward, constantly checking and rechecking to lay a solid foundation without jumping to conclusions.

Due to the scope and time-frame of this study, this strategy was not included as verification. As Morse et al (2002, p19) suggest, due to “constraints of student time-frames, abilities and budgets”, it is better for the student researcher to verify some major concepts and leave others ““hypothetical”, rather than the student working with incomplete, thin data sets”.

Reliability

Reliability refers to the extent to which research procedures can be repeated with the same end results (Yin 2009). From a somewhat different perspective, Marshall and Rossman (2006) claim that the findings derived from using non-standardised research methods (such as semi-structured and unstructured interviews) are not necessarily meant to be repeatable since they represent reality as reflected at the time of data collection in a situation which may be subject to change. They state that an attempt to ensure that qualitative, non-standardised research could subsequently be

replicated by another researcher would not be realistic or feasible without undermining the strength of this type of research. Stuart et al (2002) address this divergence by suggesting that there are two ways to increase reliability: the first is to develop a research protocol (i.e. the guide to be used by the researcher to maintain focus throughout the study), an approach highly propagated by Yin (2009) as well, and the second is to establish a case study database that will allow another researcher to replicate the analytical part of the research from the raw data (Stuart et al. 2002).

To increase the reliability of this research, a research study protocol was developed (Appendix A) and referred to throughout the research. The raw data was also captured in a database with subsequent notes added (while still protecting the identity of participating individuals and companies) as described in section 3.6.2 under *Data recording*.

Construct validity

This addresses the congruency between the operational measures utilised and the concepts being studied (Yin 2009; Stuart et al. 2002). According to Yin (2009), this test is especially challenging in case-based research with common criticisms pointing to the failure to develop an adequately effective set of measures. Yin (2009) recommends following two steps to ensure construct validity: defining the specific concepts of the study and how it relates to its original objective and eliciting operational measures that match these concepts.

In this research, the two steps were covered by firstly identifying the propositions relating to the research questions, i.e. the concepts that will be studied (refer to section 3.1) and secondly by identifying the measures by which these concepts will be evidenced. These operational measures were established through 1) listing the key enablers and strategies of SSM as attributes to look for in the participating companies and 2) developing a measurement set for each of these that indicate how the participants measure up against companies that are leaders in the field of SSM, based on existing research literature (refer to section 3.7).

Internal validity

According to Yin (2009) and Stuart et al (2002), this aspect (specifically for explanatory studies) seek to identify a causal relationship between certain events or conditions (Stuart et al. 2002; Yin 2009). Yin (2009) recommends identifying similar patterns as a way to enhance internal validity, i.e. to be able to show that the data patterns match proposed patterns, provides good evidence for a stated proposition, whether those patterns refer to causal relationship between variables or to building of explanations.

The internal validity of this research was established through developing the proposed conceptual framework discussed in the previous section from extant frameworks and models. The aim of using this model is to present the relationship between SSM adoption and its application in practice by mapping the participant companies' positions following the data analysis. Visually this will make it easy to recognise whether the data patterns match the proposed patterns or not.

External validity

Two methods of achieving external validity have been demonstrated in this research study, namely that of generalisability and triangulation. Each is briefly discussed below.

Generalisability

In contrast to statistical generalisability, the generalisation of the results from this multisite case-based study will occur at the level of the above conceptual framework and propositions previously stated. This is referred to as analytic generalisation (Yin 2009), which refers to the use of previously developed theory as a template for comparing empirical results of the case study. Analytic generalisations are “applied to wider theory on the basis of how selected cases ‘fit’ with general constructs” (Curtis et al. 2000).

The researcher believes that although the number of sites selected for data gathering is small, it does not detract from the fact that these organisations are typical of the WA mining industry where the industry is populated by organisations of different sizes, coming from different perspectives and persuasions as it relates to their core business focus (refer to Table 3). As such, although four respondents cannot be seen as conclusive evidence of

the key findings, this research (which explores how existing models and frameworks applies to the WA mining industry) indicates that these finding may very well be applicable to the rest of the industry.

Triangulation

Roberts et al (2006, p44) states that triangulation enhances the validity of qualitative research. “Triangulation assists with the consistency, comprehensiveness and robustness of the study”.

Triangulation is looking at something from different viewpoints. Denzen (1989) identified four basic types of triangulation:

Data triangulation: involves time, space, and persons

Investigator triangulation: involves multiple researchers in an investigation

Theory triangulation: involves using more than one theoretical scheme in the interpretation of the phenomenon

Methodological triangulation: involves using more than one method to gather data, such as interviews, observations, questionnaires and documents

Golafshani (2003) mirrored these types in her four approaches to triangulation, i.e. triangulation of measures (referring to multiple measures of the same phenomenon), of observers, of theory (referring to multiple theoretical perspectives used during planning or analysis of the setting), and of method (referring to the mixing of multiple styles that may be qualitative and quantitative).

The applicable method of triangulation used here is that of theory, where more than one perspective was used during data analysis as illustrated by the matrix in the previous section, i.e. section 3.5 as well as the different graphs presented in Chapter 4:

Forms of bias

Saunders et al (2009) identify different forms of bias, amongst other issues, as a potential data quality issue in relation to semi-structured interviews.

The specific types of bias referred to are interviewer bias, interviewee bias and bias with regards to the nature of the individuals or company

participants. These may also impact on the reliability of the study. The key to countering any potential issues relating to bias, is careful consideration of the interview preparation. This was discussed in detail in section 3.6.2 and is not necessary to be repeated here. Suffice it to state that the researcher believes these different forms of potential bias were sufficiently controlled through careful preparation and execution of the interviews to negate its impact on the quality of the research.

3.9 ADDRESSING ETHICAL ISSUES

The most prevalent ethical issues likely to arise were confidentiality and anonymity. These were addressed upfront with the participating companies by drawing up an information sheet and distributing these to established informed consent. Table 7 summarises the information included in the information sheet (Saunders 2009).

Table 7 Requirements of the information sheet to participating companies

Research aspect	Detail to be included
Nature of the research	Purpose of the research, the name and background of the researcher and backing institute and some sampling selection details
Participant requirements	Type of data to be collected, instrumentation, time required from participants, targeted individual participant positions and main research target dates
Implication of participation	The voluntary nature of participation, the right to withdraw partially or completely at any time, associated risks and rewards, protection of companies' identity and confidentiality
Data use and publication	Access control, results dissemination, data storage, anonymity and confidentiality assurances during the research and thereafter.

Research aspect	Detail to be included
Contact details	Contact person's details for addressing any queries about the research

Although this research involved humans, it was considered to be low-risk and as such an application for approval of research with minimal risk was made to and granted by the Curtin University Human Research Ethics Committee.

3.10 CONCLUSION

This chapter outlined the study's methodology with particular reference to the qualitative approach taken; the research design; data collection and analysis; addressing reliability and validity of the instruments. In the following chapter, the key findings are presented.

CHAPTER 4: KEY FINDINGS

4.1 OVERVIEW

This chapter presents the key findings as construed from the interviews held with the participant companies. Firstly, a brief synopsis of the participants' responses to each of the interview questions are presented. Next the scores of each company for theme 1 and theme 2 are presented separately. This is followed by the consolidated positioning of each company for theme 1 and theme 2 combined, culminating in the mapping of the companies on the conceptual framework, concluding with initial impressions based on each company's individual position.

4.2 BRIEF SUMMARY OF INTERVIEW RESPONSES

The next step in the data analysis was to complete the scoring for each company based on the response(s) to each of the interview questions. Each of the responses are outlined briefly in the table below.

Table 8 Summary of interviewees' responses

	Attribute name	Company 1	Company 2	Company 3	Company 4
1	Leadership: Skills & experience	Varies from post-graduate level to no formal qualification. Experience varies from 5 to 30 years.	Varies from graduate level to no formal qualification. Experience varies from 5 to 15 years.	Varies from graduate (not SM specific) level to no formal qualification. Experience varies from 2 to 10 years	Senior staff post graduate qualifications. Experience varies from 14 to 20 years
2	Leadership: Reporting line & job title	Via regional CFO to Global CFO and Executive Committee. Head of Contracts and Supply Chain	Direct to Global Supply Manager. Supply & Procurement Manager	Via Admin/Commercial manager to Resident manager to Head Quarters Operations Manager. Contracts manager	Via CFO to Executive Leadership. Procurement Manager
3	Organisation design: Position & decision making style	Decentralised to regional level; hybrid based on value	Supports both global and regional strategies; hybrid based on value and impact	Decentralised model driven by value; even centralised decisions made with consultation	Recent change to high level decision making; mostly centralised with decentralisation based on authority and decision matrix

	Attribute name	Company 1	Company 2	Company 3	Company 4
4	Organisation: integration - internal & external	High level of internal integration based on federal model; critical and leverage items cross-organisational integration.	High level of integration, cross-functional and cross organisational integration; procedure driven.	Cross-organisational integration for economy of scale. Little cross-functional integration	Strong integration between business units, no cross-organisational integration
5	Organisation: development programs & succession planning	Use of balanced scorecards and self-directed leadership; succession planning map – all reviewed annually	Individual Development Program, mentoring and succession plan in place – reviewed annually. Leadership course for selected managers	Formal programs planned for future, currently based on identification of individual potential	Informal mentoring and self-directed development. No succession planning yet

	Attribute name	Company 1	Company 2	Company 3	Company 4
6	IT support: SM systems	SM module of enterprise management system use automated checking with transaction controls in place	SM module of enterprise management system for auto replenishment as applicable; linked with supplier. Contract life cycle management system (incl. reverse auctions and e-sourcing) SRM	Inventory management with ordering triggers	SRM and spend tracking in place, no B2B
SM metrics: SM group & supplier – combined of attributes 7&8 below					
7	SM metric: supplier	Selection criteria in place; ongoing measurement by exceptions	Pre-qualification program; ongoing via KPI's incl. productivity, delivery and site safety components	Informal selection criteria varying based on requirement. Tracking performance history and non-conformance	Informal selection criteria. Contract KPI's with non-conformance aspects

	Attribute name	Company 1	Company 2	Company 3	Company 4
8	SM metrics: SM group	Internal (KPI's, scorecard) and External (contract specification, 'hotlines', auditing)	Internal (Global metrics, e.g. targets for invoicing, turnaround and savings) and External (quarterly review meetings)	Internal (KPI's – reviewed annually) and External (informal elevated feedback)	Internal KPI's with annual review. External only informal feedback
9	SM metrics: continuous improvement	Quarterly standstills with annual reviews; 3-year rolling strategy	Targets reviewed annually, internal and external	Annual target with incentives	No formal process
10	Category management	In place for 80% of \$value, equates to top 50 suppliers	In place for global and regional, both services and materials – categories primarily operations driven	Categories currently structured as \$value range with appropriate approval levels	Based on \$ value and criticality – higher of these allocated to more experienced personnel
11	Longer-term contracting & outsourcing	80% plus long term; insourcing vs outsourcing economically driven, also based on capability and capacity	80% plus long term; transactional items consolidated and automated. Some onsite services outsourced	Less than 30-40% long term, majority 12 months fixed contracts	70-85% on longer term contracts based on \$ value. Approximately 80 % outsourced

	Attribute name	Company 1	Company 2	Company 3	Company 4
12	Global supply	Advanced global strategy; integrated with categories	Global alliances currently enforced	Potential with contracts in USD	Difficult to achieve with outsourcing
13	Supply base optimisation	Process in place for ongoing optimisation	Process in place for optimisation with supplier development as necessary	Early stages, primarily focused on inventory optimisation with suppliers	Significant contract optimisation with unique full-scope aspects and stringent evaluation
14	Cost management	TCO approach with supplier collaboration	TCO approach supported by 'Supplier of the Year' award	TCO approach with supplier collaboration around product development	TCO approach with extensive supplier collaboration
15	Sustainability actions	Step-changes approach; working with rest of SC	Strategy changes based on economy, e.g. changing from 'growth' to 'sustain', focused on driving out waste. Actions based on category	More operationally focused than on SM	Primarily operations management focused with cost-cutting drive

4.3 COMPARATIVE FINDINGS

Continuing the thread of the two themes identified in section 3.4, the results of the data analysis are first presented for each theme separately, then combined to present the consolidated results for the participating companies. Using the themes as the constant perspective from instrument development through data collection and analysis to presenting the findings, ensures consistency in interpretation and facilitates testing of the stated propositions derived from the research question.

4.3.1 Theme 1 findings

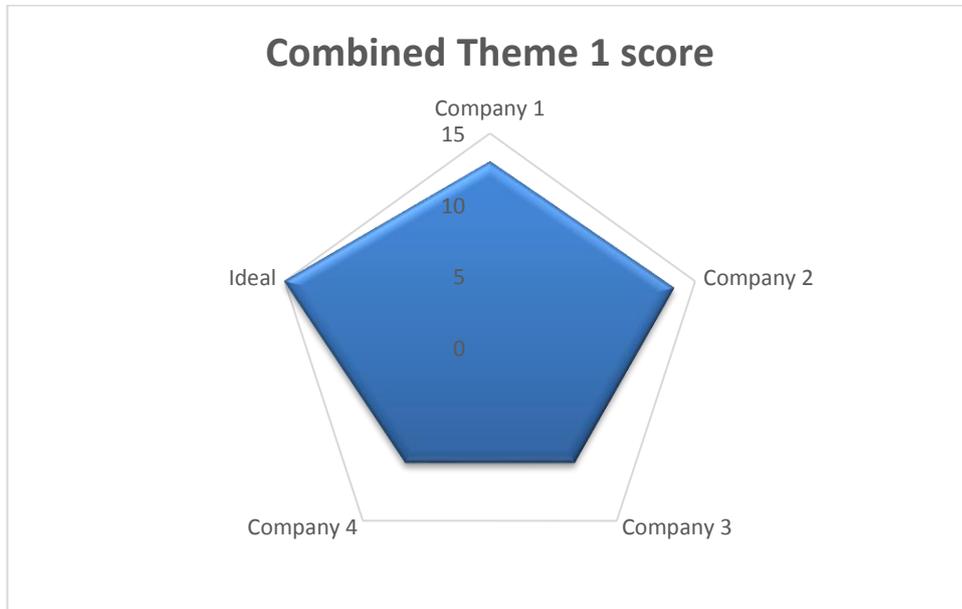
Following the scoring of the responses of the individual participants, the normalised weighted score for Theme 1 for each was subsequently calculated, i.e. how mature / advanced these companies are in terms of their adoption of key SSM features. These scores are represented in the table below.

Table 9 Theme 1 normalised scores

Attribute name	Weighted score				Ideal
	Company 1	Company 2	Company 3	Company 4	
Leadership: Skills & experience	1.5	1	1	1	1.5
Leadership: Reporting line & job title	3	3	3	2	3
Organisation design: Position & decision making style	1.5	1.5	1.5	1.5	1.5
Organisation: integration internal & external	1.5	1.5	1	1	1.5
Organisation: development programmes & succession planning	1.5	1.5	0.5	0.5	1.5
IT support:SM systems	2	3	2	2	3
SM metrics: supplier & SM group	2	2	1	2	3
Combined Theme 1 score	13	13.5	10	10	15

The combined score for each company plus the 'ideal score' are presented in the radar chart below.

Figure 9 Theme 1 Radar Chart



4.3.2 Theme 2 findings

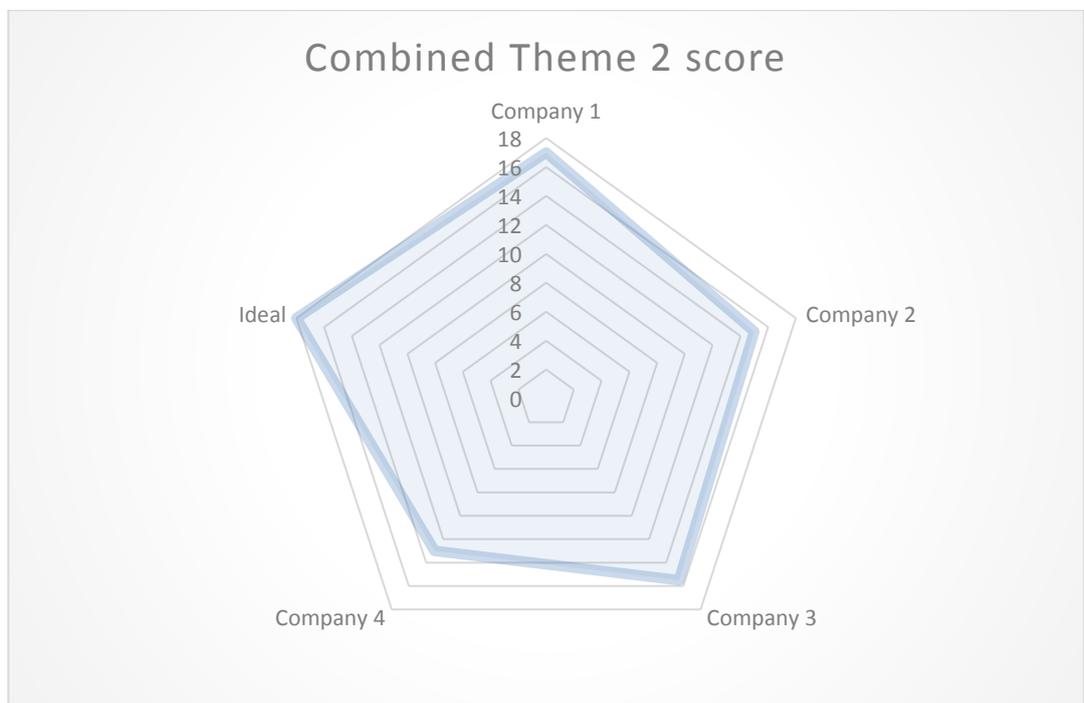
The normalised weighted score for Theme 2: The strategicness of practices (i.e. which of the key strategies and approaches identified have been integrated in the company's SM operation) for each company was similarly calculated. The Theme 2 scores are represented in the table below.

Table 10 Theme 2 normalised scores

Attribute name	Weighted score				
	Company 1	Company 2	Company 3	Company 4	Ideal
SM metrics: supplier	2	3	2	3	3
SM metrics: SM group	1.5	1	0.5	1	1.5
SM metrics: continuous improvement	0	0	0	0	0
Category management	3	1	3	1	3
Longer-term contracting & outsourcing	1.5	1.5	1.5	1	1.5
Global supply	1.5	1	1.5	1	1.5
Supply base optimization	3	3	3	2	3
Cost management	3	3	3	3	3
Sustainability actions	1.5	1.5	1	1	1.5
Combined Theme 2 score	17	15	15.5	13	18

The combined Theme 2 score for each company plus the 'ideal score' are presented in the radar chart below.

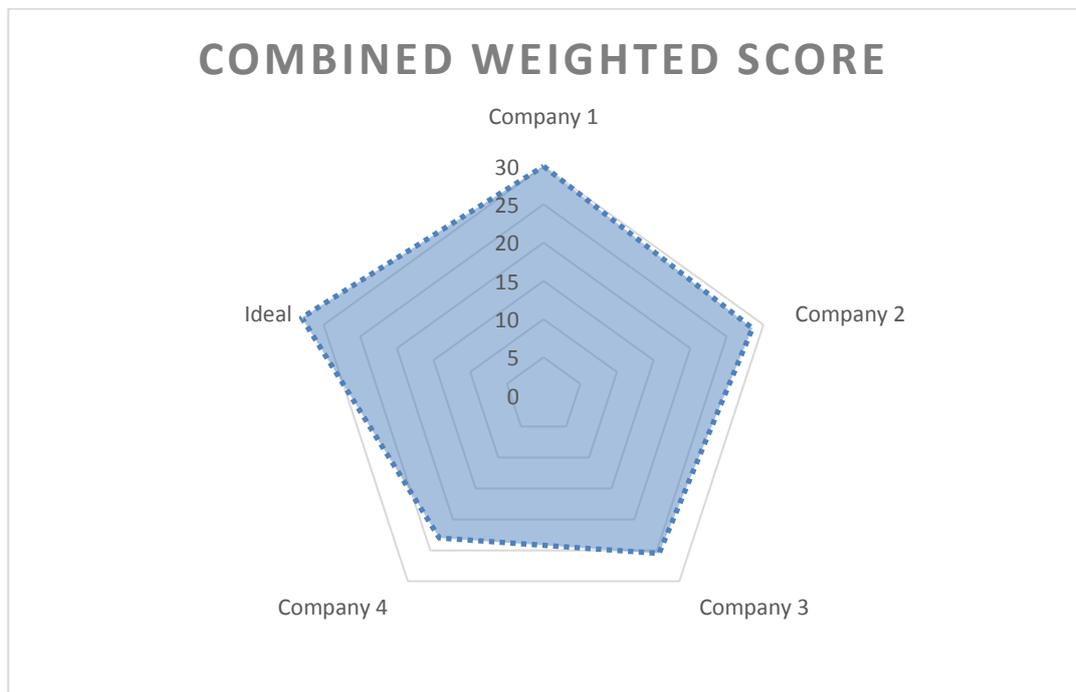
Figure 10 Theme 2 Radar Chart



4.3.3 Consolidated Themes 1 and 2 positioning

When looking at the combined scores of each company for both Theme 1 and 2, and discarding the third aim of the conceptual framework for the moment (i.e. get an understanding of the relationship between SSM adoption and applying it in practice), the radar chart below shows each company's position compared to the 'ideal' position.

Figure 11 Combined Themes 1 and 2 Radar Chart



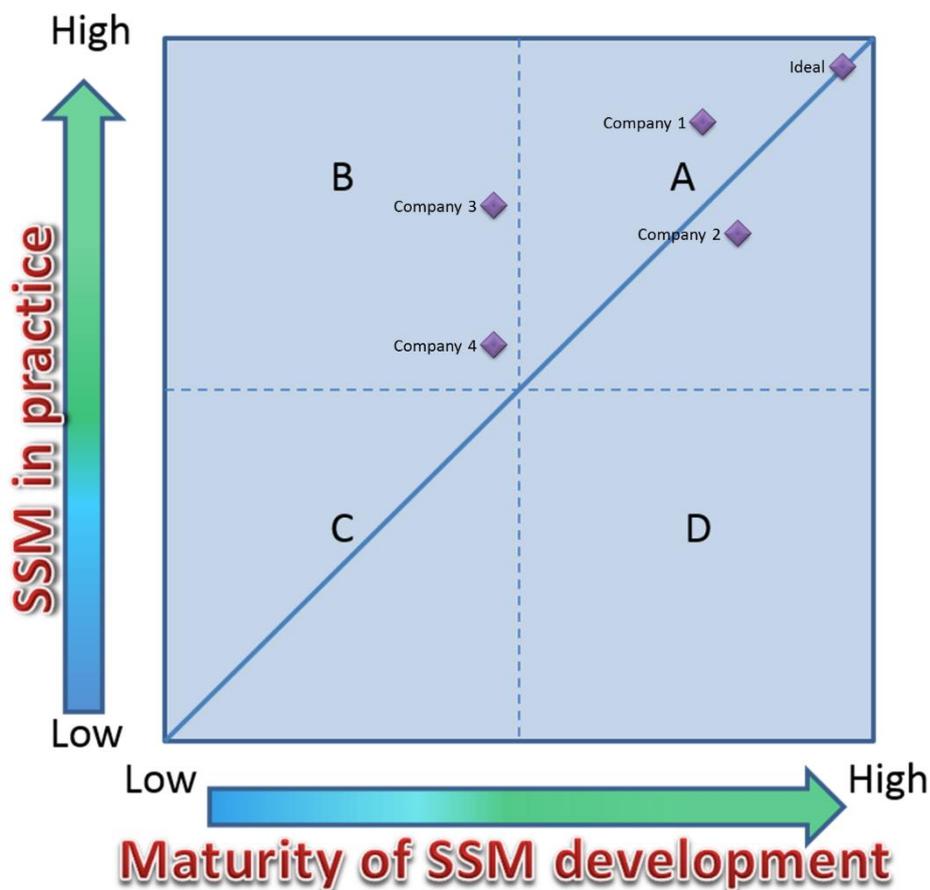
4.4 MAPPING COMPANY POSITIONS ON THE CONCEPTUAL FRAMEWORK

The conceptual matrix/framework allows not only the Theme 1 and Theme 2 positions to be visually represented, but also reflects the relationship between the two themes, i.e. between a company's maturity / level adoption of key SSM features and its level of integration of key SSM strategies and approaches in practice.

Based on the results of the data analysis, the four companies as well as an ideal position are mapped on the conceptual framework below. Although the key findings are discussed in the next chapter, it is worthwhile pointing out at this stage that if one only looks at the combined radar chart above, i.e. not allowing

for a relationship between companies' level of adoption of key SSM features and its SSM strategies and approaches in practice, it would appear on the surface that, of the four participating companies, Company 1 is closest to the ideal position. On the other hand, looking at the relative positions mapped on the matrix, Company 2 and Company 4 are closest to the diagonal, which (as described in section 3.5) may be seen as an indication of congruency or "practice what you preach" line, where practices / decisions are aligned with the level of maturity of SSM adoption. In addition, the relative positions of the four companies should not be interpreted as being linear, i.e. if one company is shown as double the distance along any axis than another company, it does not follow that the first company has progressed twice as far in its pursuance of SSM as the other one.

Figure 12 Conceptual Framework Mapping



4.5 FINDINGS FOR INDIVIDUAL COMPANIES

4.5.1 Company 1

Looking at Company 1's position on the conceptual framework, it indicates that the company is fairly advanced in both its SSM development, as well as putting the key strategies and approached of SSM (as identified from extant literature) into practice. In relative terms though, comparing theme 1 with theme 2, it appears as though the company is lagging slightly in putting all the necessary structures / organisational leadership in place to optimally pursue SSM.

4.5.2 Company 2

Looking at Company 2's position on the conceptual framework, it indicates that, as with Company 1, the company is fairly advanced in both its SSM development, as well as putting the key strategies and approached of SSM (as identified from extant literature) into practice. In relative terms though, comparing theme 1 with theme 2, Company 2 appears to be creating the right organisational structure in terms of leadership and design first before implementing the strategies and approaches that can then be suitably supported in order to optimally pursue SSM.

4.5.3 Company 3

When reviewing Company 3's position on the conceptual framework, it indicates that, although not as advanced / mature in its SSM development as the first two companies, Company 3 is fairly advanced in applying the key strategies and approached of SSM in practice. In relative terms though, again comparing theme 1 with theme 2, it appears as though the company is lagging a fair bit in putting all the necessary structures / organisational leadership in place to optimally pursue SSM, which may indicate non-sustainability of the SSM practices.

4.5.4 Company 4

Lastly, looking at Company 4's position on the conceptual framework, it indicates that, although not as advanced / mature in its SSM development or its application of the key SSM strategies and approaches, Company 4 appears to be pursuing SSM in a fairly congruent way. Its position close to the diagonal on the conceptual framework, seems to indicate that as it is developing in SSM, the company aims to put the necessary structures /

organisational leadership in place as it implements the key strategies and approaches, thereby striving to optimally pursue SSM.

4.6 CONCLUSION

The above findings are based on the data analysis performed from the data gathered in the interviews with each of the participating companies. These findings are discussed in greater detail in the next section.

CHAPTER 5: DISCUSSION

5.1 OVERVIEW

An increased awareness has developed in the last couple of decades of the value to be contributed to both a company's bottom line as well as its competitiveness by a pro-active approach to the procurement or SM area of the supply chain. That signifies that the extent to which this area is optimally set-up and functioning becomes progressively more important. Not only do the leadership team of a company need to have clearly defined targets/objectives with regards to the area of SSM, they also need to have a strategy in place to achieve those and, of equal importance, they need a step-by-step or phase-by-phase action plan on how they are going to systematically implement the necessary structures to propel the company towards its long term objectives. So how well are the representative participant companies set up to achieve this and how far have they progressed in both maturity and practice? Expanding the findings from this representative group to the WA mining industry, how far has the industry evolved in its approach to SM? Is it agile enough to handle changing market environments? What factors influence these capabilities? Does the WA mining industry align with existing models and frameworks? In this chapter, the discussion will attempt to answer all these aspects as it relates to the research questions, i.e. which SSM development principles and practices are evident in the WA mining industry; (i.e. the maturity level of SSM development and the reflection of this in practice) and how do these practices align with existing SSM frameworks and models?

5.2 THE CHICKEN OR THE EGG?

Before elaborating on the specific findings of this research study, a brief discussion of the underlying dynamics in mapping positions on two-dimensional frameworks seems in order to assist the interpretation of the individual companies' positions on the conceptual matrix. Within any framework of a two-dimensional development/ progressive initiative, which is what most of the existing models represent, there is seldom a seamless direct relationship between the two dimensions in the continuum. Although these frameworks depict the development path as a smooth trend, with

equal balance between the two dimensions, in reality these development paths are progressed through intermittent step functions of smaller or larger intervals. One may well ask: which came first – the chicken or the egg, or rather, seen in the context of this research study: which one of the conceptual framework's dimensions comes first: the structure, i.e. the next level of maturity in terms of people, systems and design, or in practice implementing the right strategies and approaches?

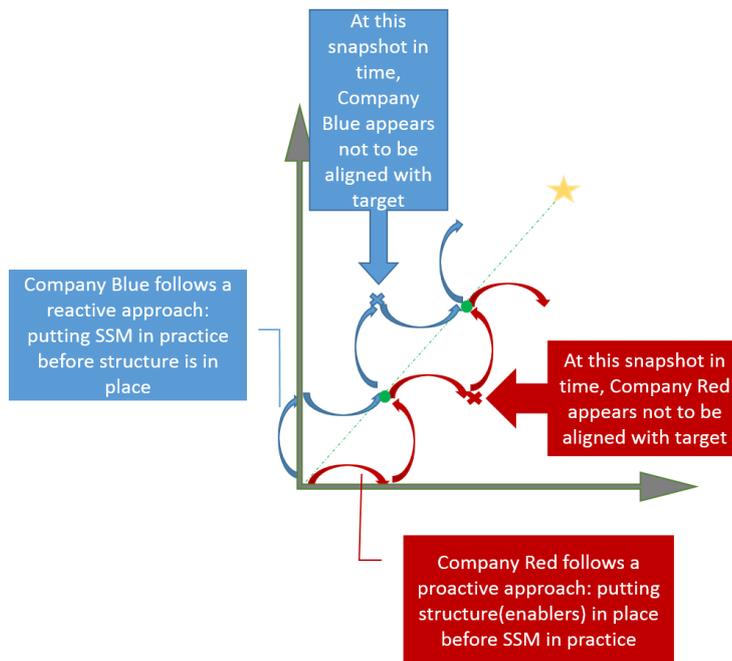
Although this should not matter once a company's targets / objectives relating to SSM have been achieved, the path and time to achieve these may well be influenced by the selection of the dimension to start with. To illustrate the point, consider the diagram below, where two companies are both trying to get to the same target (the gold star), but Company Blue approaches it from a different perspective than Company Red. Company Red is more proactive in its approach whereas Company Blue is more reactive. In the context of the conceptual framework, a reactive approach refers to the situation where a company see and hear of the benefits of certain SSM strategies and approaches and decide to pursue those without considering the strategic requirements necessary to make it long term sustainable. In certain instances, it might not even be feasible to implement specific strategies or approaches (due to size, buying power or lack of influence). One example is the Cost Management strategy, where the company may be a small fish in the supplier's big pond, and the supplier may prudently choose to rather align or collaborate with a more sizable or influential company to achieve its own objectives. More on the impact of the size of a company as it relates to successful attainment of SSM later. The drivers for a reactive approach are both external and internal: companies aim to keep up with competitors by attempting to implement the latest trends in SSM without necessarily understanding the complexities behind it or the requirements necessary to these practices work to the advantage of the business rather than just adding cumber. The reactive approach results in a stop-start progression towards the target: pursuing the advances in SSM practices and the benefits derived from these will inevitably be halted due to lack of formal structures, be it human resources, systems or organisational design. Company leadership is then forced to take the step of putting the necessary structures in place to support the implementing SSM strategies and approaches in (e.g. in the form of structures and SSM maturity in the

organization) to make the SSM strategies and approaches optimally successful and long term sustainable.

In contrast, a proactive approach refers to a conscious leadership strategy to ensure that the required structures are in place *first* and only then to implement the relevant advanced SSM strategies and approaches in practice. Once this phase (i.e. one step up towards the target) is successful and the company wants to move up to the next level of competitiveness in terms of SSM, it further expands its structures to ensure the necessary support is in place for the next step function / phase of implementing further SSM strategies and approaches in practice. The proactive pathway is mainly self-driven as opposed to reacting to external and internal factors: companies are more mature in the approach to pursue SSM, understanding the required structures in terms of human resources, systems and organisational design that need to be in place to ensure that success through implementing SSM strategies and approaches are sustainable long term. Their first call to action will be a strategy to establish the necessary structures to support the SSM strategies and approaches in practice, whether that means recruiting for the right leader for this business area or redesigning the organization structure to allow the right decision making power at the right level of authority to support and streamline the SSM function.

From the diagram one can interpret that both companies should eventually get to the target, however, depending on which snapshot at time one looks at, either company may seem out of synchronisation or misaligned with its target at certain points along their development path.

Figure 13 Step function perspective



5.3 TWO PROPOSED THEORIES

In addition to the step-function effect described above, the discussion in this chapter will also give attention to two theories outlined below. Based on the two key themes identified previously and within the unit of analysis (Yin 2009) which is represented by the WA mining industry for this case based research, these two theories evolved from the research question and the iterative nature of the data collection and analysis process. These two theories were not explicitly investigated in this study, but it adds an interesting facet to the interpretation of the results.

Theory 1:

The first theory is that the level of maturity of SSM in organisations lags the progress made in implementing strategies and approaches associated with SSM.

It is proposed that in practice, rather than following Trent's (2007) recommendation of establishing the formal structures for SSM in terms of people, systems and design first in order to successfully pursue SSM secondly, with the exception of getting the right leadership in place,

companies tend to follow an iterative process of pursuing one or two SSM strategies, then backtracking to set-up the necessary structures to fully support these and get maximum value before moving on to the next strategy or approach and repeating the process. This was clear from the interview content and nonparametric modelling: based on the weighted scores of the responses for each of the two themes separately, the participant companies performed overall better on SSM strategies and approaches in practice than on having set up the company and SM organisation with that in mind first, i.e. SSM maturity level.

Theory 2:

The second theory is that the level of maturity of SSM is influenced by the size of the companies. It is proposed that bigger companies can advance towards SSM more rapidly than their smaller counterparts simply by virtue of having more resources available. The resources relevant to this theory range from having more leadership qualities within a bigger executive leadership, through exerting bigger influence on suppliers to being more competitive in attracting the right people to the organisation - bear in mind that this very brief list of examples is by no means meant to be exhaustive.

These theories will be addressed in greater detail in the ensuing discussion. In examining the positioning of the companies on the conceptual framework as well as the implication for the WA mining industry as a whole, it is also prudent to probe whether these theories hold true or not.

5.4 ANALYSIS OF THE INDIVIDUAL COMPANIES BASED ON THE CONCEPTUAL FRAMEWORK

Before continuing with the specifics of the individual companies, a quick recapitulation of the two-stage purposeful sampling strategy, as executed, is presented:

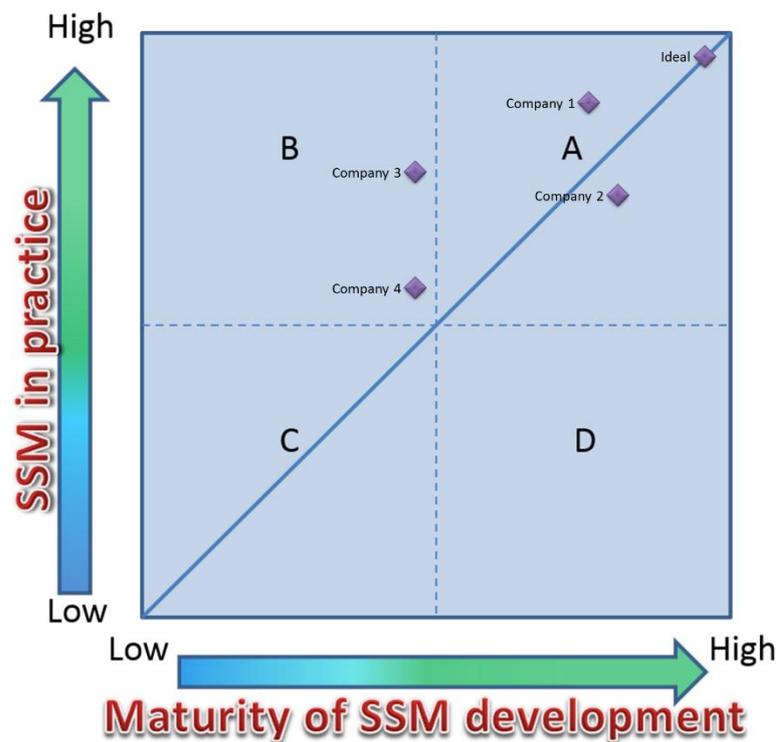
Stage 1, i.e. the homogenous sampling stage based on similar characteristics where all four companies are a) mining companies from the WA mining industry and b) companies that have progressed the role of SM in their organisations.

Stage 2, i.e. the heterogeneous (or maximum variation) sampling based on the sizes of the companies selected (defined as its number of Western

Australian based operations), where Companies 1 and 2 were at one extreme of the range and Company 4 at the other extreme, with Company 3 somewhere in between.

For ease of reference, the figure showing the mapping of the four companies on the conceptual framework is replicated below.

Figure 14 Companies positions mapped on conceptual framework



5.4.1 Company 1

Mapped on the conceptual framework, Company 1 falls in quadrant A, above the diagonal line. This positioning suggests the following:

- 1) Company 1 is fairly far advanced in both its level of maturity, i.e. adoption of key SSM enablers as well as in putting SSM strategies and approaches into practice;
- 2) Company 1 has a high level of maturity relating to its adoption of SSM enablers, i.e. adopting the necessary organisational structures in terms of human resources, systems (for information, measurement and control) and organisational design;

- 3) Company 1's level of maturity of SSM ((at this snapshot in time) lags the progress made in implementing strategies and approaches associated with SSM.

Bearing in mind that Company 1 is one of the two companies at the 'big size' end of the range, this outcome is in line with expectations. Referring back to the discussion on step functions during the development process, it appears that Company 1 is a more reactive company, vigorously pursuing the value and advantages that SSM strategies and approaches are evidently able to deliver on each level until forced to expand the formal structures required to sustain these actions. However, as Company 1 is not far off the diagonal line, it would appear as though they are doing the 'catching up' in terms of expanding the organisational enablers fairly effectively, without falling down on the strategies and approaches in practice.

5.4.2 Company 2

Mapped on the conceptual framework, Company 2 falls in quadrant A, below the diagonal line. This positioning suggests the following:

- 1) Company 2 is fairly far advanced in both its level of maturity, i.e. adoption of SSM enablers as well as in putting SSM strategies and approaches into practice;
- 2) Company 2 has a high level of maturity relating to its adoption of SSM enablers, i.e. adopting the necessary organisational structures in terms of human resources, systems (for information, measurement and control) and organisational design;
- 3) Company 2's level of maturity of SSM ((at this snapshot in time) is slightly ahead of its progress made in implementing strategies and approaches associated with SSM.

Similar to Company 1, Company 2 is the other of the two companies at the 'big size' end of the range. As such, its positioning on the conceptual framework is in line with expectations. As far as step functions during the development process is concerned, Company 2 appears to be a more proactive company, putting the necessary formal structures in place first before implementing the SSM strategies and approaches that subsequently deliver the expected value and advantages. Prior to implementing more advanced strategies and approaches, Company 2 evidently expands its formal structures to support and sustain this next level of practices. Again similar to

Company 1, Company 2 is not far off the diagonal line, seemingly having a well-aligned and – balanced plan to successfully advance SSM in the short as well as long term, without creating redundancy in its SM structures as it relates to human resources, systems and design.

5.4.3 Company 3

Mapped on the conceptual framework, Company 3 falls in quadrant B, a fair way above the diagonal line. This positioning suggests the following:

- 1) Company 3 is fairly advanced in respect of implementing SSM strategies and approaches;
- 2) Company 3's level of maturity relating to its adoption of SSM enablers, i.e. adopting the necessary organisational structures in terms of human resources, systems (for information, measurement and control) and organisational design is in the higher low to middle medium range;
- 3) As far as Company 3's level of maturity relating to its SSM development, it is considerably lagging behind the SSM strategies and approaches that have apparently been implemented in practice.

Company 3 is the mid-size company in respect of the heterogeneous stage of the sampling strategy. In terms of potential expectations, Company 3 may have been expected to be at that level of maturity, however, it is somewhat unexpected for it to be so far advanced in terms of implementation of SSM strategies and approaches – even further than Company 2. As far as a well-balanced approach is concerned, it does appear as if Company 3 is out of alignment (or out of its depth) in terms of sustainability of the SSM practices implemented. Company 3 appears to be a reactive company, enthusiastically pursuing the value and advantages that SSM strategies and approaches are evidently able to deliver without too much planning as far as ensuring these practices are long term sustainable and manageable. Unless Company 3 calls time-out, take stock of its position and plan how to do some serious 'catching up' in terms of establishing or expanding on existing organisational enablers, the SSM practices they've embraced may very well become unmanageable and therefore unsustainable, which means the company risks either losing credibility both internally, with other business areas, and externally, with their suppliers, or regressing the SSM strategies and approaches to a superficial level in practice, not able to achieve the

expected high level of value and competitive with diluted derived benefits to all involved parties.

5.4.4 Company 4

Mapped on the conceptual framework, Company 4 falls in quadrant B, just above the diagonal line. This positioning suggests the following:

- 4) Company 4 is making fair progress with both its level of maturity, i.e. adoption of SSM enablers as well as in putting SSM strategies and approaches into practice;
- 1) Company 4's level of maturity relating to its SSM development, i.e. adopting the necessary organisational enablers or structures in terms of human resources, systems (for information, measurement and control) and organisational design is in the higher low to mid medium range;
- 2) Company 4's level of maturity of SSM (at this snapshot in time) slightly lags the progress made in implementing strategies and approaches associated with SSM.

Company 4's positioning on the conceptual framework delivers two surprises:

- a) being at the 'small size' end of the maximum variation range in terms of the heterogeneous stage of the sampling strategy, it is a pleasant surprise to find Company 4 in the medium range in terms of progress made with respect to putting SSM strategies and approaches into practice.
- b) Being positioned not far off the diagonal line, Company 4 appears to have a well-aligned and – balanced plan to successfully advance SSM in the short as well as long term, not getting too far ahead with its SSM practices without attending to the necessary enablers as it relates to human resources, systems and design.

5.4.5 Overall perspective

In terms of having a well-balanced and effective strategy in place to progress SSM, Companies 1 and 4 appears to be the most successful, with the two dimensions apparently being expanded simultaneously and methodically, with Company 1 not far behind. Company 3 may have to revisit its strategy if the aim is to progress SSM successfully in the longer term.

What does it mean in terms of the WA mining industry?

To understand what this means in terms of this specific research study, the two research questions will be addressed separately. Section 5.5 will focus on answering the first research question, i.e. which SSM practices are evident in the WA mining industry (i.e. the maturity level of SSM development and the reflection of this in practice); and section 5.6 will then elaborate on the second research question, i.e. how do these practices align with existing SSM frameworks and models?

5.5 ADDRESSING RESEARCH QUESTION 1

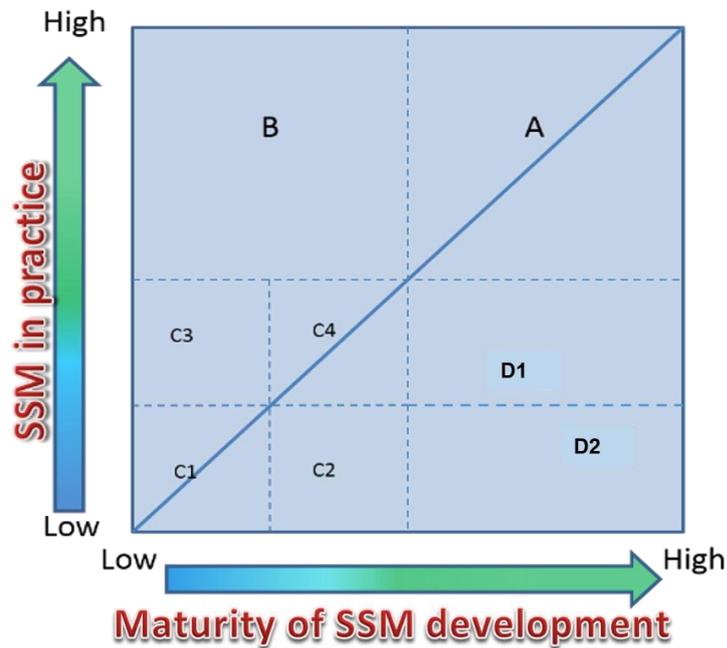
In this section, specific focus will be given to the level of SSM maturity within the four participant companies and how this maturity (or lack thereof) reflects in the strategies and practices of these companies.

5.5.1 The vacant quadrants C and D

Looking at the positioning of the four companies overall, it is worthwhile discussing the two empty quadrants first, i.e. quadrants C and D.

If quadrant C is divided into four quadrants of its own as illustrated below, the expectation from the specific purposive sampling strategy followed, will be that none of the participant companies will fall into quadrant C1, as that will be synchronous with the first stage of the specific purposive sampling strategy, where homogenous sampling was applied, specifically the chosen characteristic of “companies that have progressed the role of SM in their organisations”, as stated in chapter 3. Should any of the participant companies have ended up in quadrant C1, it would have raised questions on the accuracy of the execution of the selected purposive sampling strategy. In terms of the second stage of the sampling strategy followed, where heterogeneous (or maximum variation) sampling with the criteria being the sizes of the companies selected, was executed, the expectation may have been that the smallest company (Company 4) may end up in C2, C3 or C4. So with quadrant C not containing any of the companies, it is indicative that the WA mining industry are well progressed in the area of SSM, irrespective of size, which is a somewhat surprising outcome.

Figure 15 Dividing quadrants C and D further



As for quadrant D, if a company fell within quadrant D1, especially closer to the diagonal line, it would not be cause for any concern. However, if a company was to have been mapped in D2, without proximity to the diagonal, it would have indicated a fairly high level of maturity in terms of having the necessary SM structures in place, but not converting this into a competitive advantage in respect of implementing SSM strategies and approaches, similar to being a highly trained, extremely fit, exceptionally talented athlete but not competing in any events. In the medium to long term this situation will lead to the SM organisation becoming expensive and cumbersome with too many built-in redundancies, without delivering any competitive advantage or business benefits.

5.5.2 Outcomes from the sample group with regards to research question 1

What do the analysis in Section 5.4 represent in terms of a) the WA mining industry's maturity level of SSM development, and b) SSM strategies and approaches in practice?

Outcome 1

These four companies are well progressed towards the adoption of key SSM enablers / organisational structures in terms of human resources, systems (for information, measurement and control) and organisational design. This

assessment is based on the Theme 1 findings which reflect against the key features extracted from extant literature and discussed in Table 5 (Section 3.7.2). Although companies 3 and 4 are still within the medium range of maturity on the conceptual matrix, considering that they were selected under a purposive sampling strategy, overall their maturity in terms of SSM development is at an escalated level.

Outcome 2

The WA mining industry appears to be in fairly good shape as far as applying SSM strategies and practices are concerned. With all of the participant companies falling within quadrants A and B, it is a positive indication that this industry embraces SSM strategies and approaches.

Outcome 3

In general, the companies appear to be more reactive than pro-active with regards to putting the necessary organisational enablers in place *prior to* implementing SSM strategies and approaches. It has to be noted that this study did not investigate whether there are specific benefits or drawbacks to being either reactive or pro-active and no opinion is offered as to which is better, if any one.

Outcome 4

Bigger companies seem to be further advanced along the SSM pathway than small to medium size companies. This outcome is expected as bigger size companies have more resources available to them to actively pursue SSM, as mentioned earlier.

Outcome 5

Examining whether theory 1 (i.e. the level of maturity of SSM lags the implementation of practices) holds true or not: theory 1 holds true for the majority of this sample group, however, the one exception (being Company 2) raises doubt on this theory and it would therefore be sensible to expand the sample group to test this theory more extensively if it is believed to hold significant value.

Outcome 6

Examining whether theory 2 (i.e. does size matter?) holds true or not: it would appear from the outcomes of the sample group that this theory holds

true. However, it must be made clear that this does not imply that companies of all sizes must strive to the highest level of maturity in SSM adoption. As Trent (2007) emphasizes, a capable supply leader / leadership team will recognize that SSM is not for all organisations – the best SM model is the one that fits the business' needs, therefore it will also be the one that takes the size of the company into account.

5.5.3 Conclusion

To encapsulate the above outcomes in answer to research question 1, the SSM practices evident in the WA mining industry reflect an advanced level of maturity in terms of SSM development. Not only have these companies adopted a number of the necessary enablers / organisational structures to support SSM strategies and approaches that will give them competitive advantages, but they are also following through by putting the SSM strategies and approaches in practice and reaping the rewards from leveraging these internally as well as externally through their relationships with their supplier base. The interviewees from the participant companies mentioned varying degrees of positive consequences from strengthening relationships with their supplier base, such as:

- improved knowledge base, skills and expertise
- innovative solutions as a result of emphasising research and development within the relationship
- learning together to support growth, not only in volume, but also in high tech logistical solutions to support export operations
- achieving / benefiting from economies of scale by engaging with globally competitive suppliers

These advantages stem directly from actively pursuing SSM and clearly support Walker's (2005) reasoning for the importance of strengthening and enhancing relationships between mining companies and their suppliers and leveraging the knowledge and expertise within these relationships to encourage new or expanded relationships as discussed in Section 2.3.

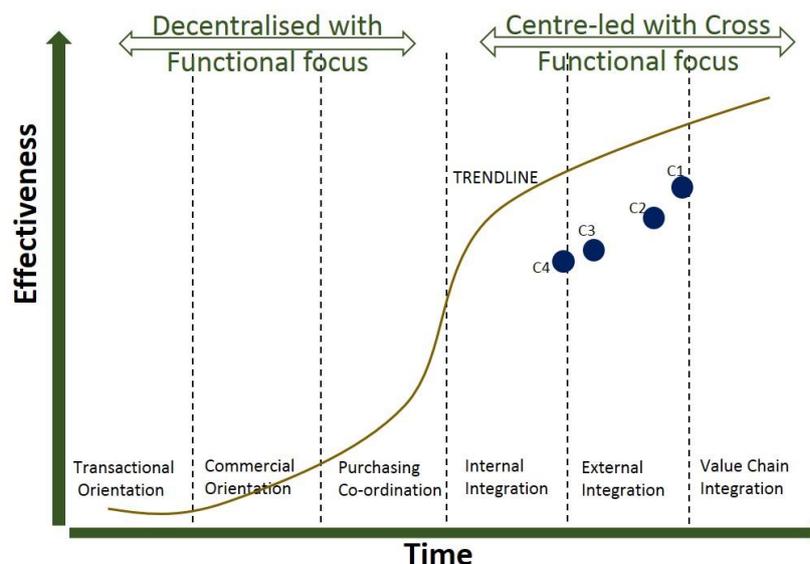
5.6 ADDRESSING RESEARCH QUESTION 2

In this section, the emphasis will be on assessing the alignment of the WA mining industry's strategies and approaches to the existing frameworks and models. This section will specifically focus on the three frameworks/models presented in Chapter 2 and each will be discussed in turn. As described in the research process (Section 3.4), the outcome of the assessments against Themes 1 and 2's key features as extracted during the literature review (i.e. the Themes 1 and 2 finding), provides the basis of how well the SSM practices in the WA mining industry align with these frameworks/models. It should be noted that the data collection did not specifically centre on measuring the individual participant companies' compliance with these frameworks / models, but alignment can be extrapolated based on the assessment of the key SSM features as these are reflected within these frameworks / models. Overall, the participants' alignment, as representative purposive sample of the WA mining industry, was assessed based on the interview responses, the researcher's notes and the key findings as presented in Chapter 4 as well as the analysis in Section 5.4.

5.6.1 Van Weele et al's (1998) Six Stages of Purchasing Development

Looking at the 'Six Stages of Purchasing Development' model simplistically (as reflected in the figure below), all four participant companies exhibit cross-

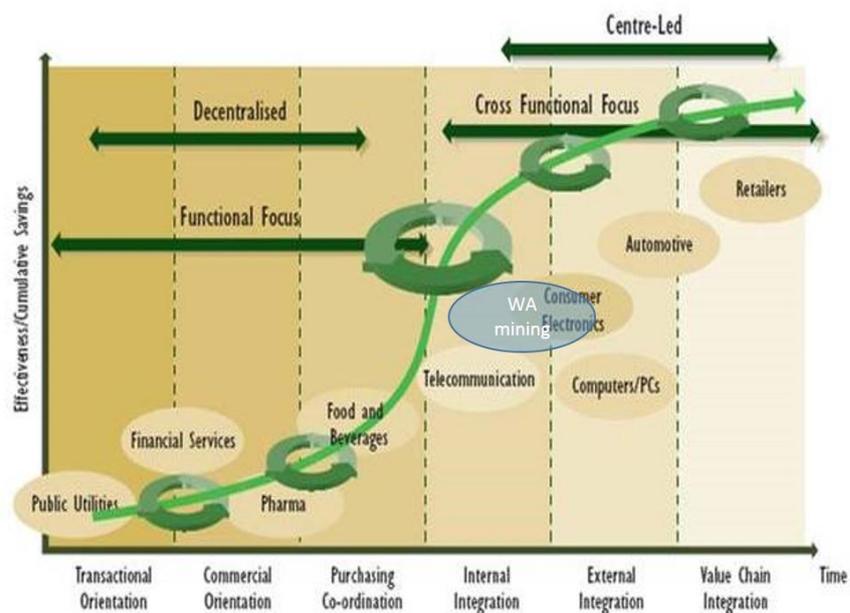
Figure 16 Simplistic view of the Six Stages of Purchasing Development



functional focus extending to limited cross-organisational participation. All have moved beyond 'Purchasing co-ordination' and their approach to SSM

clearly demonstrates both internal and external integration, with companies 1 and 2 showing movement towards 'Value chain integration'. SM initiatives as it relates to progressive strategies are deemed to be top management driven, i.e. displaying 'centre-led' characteristics. Effectiveness in all participant companies are perceived to have increased significantly as they have progressed with SSM activities. Based on this, should the WA mining industry be plotted on Van Weele et al's (1998) model, it seems it would be a fair fit between the telecommunications and consumer electronics industry (as shown in the figure below). One perceived shortcoming of Van Weele et al's (1998) model is that it needs to be extended to incorporate further emerging development stages such as development in cross-organisational practices, although one could argue that value chain integration is an aspect of that.

Figure 17 WA mining industry on Van Weele et al's (1998) six stages model

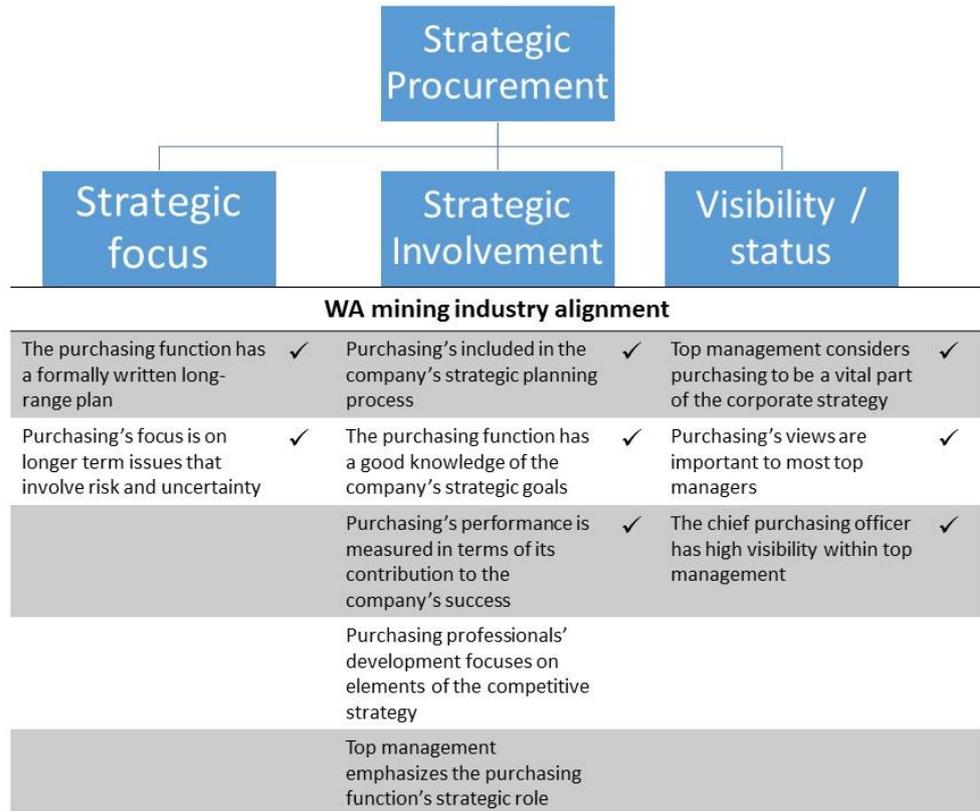


5.6.2 Paulraj et al's (2006) representation of Strategic Procurement levels

To explore alignment with Paulraj et al's (2006) model of Strategic Procurement, the participant companies were assessed against the features described in the model. A positive assessment, i.e. a "✓" was awarded if at least three of the four companies possessed that specific feature characteristic. The result is presented in the figure below. Although it may appear at face value that the WA mining industry has an average alignment with Paulraj et al's (2006) model, it is worthwhile noting that this model

represents level 3 of their model's strategic procurement development stages, which means that the WA mining industry displays some fairly advanced properties of strategic procurement, but on other aspects it seems to still be only at level 2. Thus, it is safe to say that the WA mining industry displays alignment with Paulraj et al's (2006) model, with characteristics from both levels 2 and 3.

Figure 18 WA mining industry and Paulraj et al's (2006) perspective on Strategic Procurement



5.6.3 Trent's (2007) Strategic Supply Management Framework

In terms of assessing alignment of the WA mining industry through the participant companies' responses, Trent's (2007) framework differs somewhat from the other two models discussed above, insofar as Trent provides a framework containing guidelines for companies who aspire to rapidly progress towards SSM by embracing a demanding development process. This framework also influenced the development of the semi-structured interview to a large extent, as it explicitly defines characteristics required to effectively and efficiently progress SSM within a company. Thus, to explore the alignment of the WA mining industry with Trent's framework,

the participant companies' characteristics are compared to those contained in the framework, using a simplified basis for comparison:

E - if a characteristic is well-established in at least three of the four companies, i.e. all the different elements involved are present, an "E" (established) was assigned

D- if a characteristic is developing or established in at least two of the four companies, i.e. some of the different elements involved are present, a "D" (developing) was assigned

L - if a characteristic is not established at all or only present in one of the four companies, i.e. substantially lacking across the four companies, an "L" (lacking) was assigned.

The outcome is presented below. Although Trent (2007) emphasizes that becoming a strategic supply organisation does not happen overnight and that industries pursue SSM at different rates, it does appear as though the participant companies as a whole are not pursuing SSM as rigorously as they could. If meticulous attention were paid to these guidelines, the results may have been considerable better than those achieved even though the participant companies may be satisfied with the benefits they have gained by pursuing SSM.

Table 11 WA mining industry performance against Trent's (2007) guidelines.

SM enablers in the WA mining industry	
Organisational design	D
Supply measurement	D
Information systems	D
Human resources	L
SM strategies and processes in the WA mining industry	
Supply strategy development	E
Strategic outsourcing	E
Longer-term contracting	D
Strategic cost management	E
Supplier evaluation and selection	E
Supplier relationship management	D
Supplier development	L
Supplier quality management	E
Early involvement in process	L
Global sourcing	L
Strategic alliances	L

5.6.4 Conclusion

To summarise the individual comparison to the three existing frameworks / models discussed above:

The WA mining industry does not display aberrant behaviour in terms of existing SSM practices and approaches as represented by existing frameworks / models.

Based on the alignment with the three frameworks / models, the WA mining industry is in the process of developing the necessary strategies and approaches to support and execute SSM successfully. Some of the SSM characteristics displayed by the participant companies are at a very high level of development, while others are still in infant stages.

There is definite room for improvement, not only within the researched industry's adoption of SSM, but also in terms of extending existing frameworks / models to include additional factors that play a role in the development and execution of SSM strategies and approaches. These will be addressed in Chapter 6.

5.7 THE IMPLICATIONS OF THE STUDY FINDINGS IN A CHANGING ENVIRONMENT

As mentioned in Chapter 2, the ultimate role of a company is the engineering of a sustainable position for the company on its supply and value chain, thereby creating opportunities to achieve an acceptable margin or, in other words, to achieve competitive sustainability. As in any competitive arena, it is self-evident that the more mature entity – with maturity relevant to its competitive advantage - will in all likelihood be more capable of adapting to changes in its operational environment. This ability to adapt is also referred to by Azapagic (2004) where he emphasizes that the mining and mineral industry needs to redraw traditional boundaries and explore sustainability issues along its whole supply chain in order to rise to the challenge of sustainable development.

To examine the implication of the study findings in a changing environment, two hypothetical scenarios will be discussed: 1) where the changing environment is reflected by an economic downturn, and 2) where the changing environment is reflected by new trends in SM, e.g. the recent trend of offshoring procurement.

For scenario one: if it is maintained that theory 2 holds true or, in other words, size does matter, it stands to reason that bigger companies will fare better in a changing environment, in the context of SSM the same as with any other business area.

In contrast, smaller companies may be forced to regress to SM practices more focused on their own survival more quickly than their bigger counterparts. This regression may include breaking down its progress in terms of establishing organisational enablers for successful SSM, meaning that when the environment changes for the positive again, these companies will have to start from scratch, especially where they may have severely damaged relationships during the downturn.

It is worthwhile noting that irrespective of size though, companies who have established SSM enablers / structures relating to design, people and systems, should be in a better position to pro-actively manage SM in a down-turning economy due to having established longer term strategies, ongoing improvement actions such as supply base optimisation and strategic supplier alliances, to name a few.

However, in a changing environment as reflected by an economic downturn, this advantage is limited insofar as SSM is concerned: even with SSM being strategically critical to supply chain performance, the old adage of a chain only being as strong as its weakest link still rings true. Thus, although a bigger company may achieve a higher level of maturity in terms of SSM adoption and have many strategies and approaches in place, including expansive collaboration with its suppliers, the value chain will still come under pressure in a down-turning environment and may still give in if the pressure exceeds the strength of the weakest link, which may not be the company itself. On the other hand, bigger companies with a higher level of maturity in its SSM adoption, should overall have a stronger than average supply chain if its SSM strategies and approaches are aligned with its adoption of organisational enablers relating to human resources, systems and design. Therefore, the companies with more mature SSM structure and practices, should, together with its supply chain, be able to withstand more extreme market downturns for longer periods of time.

For scenario two and still maintaining that theory 2 holds true, it again follows that bigger companies will fare better in a changing environment, albeit the offshoring/ hollowing out of procurement. It is posited that the level of maturity has an equally significant influence here in terms of maintaining a sustainable position for the company on its supply chain: without the necessary SM organisational enablers, i.e. the structures in terms of human resources, systems (for information, measurement and control) and design, it will be nigh impossible to ensure consistent supply performance through the company's value chain, agility to adapt to changes in the market arena will be diminished and the very real risk of not being alerted to the aforementioned will increase exponentially.

5.8 CONCLUSION

The outcomes from this research study exhibit elements in line with expectations as well as some elements that were not anticipated. In general it appears as though the WA mining industry is aligned with existing frameworks and models as discussed in Chapter 2, although most of these models do not consider the dimension of size in terms of procurement function development, where this research study suggests that size of

company does play a role in how rapidly SSM is pursued as well as the extent to which it is pursued. Given the level of maturity of SSM adoption in the WA mining industry as inferred from the findings in this study of a sample group, the implications thereof in a changing environment is also briefly addressed.

CHAPTER 6: CONCLUDING COMMENTS AND RECOMMENDATIONS

This purpose of this chapter is to:

- provide a brief summary of this report
- highlight the major conclusions
- point out the contribution this research delivers
- identify limitations regarding this study
- recommend areas of further study relating to this subject

This research study sets out to address the question of what the SSM practices in the WA mining industry are (i.e. the maturity level of SSM development and the reflection of this in practice) and how these practices align with existing frameworks and models. To attain this, the study aims to examine the degree to which SM is regarded as a strategic activity in this industry and to provide guidelines to improve SSM practices and decision-making with reference to these frameworks and models.

After setting specific objectives and framing a research question, a perspective of extant literature relating to SSM and the relevant frameworks and models is provided. During the course of reviewing this literature, three specific models/frameworks are explored in more detail. It becomes apparent that research specific to SM (including SSM) and the mining industry is extremely limited.

Drawing on the extant literature, a conceptual framework is proposed to visually present the degree to which SSM has been adopted against its implementation in practice as well as to allow comparison between companies in terms of their positions relative to each other as well as relative to the ideal position.

In chapter 3, the research approach and design selected are extensively discussed with specific attention being paid to the strategy, the instrument development,

sampling design and subsequent data collection and analysis. To address quality issues regarding this research, Morse et al's (2002) verification strategies, the four common tests (Yin 2009) of construct validity, internal validity, external validity and reliability, as well as Saunders et al's (2009) different forms of bias are discussed. The findings from the interviews with the participant companies are presented in chapter 4, followed by a discussion of these findings in chapter 5. In addition, two theories proposed during the research period, are tested against the findings and the information gleaned from the interviews with conclusions explained. Based on the purposive sample selected, the WA mining industry's alignment with existing models/frameworks are discussed as well as the implications of all the discussed outcomes in a changing environment.

6.1 THE PROPOSED THEORIES

Recapping outcomes 4 and 5 as presented in section 5.5.2:

Theory 1 (i.e. the level of maturity of SSM lags the implementation of practices) could not be conclusively supported by this study. If it is believed that this theory holds significant value, it is suggested that the sample group is expanded to allow additional testing of this theory.

Theory 2, i.e. 'does size matter?' appears to hold true based on the outcomes of this research. Consequently, the two-dimensional matrix/framework needs to be expanded to allow for the dimension of company size to be incorporated. Thus, an expanded three-dimensional framework is proposed to:

- i) visually present the degree to which SSM has been adopted against its implementation in practice, for both the individual company as well as the WA mining industry
- ii) allow comparison between companies in terms of their positions relative to each other as well as relative to the ideal position
- iii) in addition, allow for the size dimension to be presented collectively with the above.

6.1.1 A 3D framework for assessing companies' progress towards SSM

Where this 3D framework is used to map the position of more than one company based on its progress towards SSM – where this progress is assessed by the degree to which SSM has been adopted and its implementation in practice - the framework could provide value to companies in three ways:

- 1) It will enable companies to assess themselves against the ideal path of SSM development, which indicates a balanced, sustainable approach to SSM development. In the 3D framework this is represented by the coloured pyramid shape rather than just a diagonal line as with the 2D framework.
- 2) It will enable companies to compare itself (in terms of SSM development) to other companies mapped, while simultaneously accommodating the impact of size on SSM development.
- 3) It will support comparison between various sets of companies, depending on the objective of the comparison. E.g. cross- or inter-industry comparisons where similar size companies across different industries could be compared; intra-industry comparisons where different size companies within the same industry could be compared or a combination of inter- and intra-industry comparisons.

In contrast to the 2D framework, the expanded framework has an additional axis, representing the size of companies being compared. It is important to note that the method of assessing the size of company could be different between different comparison sets, however, within one comparison exercise, it needs to be analogous and clearly defined prior to mapping. The expanded framework is presented in Figure 19 and

Figure 20.

Figure 19 The axes/dimensions of the framework defined

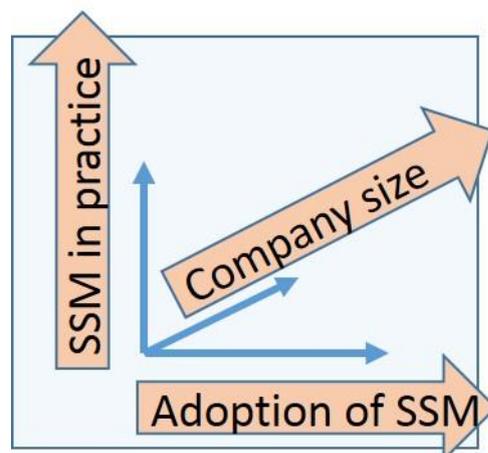
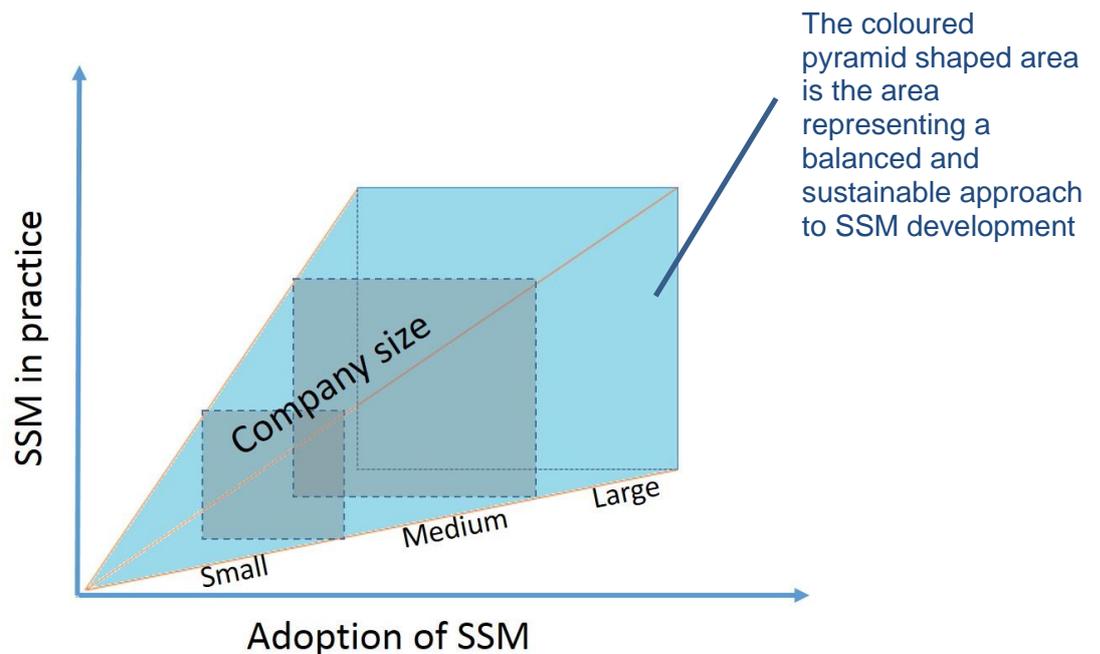


Figure 20 Three-dimensional framework for assessing SSM development



Major conclusions / Implications for industry

- The WA mining industry is well on its way as far as pursuing SSM and its accompanying advantages are concerned. Overall its maturity level of SSM adoption is in the lower to upper medium range.
- It appears that the WA mining industry is not just haphazardly implementing strategies and practices under the banner of SSM, but is approaching it fairly methodically, understanding the importance of having the right structures in terms of people, systems and design in place, although it seems as if it is sometimes a case of being forced to put these in place to be able to support the next phase of SM strategies and approaches.
- The size of a company impacts not only the pace at which it pursues SSM, but also the extent to which it can efficiently adopt SSM enablers, strategies and approaches. A Roll-Royce solution is not always the answer for smaller companies. However, a way to still achieve its optimum in this area is to start

with the right organisational design and the right leadership for the SM organisation as SSM will not happen without the right people. The two-dimensional conceptual framework is expanded to accommodate the size dimension.

- Although the WA mining industry appears aligned with existing models and frameworks, it is still lacking in some areas. Specifically its maturity level of SSM adoption can be improved by paying more attention to the guidelines given by these models/frameworks and by going about pursuing SSM from a more pro-active perspective than re-active.

To conclude, it is clear that no matter which approach a company takes in pursuing SSM, this cannot be driven from the bottom up: if the executive management in the company does not support SSM, efforts to pursue SSM will be weak, cumbersome and will not deliver the value being chased by implementing the SSM strategies and approaches in the first place. It is worthwhile adding that individual companies must determine the best fit for their business and its environment as it relates to setting the company up for SSM, i.e. formal structures and enablers, and implementing strategies and approaches aligned with SSM.

Contribution of this study

This research contributes to the existing body of knowledge by providing insights about the importance that companies in WA mining industry attach to the role of SM in their organisations and how SSM strategies and approaches are reflected in practice.

This research interprets the degree to which SSM characteristics have been adopted in the mining industry and explored the consistency of practices and decision-making within SM. Furthermore, comparisons were made to existing SSM models and frameworks to determine whether these are suitable for the mining industry. There appears to be good alignment overall with the existing models and framework reviewed and it does not appear as though there are unique circumstances to such an extent as to justify other models, new or expanded, just for this industry. However, there is potential for expanded models across the board, which will be addressed under further study recommendations.

Limitations of this study

The following limitations were identified in respect of this research study:

- i) The timeframe of this study was short, thereby enforcing a cross-sectional time horizon or a snap-shot in time. A longitudinal study could potentially have provided more in-depth discussions and conclusions, especially regarding reaction to changing environments.
- ii) Due to the small number of participants, there may be limitations to the generalisability of the findings. A bigger number of participants may have provided additional insights.
- iii) The purposive sampling scheme selected may have imposed unintentional limitations on this research, as potential candidates were identified and selected based on the researcher judgement.
- iv) There are numerous models and frameworks representing development of purchasing / SM. Although some of the models/frameworks revered in this research study, drew on various other models of development, more appropriate models/frameworks for comparison may have been excluded.

Recommended further studies

As mentioned in the limitations above, this research study was based on a snapshot in time, with some interview questions attempting to get answers around longer term sustainability actions. However, there may be a disconnect between perspective on what will happen and actual practices in changing environments.

Recommendation 1:

Further research may be valuable to test the findings of this research over a longer period of time, including if possible, before and after insights regarding changing environments.

Also mentioned in the limitations above, is the small sample size selected. Although appropriate for this research study, a larger sample size may provide additional insights.

Recommendation 2:

Further research may be valuable to test the findings of this research using a larger sample size with multiple participants from varying company sizes.

Alignment of the WA mining industry with existing models and frameworks was acceptable. However, there seems to be potential to develop an expanded SM development model, probably 3-dimensional, that can reflect i) the differences over a time period; and ii) the effect of company size on the level and rate of development.

Recommendation 3:

Opportunities exist to expand on the models and frameworks used in this study to include additional dimensions like time-phased changes and company size influence on SM development

The evolvement of SM to a strategic level has come about due to companies seeking added competitive advantage in this area and extant literature has proven the benefits that can be realised by raising SM strategic importance within companies' supply chain. However, there is limited research on the nature of the relationship between the level of advanced SM or SSM and the benefits realised.

Recommendation 4:

Opportunities exist to explore the relationship between companies' strategicness in their SM area and the benefits realised, e.g. is the relationship direct, parabolic or a combination of direct with definitive limits?

Concluding remark

Making the decision to pursue SSM is no guarantee of success nor of gaining competitive advantage as a result. A meticulous, top management driven approach is called for. Nevertheless, the traditional function of purchasing has come a long way from being the back-office activity it used to be to being strategically critical to businesses' survival and competitiveness.

The outcomes from this research delivered a few surprises, more to do with additional elements not previously considered in the extant literature than a reversal of previous findings, which just goes to show that the contribution of SM to businesses' ongoing evolvement has not reached its full potential yet.

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APPENDIX A – THE STUDY PROTOCOL

Study protocol - SSM practices in the WA mining industry

The purpose of this research protocol is to establish a succinct, quick reference guide for the research study overall. This protocol is a working paper that enables the researcher to quickly and frequently verify that the research is still in line with the study objectives and research question, moving in the right direction to ensure that this will be achieved.

OVERVIEW

Competition, fuelled by globalization and technological advances, has increased exponentially in the last two decades. At the same time, companies are recognising that they can significantly increase strategic benefits by developing their supply management function.

A substantial amount of research has focused on SM as a key contributor to companies' competitive advantage across multiple industries, but few research studies have addressed supply management in the mining industry, from a strategic perspective or otherwise.

There are two distinct schools of thought relating to SSM, one side viewing it as the next step up the ladder of supply management evolution, the other considering strategic practices as a subset of supply management. However, both agree on the characteristics inherent to achieve strategic benefits through more intelligent supply management.

This research will aim to investigate: 1) the degree to which supply management is regarded as a strategic activity in the Western Australian mining industry; and 2) the alignment of practices and decision-making with strategic direction and with existing frameworks/models in supply management.

A case study strategy will be adopted with qualitative data being collated through semi-structured interviews. In addition, a conceptual framework will be used to evaluate the level of congruency between SSM adoption and actual practices and decision-making. Further analysis will compare industry practices to existing models to determine whether these are suitable to the mining industry or whether expansion may be required to suit circumstance unique to this industry.

OBJECTIVES

This research aims to explore the adoption of SM as a strategic discipline in the Western Australian mining industry and the alignment / conformance of the industry's SSM practices to existing models and frameworks. To achieve this, the study should (i) examine the degree to which Supply Management is regarded as a strategic activity in this industry; and (ii) provide guidelines to improve SSM practices and decision-making. This will be addressed through the following question:

What are the SSM practices in the WA mining industry; and how do these practices align with existing frameworks and models?

BACKGROUND

THE EVOLUTION OF SM

Traditionally, the purchasing function was seen as a purely supporting activity in the business organization, fulfilling a passive, administrative role. When Porter identified the power of buyers and suppliers as two of the five critical forces governing industry competition in his influential Five Forces model (Porter 1979), the role of this traditional function heightened in importance and was then referred to as 'Procurement' to encompass the sourcing process from requirement specification through supplier evaluation and selection to the ongoing management of the buyer-supplier relationship.

SM as a discipline was first suggested in 1983, when Kraljic (Kraljic) argued that "purchasing must become supply management". Most companies have come a long way since then, engaging in SM practices like Early Supplier Involvement (Knoppen, Christiaanse and Huysman 2010), Cost Management, Supplier Performance Measurement and Relationship Management to name a few (Cousins 2008; Leenders 2006; Lysons 2006; Monczka 2009; Trent 2007; Keough 1993).

Strategic Supply Management

With the growing recognition of SM's impact on companies' financial performance and on the overall supply chain performance (Burt 2003; Chen, Paulraj and Lado 2004; Day and Lichtenstein 2006; Rajagopal and Bernard 1993), more and more companies are striving to achieve an even higher

level of SM competency, namely SSM. The ultimate role of a company is the engineering of a sustainable position on its supply and value chain, thus providing opportunities for the development of an acceptable margin or profit.

However, there is clearly a divide in schools of thought regarding the concept of SM evolving into SSM. On the one side, there are many authors advocating the concept of SM with specific strategic focus areas only included as a subsection thereof (Burt 2003; Leenders 2006; Lysons 2006; Monczka 2009; Tassabehji and Moorhouse 2008; Cousins 2008). On the other side, there is a group of authors that specifically distinguish between SM and SSM, citing SSM as the next step up the evolution ladder (Chen, Paulraj and Lado 2004; Cousins and Spekman 2003; Cousins 2008; Day and Lichtenstein 2006; Trent 2007; Keough 1993).

Van Weele and Rozemeijer (Van Weele) drew on the work of revered authors such as Reck and Long, Syson, Bhote, Cavinato, Monczka et al to define a six stage purchasing developmental model reflecting a stage-wise development of SM from its traditional function to being integrated into corporate strategy, with a direct relationship to its efficacy.

Similarly, Paulraj et al (Paulraj, Chen and Flynn 2006) identified purchasing within different companies to be “at different stages of strategic development or evolution, with its role ranging from clerical to integrative”.

Trent (Trent) defines SSM as featuring strategies that are “part of a rigorous development process” and presents a framework showing its pre-requisites, objectives and critical enablers with potential performance benefits. As a strategic function, SM participates in a company’s strategic planning process and is regarded as a key decision maker.

Key characteristics of SSM

Irrespective of which school researchers belong to, they are all in agreement that, for SM to contribute on a strategic level, the following is required:

- a central decision-making SM organizational structure;
- a high-profile leader (often called ‘Chief Procurement Officer’ or CPO, to denote a comparable level of importance to the CFO) with general business skills and functional credibility;

- cross-functional and cross-organizational teams of people with appropriate skills and competencies;
- portfolio of supplier relationships and cost analysis; and
- the information technology and performance measurement systems to support decision making on all levels.

SM IN THE MINING INDUSTRY

As mentioned by (Azapagic 2004) “although at the bottom of the supply chain, the mining and minerals sector still has a number of suppliers, including providers of energy, chemicals and other materials.” Azapagic (Azapagic) suggests that the mining and mineral industry need to broaden the traditional system boundaries and consider sustainability issues along the whole supply chain if this sector wants to be able to respond appropriately to the challenge of sustainable development.

Traditionally, supply chain management in the extractive industry (companies that prospect, explore and produce non-regenerative natural resources from the earth (McCracken 2005)) is viewed as being predominantly one-way, i.e. outbound, (Langley 2008) with very little academic research available on SSM in this industry. As reiterated by (Walker 2005):“... there is a relative paucity of studies that explore the backward linkages arising from the mining sector” – ‘backward linkages’ referring to the supply sector of the mining industry.

In his abstract depiction of the mining value chain as mapped to the Porter value chain concept, (Vorster 2001) lists procurement, human resource management, risk management and research and development as supporting activities for the primary mining activities. These activities are essential components of SSM as noted above.

THE LEVEL OF MATURITY OF SSM AND ITS IMPACT ON DECISION-MAKING

When under pressure, most companies look towards SM first for cost savings through reduced prices from suppliers, literally pushing struggling suppliers over the edge, which bears the question: does SSM practices (with longer term planning at its foundation) fly out the window in tough economic

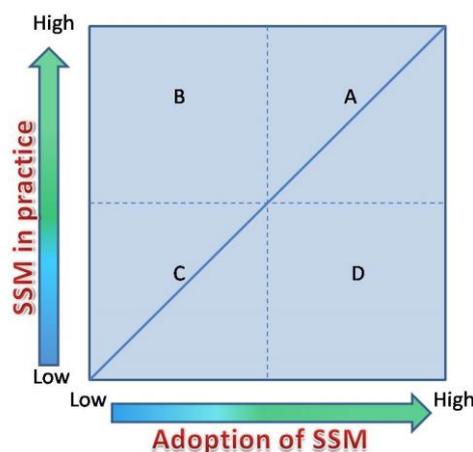
times? More progressive companies realise that this is not the solution. Rather, approaches such as selective price reductions in non-critical categories, collaborative relationships, focusing on mutual longer term value and accelerating reverse flow of market price changes through the supply chain are favoured by these companies (Mackenzie 2010; SCDigest 2009a). These approaches are supported by the SM gurus, who argue that suppliers easily replaced, are not cause for in-depth deliberations and collaborative considerations, but those with long term strategic value definitely are. (Kraljic 1983; Trent 2007)

In conclusion, it is recognized that not all organizations need to evolve this function to the highest development stage. However, the literature suggests that the value to be derived from adopting SSM (in principle *and* practice) are multitude and progressive organizations are breaking new ground and laying new foundations for SM with benefit gains that their competitors should ignore at own peril.

CONCEPTUAL FRAMEWORK

For companies to get the full benefit of transforming their supply organizations into a “powerful, competitive weapon that adds value far beyond cost savings”(Hardt 2007), executives need to take SM to the next level. Drawing on extant literature, the following matrix is proposed to express the degree to which SSM has been adopted in the WA mining industry against the strategicness of practices through changing economic conditions.

Fig. 1: Conceptual matrix



This matrix provides a simple framework for clarifying the relationship between SSM adoption in principle and applying these principles in practice. The horizontal axis represents the degree to which SSM has been adopted in an organization, ranging from low to high, i.e. to what extent has a company adopted the key characteristics of SSM? The vertical axis represents the strategicness of practices / decisions taken, i.e. are SSM approaches consistently applied through changing economic conditions for longer term benefit? The diagonal in the diagram may be seen as a congruency or “practice what you preach” line, where practices / decisions are aligned with the level of SSM adoption.

SIGNIFICANCE

Considering that natural resources are limited, that most supply chains originate in this industry and that SM has gained significant importance in recent years across industries, research specific to SM and the mining industry is extremely limited. This research will contribute by providing new insights about the importance that mining companies in Western Australia attach to the role of SM in their organizations. It will attempt to interpret the degree to which SSM characteristics have been adopted in the mining industry. It will also explore the consistency of practices and decision-making within SM, with specific reference to the mining industry of Western Australia. Furthermore, comparisons will be made to existing SSM models and frameworks to determine whether these are suitable for the mining industry or whether an expanded model is required in order to address the circumstance that may be unique to this industry.

For the mining sector, the research could yield useful insights in respect of role defining for SM and how “walking the talk” of SSM could create value in the longer term.

RESEARCH METHOD

A qualitative approach is proposed as being more appropriate for this research, where qualitative research aims to understand “phenomena in context-specific settings” as opposed to quantitative research which emphasizes facts and causes of behavior while seeking to generalize findings (Golafshani 2003). A positivist paradigm will be applied and the research will include deductive aspects (comparing practice with existing frameworks/models). This will be an explanatory study to establish how closely the degree of SSM adoption matches practical reality of decisions made and a case study strategy will be used (a specific contemporary trend being investigated in real-life context (Saunders 2009)). Three stages have been identified:

Stage 1	Literature review - identify key SSM features from frameworks and models established through literature.
Stage 2	Evaluating secondary data to identify WA mining companies at different stages of adopting SSM, based on above features,

	specifically the position and reporting line of the supply leader in the organisation structure.
Stage 3	Semi-structured interviews with four selected companies - establish level of putting SSM in practice under changing economic conditions. Analyse data and map it on conceptual matrix, noting omissions and duplications.

Sample selection

The Western Australian mining sector was chosen for a combination of reasons.

1. There is a distinct lack of research regarding SM in the mining industry.
2. Choosing a single industry has the advantage of controlling for the multitude of confounding factors that may impact in cross-sectional investigations (Mahama 2006; Walton 1998) such as supply chain positioning, process differences and industry outlook.
3. WA mining is a major contributor to Western Australia's economic performance.
4. This selection is most appropriate considering the time constraints and access requirements.

Furthermore, the sample selection will be non-probabilistic, purposive sampling to ensure inclusion of companies at different stages of SSM adoption.

Instruments

Following the initial identification of candidate companies, these companies will be contacted to establish their willingness to participate. Questions developed during stages 1 and 2 mentioned above will form the basis of semi-structured interviews to be conducted with four willing companies.

Data Collection and analysis

Semi-structured interviews will be conducted with the SM leader(s) in each company. Data collection in the form of intensive note-taking during the interviews will be followed by data transcription and coding (if the latter was not incorporated in the questionnaire) to assist with analysis. The coding will be

used to map the participants' position on the conceptual matrix. Required statistical analysis is not intensive and will be conducted using Excel.

ETHICAL ISSUES

The most prevalent ethical issues likely to arise are confidentiality and anonymity. The most prevalent ethical issues likely to arise here are confidentiality and anonymity. These will be addressed by drawing up a participating company information sheet and distributing these with the aim of obtaining informed consent. Table 2 summarises the information to be included in the information sheet (Saunders 2009).

Table 2: Requirement for an information sheet to participating companies

Research aspect	Detail to be included
Nature of the research	Purpose of the research, the name and background of the researcher and backing institute and some sampling selection details
Participant requirements	Type of data to be collected, instrumentation, time required from participants, targeted individual participant positions and main research target dates
Implication of participation	The voluntary nature of participation, the right to withdraw partially or completely at any time, associated risks and rewards, protection of companies' identity and confidentiality
Data use and publication	Access control, results dissemination, data storage, anonymity and confidentiality assurances during the research and thereafter.
Contact details	Contact person's details for addressing any queries about the research

All data will be anonymised. Though involving humans, this research is considered to be low-risk and as such a Form C application will be made to the ethics coordinator in the School of Information Systems.

FACILITIES AND RESOURCES

No special facilities or resources are required for this research; standard office equipment will suffice.

DATA STORAGE

All data collected during this study will be stored securely (in electronic form) at the School of Information Systems for a period of 12 months from date of thesis publication. Data access will only be allowed for the researcher, her supervisor and members of the Thesis Committee.

INTERVIEW SCHEDULE

Research project: SSM practices in the WA mining industry

Interview schedule for semi-structured interviews with supply leaders of companies.

<u>No</u>	<u>Topic</u> (relates to SSM characteristics)	<u>Theme</u> <u>relevance</u>
	Supply Leadership in company	
1	What are the levels of qualification of the supply leader(s)? And of SM group? (Professional and technical qualifications / Years of experience / Time with company) – Range represented by group: minimum, maximum and average	1
2	What are the reporting line and job title of the supply leader(s)? (Reporting into top/ 2 nd from top/ 3 rd from top/ other levels of organization)	1
	Enablers / Critical success factors / Pre-requisites for SSM	
	<u>Organization design</u>	

<u>No</u>	<u>Topic</u> (relates to SSM characteristics)	<u>Theme</u> <u>relevance</u>
3	Where is supply management positioned? Describe the decision-making style? (Centralised/ de-centralised/ hybrid)	1
4	How is supply management integrated with other business units? (Co-location / cross-functional teams / cross-organizational teams / represented at new initiatives)	2
5	What tools are used for development and succession planning? (Team leader rotation/ mentor program/ leadership development programs/ other)	1&2
	<u>IT support systems</u>	
6	What supply management tools are in place? (CRM, SRM, e-procurement, automated replenishment, supplier collaboration systems, communication and info sharing)	1
	<u>Supply management metrics</u>	
7	Are there standardised processes in place for supplier measurement? Including non-conformance aspects? (Evaluation & selection as well as ongoing performance)	1
8	Are there established metrics for the supply management group's performance? (Internal and external)	1
9	How often do these metrics get reviewed and updated? (Has it changed in the last 2-3 years?)	2
	Strategies and Approaches	
10	Is category (or portfolio) management in place? (Including strategies for different categories) (Across all requirements or not)	2

<u>No</u>	<u>Topic</u> (relates to SSM characteristics)	<u>Theme</u> <u>relevance</u>
11	Percentage (value to business) of supply requirements under longer-term contracting, i.e. 2+ years? Percentage (value to business) of outsourcing in last 5 years?	2
12	Does the formal supply strategy support global supply? (Affecting which categories)	2
13	Has the company gone through a supply base optimization exercise in the last five years?	2
14	Does the supply management group practise cost management where applicable? (Work intensively / collaborative with relevant suppliers to drive costs out)	2
15	With recent GFC, what were the first actions / areas addressed to ensure company's sustainability?	2
	Other comments / notes	

INITIAL REPORT FRAMEWORK

Chapter 1 - Introduction:

- Background
- Aims of study
- Research question
- Conceptual framework
- Method and approach
- Limitations
- Definition of key terms
- Outline of thesis

Chapter 2 - Context for story

- Literature review

Chapter 3 - Methodology

- Qualitative method
- Research process
- Research design
 - Sampling
 - Data collection
 - Interview questions
 - Interview process
- Data analysis
- Trustworthiness and validity

Chapter 4 - Findings

Chapter 5 - Discussion

Chapter 6 - Conclusion and recommendations

- Major conclusions
- Recommendations
- Implications for practice