

# Should Cost Reviews and Supply Chain Integration:

A case study at ASSA ABLOY Entrance Systems



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## Abstract

**Title:** Should Cost Reviews and Supply Chain Integration: A Case Study at ASSA ABLOY Entrance Systems

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**Problem Discussion:** Competition in the global economy has lead companies to seek different ways to remain competitive and profitable. Growth though mergers and acquisitions and global sourcing are alternatives available to organizations to promote growth and reduce costs. The case study organization has chosen both methods as part of their business strategy. In addition the firm has recently implemented a strategic cost management program known as *should-cost*. This cost reduction method has received little attention in academic studies in general, and specifically, in regards to its relationship with the current concepts of supply chain integration. Furthermore it is considered whether this cost reduction program, in addition to its primary purpose as a cost savings tool, could promote integration and if so can the insights gained from the study be used to improve the should-cost program to further develop the integration process?

**Purpose:** An exploration of the relationship between the strategic cost management program, known as should-cost, and supply chain integration is one aim of this study. Achieving this goal helps fill a gap in the relevant academic literature. An additional goal is to demonstrate how should-cost can promote integration within a firm. The final aspiration of this study is to use the results of the study to further develop should-cost not only as a strategic cost reduction method but also as an aid to integration.

**Method and Limits:** This is an exploratory study and common with this type of research the case study method was chosen. Given the deductive nature of the paper a review of the relevant literature was the starting point of the project. From there data was gathered from multiple sources at the subject firm. The primary sources of data were interviews, documents and archival artifacts, and participant observation. This data was then analyzed in order to

explore the issues raised in the problem discussion. The main limitation of this study is that interviews were primarily conducted with management personnel and not the purchasing staff.

**Conclusion:**

Should-cost was found to aid internal integration. In particular, by developing the knowledge and skills of the purchasing personal it was found to increase functional coordination and improve communication between functional groups. Additionally, by raising the knowledge and skills of the purchasing staff, should-cost promotes integration by raising the strategic value of the purchasing function. Although not a stated purpose of this study, should-cost, by revealing potential suppliers for improved relations via supplier development, aids external integration.

**Keywords:**

Should-cost, Supply chain integration, Internal integration, Strategic cost management, Purchasing portfolio models

## List of Abbreviations

<b>Abbreviation</b>	<b>Definition</b>
AA	ASSA ABLOY
AAES	ASSA ABLOY Entrance Systems
ABC	Activity Based Costing
BBP	Better Buying Power Initiative
DOD	Department of Defense (USA)
EBIT	Earnings Before Interest and Taxes
EMEA	Emerging Markets, Europe and Africa
FF	Components and Hardware Division
FPI	Fixed Price Incentive
GAO	Government Accounting Office (USA)
HPDS	High Performance Door Solutions
IDDS	Industrial Door and Docking Solutions
M&A	Mergers and Acquisitions
NAICS	North American Industry Classification System
P/SM	Purchasing/ Supply Management
PDS	Pedestrian Door Solutions Division
R&D	Research and Development
RBV	Resource Based View of the Firm
RFQ	Request for Quotation
SC	Should-Cost
SCA	Should-Cost Analysis
SCI	Supply Chain Integration
SCM	Supply Chain Management
SCR	Should-Cost Reviews
SG&A	Salaries, General and Administrative Expenses
TCO	Total Cost of Ownership
USAF	United States Air Force
VA/VE	Value Analysis/ Value Engineering

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## 1.0 Introduction

### 1.1 Background

With the challenges of competing in the global economy, many corporate executives are considering their strategic alternatives. Whether it is achieving growth through mergers and acquisitions, identifying a financial partner, or divesting a business, the ability to create, enhance, or preserve value is critical (Van De Blunt, 2014). Acquisitions, as a strategic alternative, are used by firms seeking to grow either domestically, internationally or both.

Whether local or global there are numerous reasons as to why an organization may want to acquire a company. Gaughan (2011) finds that growth is frequently cited as one of the most fundamental motives for a merger or acquisition (M&A). Organizations seeking to expand are presented with the options of promoting growth organically or via M&A. To grow through M&A allows a company to grow more rapidly but this also implies greater risk for the organization. A firm may wish to grow vertically which typically involves the purchase of a firm that is a supplier to the acquiring firm. Alternately a firm may acquire another firm in order to fill in gaps in their product line, to add complementary products, or to add customers in new markets. This type of merger is referred to as a horizontal merger (Gaughan, 2011).

In terms of international growth a firm with a successful product mix in one national market may see a cross-border deal as a way of achieving greater revenues and profits. The typical rationale for a cross-border acquisition is that it enables the acquirer to utilize the country-specific knowledge of the target which included its indigenous staff and distribution network (Gaughan, 2011).

Coupled with the opportunity for increased growth is the potential for increased revenue through synergies. In terms of M&A's, synergy suggests that the sum of the parts of the two organizations will be greater than what they would be if they remained separate entities. Typically there are two forms a synergy created from an acquisition: operating and financial synergy. Operating synergy is comprised of revenue enhancements and cost reductions. Financial synergy occurs when the cost of capital is lowered for the combined firms (Gaughan, 2011).



M&A strategists tend to look for cost-reducing synergies as the main source of operating synergies when considering a possible deal. Typically, cost reduction may be due to economies of scale, where decreases in per-unit costs are the result of a company's growth in the size or scale of its operations. Additional cost reductions from M&A can be captured by eliminating redundancies, improving efficiencies and balance sheet improvements such as; reducing working capital, fixed assets, and borrowing or funding costs (Gaughan, 2011).

However, there is another source of cost synergies that has been overlooked. This can be found in the area of supply chain network integration as part of the post-acquisition consolidation process. Langabeer and Seifert (2003) found not only that supply chain effectiveness drives the financial results but that supply chain integration is essential to post-merger success. The authors also suggest that early integration of supply chain management in the process can improve the outcome of the merger. However, Langabeer and Seifert (2003) do not provide suggestions as to how managers are to implement supply chain integration in the newly combined firms.

In addition, to using acquisitions to remain competitive and grow profits, corporation have looked to global sourcing as a strategic alternative (Gelderman and Semeijn, (2006). The catalyst for global sourcing has been competitive pressure internationally which has forced firms to improve quality and responsiveness (Birou and Fawcett, 1993). Globalization is dramatically changing interactions among the world's economies through increasing interdependencies (Monczka et al., 2009). Globalization in developing economies such as China and India represents opportunities for cost savings on the buying side and new markets on the selling side. On the selling side more prosperous consumers are demanding brands that reflect higher status or affluence. On the supply side, the cost/price benefits associated with sourcing in developing countries are a significant motivation for remaining competitive in an increasingly globalized world (Monczka et al., 2009). However, in order for a firm to do this and compete globally, it has been found, that having a world-class global supply base is a necessity (Hanfield and Nichols, 2004). How to source globally has become a key concern amongst companies considering this option (Gelderman and Semeijn, (2006).

Global sourcing is defined as the integration and coordination of purchasing units across a firm's worldwide locations, looking for common items, processes, design, technologies, knowledge and suppliers ( Rozemeijer, 2000), (Monczka and Trent, 1991); (Faes et al., 2000). It has been noted

by Gelderman and Semeijn (2006) that firms have found it difficult and challenging to master the integration and coordination not only across business units but also within the units as well. Furthermore Gelderman and Semeijn (2006) indicate that despite the increased focus on global sourcing, little is known about the actual integration of purchasing across worldwide business units.

## 1.2 Problem Discussion

One company that has used M&A as a growth strategy is the Swedish manufacturing firm ASSA ABLOY. ASSA ABLOY is the world's leading lock manufacturer by sales and has grown from a company with 4700 employees in 1994 to a worldwide organization with over 43,000 employees. This growth has been achieved in part due to the company's aggressive acquisition strategy with over 100 acquisitions in the last 7 years since the CEO, Johan Molin took charge. Company revenues have almost doubled over this time period to an estimated 147bn SEK (7,2bn\$) in 2013. The economist, citing a report by Morgan Stanley analysts, claims that 91 percent of the firm's revenue growth in the last decade has been due to acquisitions (Milne, 2013).

The firm's CEO has noted that these acquisitions were necessary for several reasons. The first reason is that they allow the company to compete at a lower cost in developing markets. Furthermore, they have permitted the firm expand in certain countries where it is deemed necessary to have a local presence to stay in touch with the norms and tastes of the consumers in those markets. In addition, access to new technology has been cited as an important reason since locks are increasing becoming more electronic in nature (Milne, 2013).

In addition to increasing revenues through acquisitions the firm has also been pursuing consolidation and cost efficiency strategies in order to improve the bottom line. A new restructuring program was launched in the fourth quarter of 2013. The restructuring program is a result of the firm's active global acquisition. ASSA ABLOY is moving from manufacturing everything itself to concentrating efficient assembly plants in high-cost area and transferring production to low-cost countries and sourcing more non-critical products. Today fifty three percent of products are manufactured in low-cost countries, compared with forty four percent five years ago (ASSA ABLOY Year-end Report, 2013).

Furthermore the firm has ongoing cost reductions programs such as; VA/VE, Lean projects and IT improvements.<sup>1</sup> These programs have proven to be very successful, resulting in considerable savings and increased efficiency in the group's production units (ASSA ABLOY Webpage, 2014).

Recently, in the sourcing/purchasing area, a comprehensive supply management project for raw materials and components is in progress. The firm feels that this area is becoming increasingly important due to portions of component supply being outsourced to external suppliers in low-cost countries. These activities are occurring simultaneously with the company's desire to exploit the potential economies of scale available from continuous M&A asset growth. This project for improving the efficiency in the sourcing/purchasing area is based upon a strategic cost management process known as "should-cost" analysis (ASSA ABLOY Webpage, 2014).

Ellram (2002) defines, Should-cost analysis as a cost management approach where the buying organization determines what a product, service, or piece of equipment should cost. This is determined by looking at the elements that make up the cost of that purchase, and adding a reasonable margin for profit, administrative expenses, and reinvestment into the business. This becomes a benchmark for whether a supplier quotation/bid is reasonable.

Supply chain performance has been identified as a critical driver of overall firm performance (Carr and Pearson, 2002). Many scholars cite supply chain integration as a key factor in improved supply chain performance. For example, Lee (2000) states that a truly integrated supply chain does not only reduce costs but that it also creates value for the company, its supply chain partners and its shareholders. Another stated benefit is that it allows companies to design products faster, with higher qualities and lower costs compared to companies whose supply chains are less integrated (Ajmera and Cook, 2009).

Furthermore, and as stated earlier, it has been noted that supply chain integration is essential to post-merger success (Langabeer and Seifert, 2003). However, the study by Langabeer and Seifert (2003) merely demonstrated empirically that there was a positive link between supply chain

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<sup>1</sup> ASSA ABLOY defines VA /VE as a methodology that serves to maximize product value by reviewing how product functionality can be fulfilled at the least possible cost. VA is short for value analysis and involves looking at an existing part and assessing areas where costs can be reduced or value can be added without sacrificing quality or functionality. VE stands for value engineering and is essentially the same process but applied to new product prior to being launched.

integration and post- M&A success and provides little specifics as to how these companies achieved integration.

In addition global sourcing has become a strategic growth strategy for firms operating internationally and real global sourcing requires the integration of procurement requirements worldwide business units (Gelderman and Semeijn, (2006); ( Rozemeijer, 2000), (Monczka and Trent, 1991); (Faes et al., 2000). However, little is known about the actual integration of purchasing across worldwide business units (Gelderman and Semeijn, (2006). This exposes gaps in existing literature in regards to the role integration plays in firms, post acquisition, and its role in the strategic growth strategy of global sourcing. In addition, it appears that there has been little academic research regarding the strategic cost method, should-cost.

With the growing importance of supply chain management, purchasing has been found to have an increasingly key strategic role and has evolved from an obscure buying function into a strategic business unit (Ellram and Carr, 1994). In addition, the purchasing/sourcing function has been found to be instrumental in promoting cross-functional integration among supply chain activities and that purchasing takes a key role between external suppliers and internal organizational customers in the value creation process (Carter and Narssimham, (1996);Novak and Simco, (1991).

### 1.3 Purpose

This paper will be a case study of an exploratory nature with several issues to examine and develop. One expected contribution is to gain insight and augment the limited research regarding should-cost analysis in the commercial sector. The more specific goal, in an academic context, is to examine the relationship between should-cost and supply chain integration in a firm that is not only seeks to grow via acquisition but through increased use of global sourcing. These factors lead to the first academic question:

***How does a strategic cost management program, (should-cost), aid integration in a corporation seeking growth and cost reductions via acquisitions and global sourcing?***

The second question is related to the original question and seeks to address not only academic but also practical concerns:

***If the should-cost program is found to promote integration can the program be improved, based on the factors revealed in the study, to further promote integration within a firm?***

## 2. Literature Review

### 2.1 Should Cost Analysis

The review contains a summary of the development of should-cost reviews in the U.S. military as well as its uses and applications in the commercial sector. Previous academic research on the subject is rather limited with the preponderance of literature devoted to procurement cost analysis methods such as Total Cost of Ownership (TCO) and Activity Based Costing (ABC). Here should-cost analysis or reviews are mentioned only briefly or treated as variation of the other methods (Sower and Sower, 2009). The majority of the literature regarding should-cost comes either from studies conducted by various branches of the U.S. military regarding past should-cost reviews or comes from civilian consulting studies done on behalf of the U.S. Department of Defense (DOD) (Boito et al., 2012).

However, there is some relevant academic research regarding should-cost and its relevance to private and publically traded corporations. The first part of this review will look at the experience of the U.S. military with should-cost reviews. The second will examine academic and consulting studies of its application in the commercial sector. The third and final section will provide a summary of the best practices and suggestions for successful implementation and development of should-cost reviews from both the military and private sectors (Boito et al., 2012).

#### 2.1.1 Should Cost and the U.S. Military

The U.S. military has long been plagued with issues of cost growth in their major weapons systems acquisition programs and in general high costs of equipment purchased. Should-cost reviews were one of the ways the military attempted to get a handle on the cost involved in these development programs. The U.S Department of Defense describes should-cost analysis as a specialized form of cost analysis which is used to support contract negotiations and focuses on the elimination of contractor inefficiencies (Boito et al.,2012).

The principles underlying Should Cost were used by the Air Force in the early 1960s, but should-cost, as it is now known, did not emerge until 1967 when a forty person team spent five months reviewing cost growth in a jet engine project. Here the air force developed a procedure to determine what a system ought to cost, assuming reasonably attainable economy and efficiency

in the contractor's operation. It differs from traditional pricing methods in two ways: the depth of analysis and the purposeful challenging of inefficiencies in the contractor's operation. Raymond E. Harris, Chief of Pricing, Procurement Policy Division, Army Material Command, offers a more concise definition:

“Should Cost” describes a coordinated analysis of a contractor's business management, cost estimating, and production engineering procedures in connection with the evaluation of a major non-competitive proposal. This approach assumes that the inefficiencies associated with non-competitive procurement may be identified through the coordinated effort of a government cost estimating business management and production engineering evaluation team, and that the cost impact of these inefficiencies may be eliminated during contract negotiations (Harris, 1970).

The main objective is to provide the government with a more supportable negotiation position. Procurement personnel in the military professed that the benefits of the method extend beyond the primary purpose. In addition to the short-term benefit of better pricing of current projects, there is the long-term benefit of more efficient contractor performance on future projects. Furthermore, it was felt that some of the techniques should-cost could be used to strengthen the more traditional methods of cost analysis and provide a stronger base for detailed analysis over the entire cost evaluation spectrum (Burt, 1972).

Boito et al. (2012) cite a DOD report that stated that prior to should-cost analysis (SCA) the general method used throughout the armed forces was to use historical costs as the basis for contract negotiations. In addition the report noted that a contract situation requiring should-cost reviews were rare and if they were needed a team was created for that purpose and dissolved after the review was conducted. The primary arguments against should-cost reviews were the large amount of time and data required to conduct them (Boito et al., 2012).

A recent study by the Rand Corporation provides an excellent review of the U.S. military, and in particular the air branch (USAF) of the U.S. military, experience with should-cost. This study reviewed DOD literature regarding the use of should cost from 1970 to 1988 and conducted interviews with current and past air force personnel involved in should-cost reviews. One stated purpose of the study was to examine whether should-cost reviews actually saved money compared to other procurement methods. In addition the report provided suggestions to improve the use of these reviews based on past successes and failures.

In regards to savings the review focused on three studies conducted in the 1970s and early 80s. Here Rand notes that the studies found that none of the various methods of contract pricing and negotiation in the USAF achieved better results than the others. From these three studies Boito et al. (2012) note that only one case found any cost savings during a should-cost review and the other 2 had inconclusive results and lacked statistical significance due to the small sample sizes. Unfortunately, with regards to the first case, Boito et al. (2012) were unable to determine if the savings found in the first review were passed onto the U.S. Government.

However the Rand study suggests the lack of success with should-cost reviews has more to do with the politics of the procurement process than the efficiency of the reviews. They cite quotations from A. Ernest Fitzgerald who was Air Force Deputy for Management Systems and the owner of a consulting firm that conducted should cost analyses prior to joining the air force. Fitzgerald writes in his book that finding place to save money was never the problem but the problem was getting anyone to act and turn the findings into savings. The Rand report, citing Fitzgerald, claimed that the military's early approaches to should-cost were subjective, qualitative reviews that saved little money. Furthermore even when potential savings were found they were rarely realized because they were not negotiated or given back to the contract in later contract re-reviews (Boito et al., 2012).

In recent years, in the United States there has been renewed interest in controlling government spending and the military has come under great pressure to reduce costs. Should-cost reviews are again drawing attention in the military as a potential weapon to bring spending costs under control. The military's response was to launch a new program called the Better Buying Power initiative (BBP). Launched in 2010, BBP encompasses a set of fundamental acquisition principles to achieve greater efficiencies through affordability, cost control, elimination of unproductive processes and bureaucracy, and promotion of competition. BBP initiatives also incentivize productivity and innovation in industry and Government, and improve tradecraft in the acquisition of services (Department of Defense, 2012).

The U.S. Under Secretary of Defense (Acquisition, Technology and Logistics), Aston B. Carter believes that the use of should-cost management is one of the most powerful of the initiatives proposed by the Better Buying Power program. However, Carter is quick to explain that the should-cost program will be different from the past programs in the armed forces. While the old



method focused only on a program that was entering production the new approach should be used throughout the program life cycle. The new program will have particular focuses on up-front planning and exploring engineering changes to ensure successful outcomes at every milestone. This will be accomplished by creating cost conscious technical and schedule baselines, identifying cost saving engineering trade-offs and then aggressively managing areas identified for cost savings. The final outcome will be that efficiencies can be gained throughout the program (Department of Defense, 2012).

As was pointed out in the Rand report the DOD has had rather mixed, if not poor results, with should-cost in the past. So how can anyone believe that they will lead to different results this time around? Both the Rand Corporation, and the consulting group, A.T. Kearney, propose that it may be different this time around. They point out that that the Dr. Carter has required that should-cost targets will be required on all programs of a certain rating and that the reviews will be conducted at key milestones in the life of a project. In addition, Carter, A.T. Kearney and Rand believe that real cost reductions can occur if the people involved in the process to challenge the status quo and the traditional ways of doing business and all three provide concrete suggestions as to how to implement and drive successful should-cost initiatives. However, before these guidelines are examined the focus of the paper will now examine academic reviews of should-cost programs in the commercial sector and see how corporations have used the method in their strategic cost management programs (Boito et al., 2012), (Department of Defense, 2012), (Garber and Willen, 2011).

### 2.1.2 Academic reviews of should-cost applications in private industry

As stated in the introduction the academic literature on should-cost reviews is limited and inconsistent in definition and form. For example, Monczka et al. (2009) refer to it as an external cost approach called reverse price analysis. This method, as opposed to the method used by the U.S. military, is a top down approach to analyzing a supplier's cost structure. The method suggested by Monczka et al. (2009) proposes examining financial documents pertaining to the supplier to estimate their cost structure and breaking down the price into its components of material, labor, overhead and profit. If detailed financial information is lacking for a supplier then a should-cost model based on industry averages can serve as a proxy for the more detailed analysis (Monczka et al., 2009).

However, the definition and research developed by Ellram, (2002) is more in line with the version of should-cost analysis which is the subject of this research. In this form an organization tries to determine what a purchase should cost by looking at the elements that make up the cost of the purchase and then add a reasonable margin for profit, SG&A and reinvestment into their business. This is generally accomplished by developing a model which estimates cost inputs through a combination of historical and theoretical costs. Historical costs can be market based costs such as; raw material prices or actual cost detail provided by a supplier or suppliers in a RFQ form or during the bidding process. These costs are then supplemented by a theoretical cost evaluation which builds up the cost of a process from the ground up. For example, if a machine is used in the manufacture of a component then the model will require such details as, the cost of the machine, type of financing for the purchase, annual depreciation, space occupied by the machine, number of people using the machine, work time per part, and set up costs. Ideally, the user tries to estimate all the costs involved in the process if they were to make to product themselves (Ellram, 2002).

Ellram's study examined best practices in strategic cost management at five large manufacturing companies whose purchasing organizations were described as being centralized or a mix of centralized or decentralized. The purpose of this study was an exploratory study into the strategic cost methods used by these firms and should-cost was one of the methods that all five used in some form. The study illustrates that SCA can be used to support a variety of purchasing decisions from new product development to equipment and commodity purchases. Furthermore the study revealed a richness and diversity in regards to manner in which these firms applied SC methods in practice (Ellram, 2002).

Ellram found that firms cited four broad reasons for using SCA. The first was to facilitate improvements in a variety of, and sometimes overlapping, areas:

- New product development.
- Identification of areas for cost reduction.
- To support and improve ongoing supply chain cost management programs.
- Development of purchasing to a more professional function.

The second reason was to gain greater understanding of:

- The impact of the design changes.

- The nature of supplier costs.
- How to manage the suppliers profit in relation to target margins.
- Their relationship with international suppliers.
- How SCR can work with target costing.
- The nature of overall cost issues.

The third was to develop greater supplier cooperation and involvement.

The last was to support the evaluation of:

- The validity of cost saving claims.
- The overall performance of the purchasing and supply management function (PSM).
- Net present value (NPV) analysis of new equipment purchases.
- Bids submitted by suppliers.
- The overall competitive bidding process.
- The development and determination of the business models required profit.

The SCR's were generally not used alone, but used to authenticate bids, e-auctions, and target costing. Target costing is an approach where the organization gathers internal and market data regarding what a customer will reasonably pay for a product or service offering with specific features and functions. In addition, SCR were cross-functional in nature. The SCR models typically were developed by the purchasing and finance departments with other departments like, R&D, marketing and logistics included when warranted by the type of purchase. In one case company, a large maker of computer chips, suppliers were involved in the process and developed their own SC model in order to work together with the chip maker to understand and recognize differences in approaches and assumptions (Ellram, 2002).

### 2.1.3 Consultants, the U.S. military and the new should-cost approach

The renewed interest in SCR in the military is described as a method to break the status quo in the "will cost" procurement process. The typical procurement process here starts with an estimate that builds upon past performance data to create an estimate of what a future program or purchase will cost. The main problem with this approach is not in the type of estimation process but with the use of historical costs as the starting point (Garber and Willen, 2011).

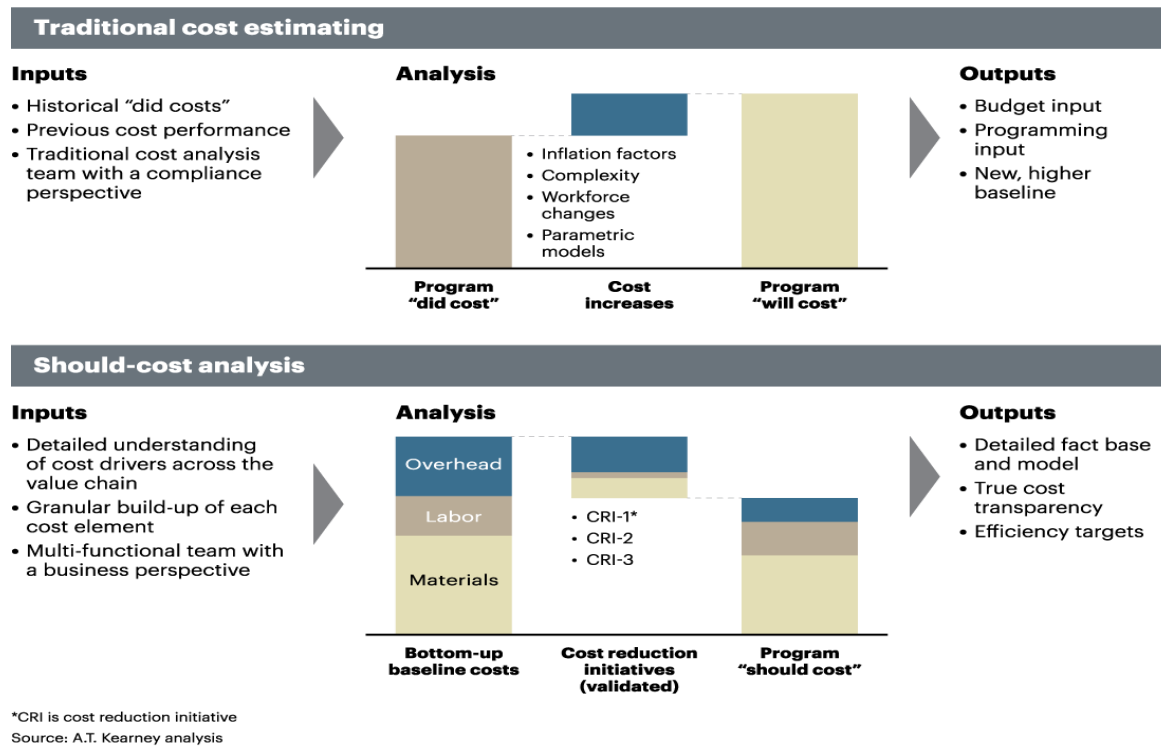
The historical cost becomes a floor where costs only increase and a self fulfilling prophecy of budget inflation is created. The new should-cost champions see the historical cost as the ceiling where costs are contained and reduced. The new estimate is based on the identification of productivity improvements and other cost efficiencies exposed during the application of SCR's.

Figure 1, created by the consulting firm A.T. Kearney helps illustrate the difference between the two approaches and how SCA can break the status quo and achieve real cost reductions and not just a reduction in the amount of an increase (Garber and Willen, 2011).

Figure 1 Should Cost vs. Traditional Cost Estimation

Figure 1

**A should-cost review breaks the cycle of historical-based cost estimates**



From their experience from conducting SCR’s in both the private and defense sector, A.T. Kearney, states that SCR’s offers several key advantages over traditional cost estimation practices. They are:

- SC provides an understanding of both “cost to produce” and “over-specification” cost reduction opportunities.
- Delivers the cost details to support fact-based negotiations.
- Sets the foundation for implementable cost reduction.
- Limits future design changes via reusable designs.
- Assesses the true impact of program decisions and trade-offs.

In regards to implementing a should-cost program these three key takeaways from the commercial and military sectors are put forward:

First, SCR's are a multi-functional process. The should-cost team is not just a business function where purchasing and finance personnel are the main members. Other members such as engineering, R&D, and marketing should be included depending on the type of purchase (Boito et al., 2012). From the perspective of the military the should-cost team's objective is not to further refine an estimate, but to examine the technical and institutional assumptions and make purposeful changes to reduce costs. Therefore to be successful, a review team must have engineers and technical experts who can determine where changes in the design and manufacturing processes can be made. In addition personnel from finance and purchasing are to be involved in order to turn the process changes into actual cost savings in the negotiation phase of a supplier's contract (Department of Defense, 2012).

The Rand study also points out that in addition to possible cost savings the multi-functional teams also promote better understanding and communication between the functions. A typical complaint found in the study was that functional groups involved in the development of weapon systems often felt that the other groups lacked understanding of their group's motivation and contribution to the program. One suggestion to address this problem was to develop training programs with different members of key functional areas involved in development process. In these training sessions each group is to explain what their information needs are and how the other groups can help to improve their work. The ultimate goal being that all members of the review teams have a greater understanding of the needs and contributions of their colleagues from different functional areas (Boito et al., 2012).

In the commercial sector, the Ellram (2002) study found that cross-function teams were crucial in new product design at the Deere Company. The philosophy at Deere was that early involvement of different functions and critical suppliers in the formulation of target costing is essential. At Deere should-cost analysis is used to support the target costing process and is often the first step in that process. Both the should-cost and target costing processes were found to be a team effort. Typically a design engineer will check the design cost based upon the should-cost estimate which was created by cost management specialists within the purchasing function. The result is then compared to the suppliers quote and if the quote does not match the design group's

estimate then the quote is compared to the should-cost estimate. Deere then uses the should-cost information to determine whether the cost gap is due to design or supply cost issues. This is an iterative process where design and material changes are made till an agreement is reached and the target cost is reached (Ellram, 2002).

The second suggestion is to prioritize efforts. With unlimited resources SCR's objective is to scrutinize every element of a purchase or program cost. However, since very organization, even government backed ones, do not have unlimited resources several options were presented to prioritize the types of purchases subject to SCR's. The military suggests creating a Pareto chart of a program or organizations cost drivers as one way of prioritizing SCR's. The Rand report cites the use of purchasing portfolio models as alternative and more sophisticated way a determining which components could be eligible for a should-cost review.

Kraljic (1983) developed the first comprehensive portfolio model for use in purchasing and supply management and is widely deployed in business and has been extensively researched (Knight et al., 2013). Kraljic, using a 2 x 2 matrix, classifies purchases based on two dimensions; external and internal. The external dimension involves factors relating to suppliers and the market in which they operate. The internal dimension concerns the importance and profit impact of a given product in relation to the firm. Each dimension is to be assessed against a number of variables and categorized into the four parts of the matrix based on the type of purchase type (Knight et al., 2013). Depending on its location within the matrix a different type of purchasing strategy was recommended (Kraljic, 1983). There are multiple versions of the model that have been proposed by scholars over the years which suggest different factors and variables to use for the two dimensions of the matrix (Knight et al., 2013).

The Boito et al. (2012) study, for the Rand Corporation, recommends the purchasing portfolio model developed by Olsen and Ellram (1997). Olsen and Ellram (1997) suggest that it is the nature of the relationship with a company's supplier that should determine the type of cost analysis used by the purchasing personnel. Here a conceptual framework was developed for determining which cost analysis method was appropriate. In this framework purchases are classified along two dimensions: (1) whether they are ongoing or one time and (2) whether the relationship desired with the supplier is an arm's length one or a strategic alliance. The result is a matrix of four types of purchases. Purchases that are one time, repetitive, but of a low-monetary

value, and that the buyer wishes to maintain at arm's length are labeled "low impact". However, continuous purchases and an arm's length relationship are deemed "leverage purchases". Where the buyer wishes to have a strategic alliance involving a onetime purchase the purchases are labeled "critical projects". Finally, for continuous purchases where a strategic alliance is desired are called "strategic purchases". Ellram, (1996) finds that should-cost analysis is appropriate for purchases of the leverage type.

The third suggestion is to establish an enterprise wide cost database. One recommendation the Rand Corporation study derived from its review of commercial firms' use of SCR's was the creation and maintenance of a corporate-level knowledge database that can be used for contract negotiations. Here they found that the industry best practice was to assign certain staff members, whose job description and performance appraisal, was based on maintaining and updating the database (Boito et al., 2012).

#### **2.1.4 Alternative Forms of Should-Cost**

During the course of the literature review it was noted that SC analysis has different forms and that the different forms can be used to support or augment the other versions of should-cost. Two alternate approaches were found in the literature

Monczka et al. (2009) suggest that a firms specific cost structures can be obtained from their financial data. Income statements can provide a reliable estimate of the firms cost of good, SG&A and profit margins. However, this does not give much information regarding cost breakdown based on product cost or product line. Furthermore this type of analysis is difficult for privately held firms since their financials are not easily obtainable.

An alternative to evaluating cost structure can be accomplished by using should- cost review at the industry level. Sower and Sower (2011) developed a version of industry cost analysis that utilizes data from a variety of public sources to determine direct labor, direct material, variable costs, SG&A and profit margins to evaluate the reasonableness of a supplier's price. The process suggested by Sower and Sower (2011) follows closely a method formulated by Monczka et al. (2009). The starting point for both is approaches is to find the most current information for revenue, direct labor and direct materials cost for the industry in question. Both authors are located in the United States and their analysis is based on U.S. manufacturing firms. An easily

accessible source of this kind of information can be obtained from the U.S. Census Bureau's Annual survey of Manufactures. This survey is an extensive review of industries, classified using the North American Industry Classification System (NAICS), and geographic locations, balance sheet and income statements, and other sources of information.

The North American Industry Classification System or NAICS is used by business and government to classify business establishments according to type of economic activity (process of production) in Canada, Mexico, and the United States of America. The NAICS numbering system employs six-digit code at the most detailed industry level. The first five digits are generally (although not always strictly) the same in all three countries. The first two digits designate the largest business sector, the third digit designates the subsector, the fourth digit designates the industry group, the fifth digit designates the NAICS industries, and the sixth digit designates the national industries. For example:

**31-33** denote *Manufacturing firms*

**331**- Firms in *Primary Metal Manufacturing*.

**3312** - Firms in *Steel Product Manufacturing from Purchased Steel*.

**33121** Firms in *Iron and Steel Pipe and Tube Manufacturing from purchased steel.(Canada, Mexico, U.S.A.)*

**331210** Firms in *Iron and Steel Pipe and Tube Manufacturing from purchased steel (U.S. Firms)*.

Using the suppliers NAICS code it is then possible to retrieve the information for the total annual revenue, total materials and total labor for the industry which best defines their structure. This material is then supplemented by information regarding cost of goods sold (COGS), SG&A, and profit margins from a secondary source such as; Morningstar, Bloomberg or DataStream. With the details of the cost structure retrieved from various sources the amount for manufacturing overhead can be found by subtracting the cost of material and labor from the census information from the COGS level. The balance is the amount allocated for overhead.

With the elements assembled the purchaser now has a cost breakdown for the industry in which their supplier operates. These industry-specific models are often adequate as a means to develop



expectations for reverse auctions, budgetary planning, preparation for price negotiations, and for estimating new or redesigned product costs.

## 2.2 Supply Chain Integration

The concepts of supply chain management (SCM) supply chain integration, (SCI) have been highly researched topics over the last 20 years (Leuschner et al., 2012). SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers (CSCMP Glossary of Terms 2014). The Council of Supply Chain Professionals sees supply chain integration as a process that links major business functions and processes within and across companies into a cohesive and high-performing business model.

### 2.2.1 Internal Supply Chain Integration

The integration construct been used to study a number of different organizational phenomena, and it has been defined in a number of different, albeit interrelated ways. Additionally, many authors who have studied integration offer no formal definition of the construct (Pagell, 2004). Monczka et al. (2009) offer the following definition of integration:

“integration is the process of incorporating or bringing together different groups, functions, or organizations, either formally or informally, physically or by information technology, to work jointly and often concurrently on a common business-related assignment or purpose.”

Integration has generally been studied at two different levels of analysis: external and internal. External integration examines integration that occurs between organizations. Internal integration examines integration across various parts of a single organization (Pagell, 2004). Much of the body of SCM and logistics research has examined internal inter-function integration. In these studies the focus has been on the interaction and collaboration between different departments (Chen et al., 2009).

Pagell 2004 notes that at the strategic level of analysis, fit or alignment has long been linked to competitive advantage. He cites Hayes and Wheelwright (1984) who posited that a business strategy needs to be supported by various functional level strategies that are internally consistent. Each function needs to be strategically integrated into the whole for a firm to be competitive.

Furthermore, according to Pagell, it is this theoretical model underlies much of the strategic research that has been done in the operations and supply chain fields.

Using this model as a starting point later research explored this relationship between integration and firm functions. These studies typically studied dyadic functional relationships and integration. For example, Hayes and Wheelright (1984) explored the role of integration between the research and development (R&D) and manufacturing and its impact on new product development. Here Pagell, 2004 notes that this study focused on the processes used to create new products, often with an emphasis on moving from a traditional “functional silos” approach to a more coordinated or concurrent approach. Chen et al, 2007, examine how the internal integration of the logistics and marketing functions affects firm performance. Other studies have looked at how relationship between human resources and manufacturing can affect firm performance (Youndt et al. 1996), (Pagell et al. 2000).

Internal integration is often an essential first step in the supply chain integration process (Rosenzweig et al. 2003). That is not to say external integration is not as important as internal integration. However, Stevens, (1989) found that internal integration is the stage that occurs just prior to the point when firms can integrate effectively with suppliers and customers. He further emphasized that true supply chain integration includes both upstream and downstream players but it is internal integration that provides the foundation for both. However, as Rodrigues et al. (2004) note internal and external integration are distinct but closely related concepts and it is beneficial to study both when exploring the issue of supply chain integration.

### 2.2.2 External Supply Chain Integration

External integration refers to integration that occurring between organizations typically between key customers and suppliers (Braunscheidel et al. (2010). Frohlich and Westbrook, (2001) found that the need for firms to integrate their operations with customers and suppliers had gained wide acceptance in academic and commercial practice. However, what remained unclear was whether it was more important to link with suppliers, customers or both? Furthermore, did increasing the level of integration between suppliers and customers lead to improved operations performance?

Using the choice of customers or suppliers as key dimensions in strategic positioning of a firms supply chain the authors use an arc to graphically demonstrate whether a firm is more customer

or supplier leaning. Here the greater the width of the arc the greater the degree of integration. As illustrated in figure 3, firms implicitly make strategic decisions in regards to the extent of upstream and downstream integration they should pursue (Frohlich and Westbrook, 2001).

Here the authors, using a large sample of global firms, found that those firms with the widest arcs of integration towards both customers and suppliers also had the highest levels of firm performance. Those firms with the narrowest arc were associated with the lowest levels of performance.

Figure 2 Arcs of Integration: Frohlich and Westbrook (2001)

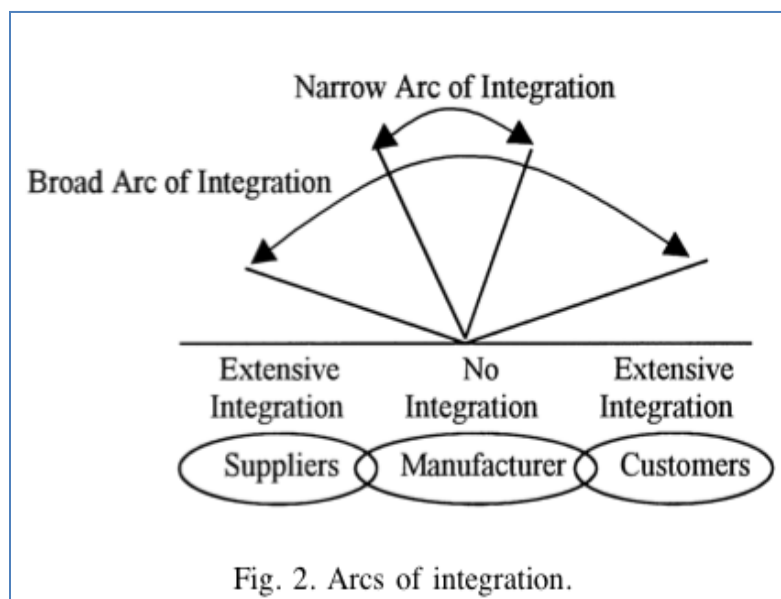


Fig. 2. Arcs of integration.

An interesting result from the study was that firms who adopted either a supplier or customer focused integration strategy gained very little advantage over the firms who chose to remain internally focused. Here the weak links in the supply chain either between the customer or supplier seemed to reduce overall firm performance (Frohlich and Westbrook, 2001).

### 2.2.3 Culture and Supply Chain Integration

Braunscheidel et al. (2010) note that the Frohlich and Westbrook (2001) study raised an intriguing issue: why did the vast majority of the firms in the study have such modest levels of integration in either direction when the evidence had demonstrated that the firms with the widest

integration arcs had demonstrated higher performance? Braunscheidel et al. (2010) contend that corporate culture may have an effect on both internal and external supply chain integration.

Using the competing values framework, Braunscheidel et al. (2010) assessed organization culture along four dimensions; clan, adhocracy, market, and hierarchy. The clan culture is internally focused and flexible in regards to corporate structure. Here the organization uses cohesion and employee morale as a means to further human resource development within the firm. The adhocracy culture is also flexible in structure but has a more external focus. This type of culture aspires to grow and acquire resources via flexibility and readiness. The market culture is an external focused organization but its structural focus is on stability and control. This culture wants to achieve productivity and efficiency through planning and goal setting. The final group, hierarchy culture, is typically internally focused and has a structure that emphasizes stability and control. The key to establish this stability and control is through effective communication and information management. An important fact regarding the competing values framework is that the model describes organizational forms that are modal and firms a cultural type is not mutually exclusive but may contain elements of all the categories (Braunscheidel et al., 2010).

This study provides evidence that culture is an underlying factor in the relationships between integration and performance. Here they demonstrate that culture is connected in regards to both internal and external integration and that previous efforts to integrate by firms may have been less successful due to this cultural aspect. In particular their findings provided evidence that firms that were typified as having adhocracy culture were positively associated with external integration and hierarchical cultures have a negative association with both internal and external integration efforts. On a more general level the study provided further evidence to support the contention of Stevens (1989) that internal integration is a necessary step before a firm can integrate with its suppliers and customers (Braunscheidel et al., 2010).

#### 2.3.4 Criticism of Supply Chain Integration

In supply chain management literature the belief that more supply chain integration will lead to better performance has become conventional wisdom (Bagchi et al., 2005). Bundled this convention comes the prescription that more supply chain integration is better (Fabbe-Costes and

Jahre, 2008). However, not all researchers agree with these concepts and have noted that actual supply chain integration is more rhetoric than reality (Bagchi et al., 2005). For example Näslund and Hulthen (2012) find that supply chain integration has not been examined empirically beyond the dyadic level in great detail. In addition there is an absence of empirical evidence to support the claimed benefits of supply chain management integration. Bagchi et al. (2005) find, in contradiction to convention wisdom, that long-term relationships with suppliers may in fact harm firm performance.

Fabbe-Costes and Jahre (2008) find that more supply chain integration does not always improve performance. This finding was based in part on the lack of common definitions and measures of supply chain integration and performance which make it difficult to support the mantra that “more is better”. This is supported by Näslund and Hulthen (2012) who find that there is significant confusion as to the definition of supply chain integration and propose a unifying definition. In addition to a lack of common definitions there is also a lack of detailed frameworks and concrete recommendations for how supply chains become more integrated. For these reasons and others it has been suggested that both researchers and managers be more cautious concerning supply chain integration and its impact on performance and be conscious of the limitations of prior research (Fabbe-Costes and Jahre, 2008).

## 3.0 Research Methodology

### 3.1 Research Approach

Since the purpose of this paper is to examine the question of how a strategic cost management (should-cost) program can aid internal integration and consolidation in a corporation after a period of high M&A activity. This paper is of a deductive nature as it starts with the general information on the theory behind should-cost and supply chain integration and to what extent they are related. Saunders, et al. (2012) define a research approach as deductive when it analyzes existing views from different fields and tries to clarify the interrelation between them. Here the purpose is to explore the relation between should-cost analysis and integration in a firm that has sought growth via M&A and global sourcing.

### 3.2 Research method

The research method will be a multi-method qualitative study. Qualitative research is an interpretive philosophy where the researchers try to make sense of the socially constructed meanings expressed about the phenomenon being studied (Saunders, et al., 2012). It is often referred to as naturalistic since researchers need to operate within a natural setting or research context, in order to establish trust, participation, access to meanings and in-depth understanding (Saunders, et al., 2012). Yin, (1989) finds that qualitative methods are appropriate with a deductive approach when the purpose is to test an existing theoretical perspective.

This method was deemed appropriate since the author wishes to explore how the implementation of the should-cost program by management at AA is perceived by the employees involved in the program and how this new program could possibly enable or hinder integration within the firm. The hope here is that by being present at the organization and interacting with the staff at AA the study can gain greater insight and meaning of this largely under researched topic.

### 3.3 Research Strategy

The research method chosen was that of an exploratory case study. This method was chosen since this method typically is used when related to questions of “how” or “why” (Yin, 1989). Furthermore, Yin finds that case studies, in particular have a distinct advantage when a “how” or “why” question is being asked about a contemporary set of events, over which the researcher has

little or no control. The researcher hopes to gain more insight into how the should-cost program at AA relates to the broader concept of supply chain integration? How the employees see the new cost program as it relates to their roles as purchasers within the firm? How do personal from other functions such as production and R&D feel about the tool and the training program? In addition the author hopes to gain insight into managerial decision making. For example, why did the company feel it was necessary to implement a cost-reduction program now? Further, why was the should-cost program chosen as opposed to other costing methods?

A more technical definition of a case study is that it an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1989). This will be a single case study with in the Entrance Systems Division of the Assa Abloy Corporation. According to Saunders et al, (2012) a single case strategy is often used when the subject represents a critical case or alternatively, an extreme or unique case. Given the lack of research regarding should-cost reviews in commercial organizations and, in particular, those seeking growth via M&A and global sourcing it is believed that the subject in question meets the definition of being a unique subject.

### 3.4. Literature Review

The first part of the working process for this thesis contains the literature review and the development of conceptual framework. Saunders et al. (2012) find that deductive theory generation starts with a review of academic literature. The literature review starts with an examination of should-cost reviews and models (given the authors limited knowledge of the subject) and evolves to examine its relationship with supply chain integration. As the exploration of the subject progressed it was noted that should-cost had elements that could be related to supply chain integration. This lead to a need for greater knowledge regarding supply chain integration and review of surveys on the subject was started. From the survey literature the elements regarding integration, both external and internal, corporate culture, and the purchasing function were explored further based on later data gathering.

## 3.5 Data Collection

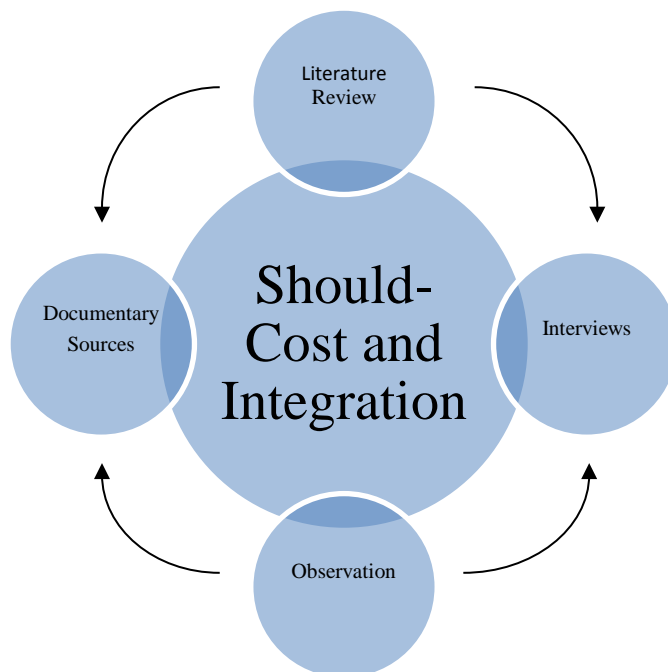
### 3.5.1 Triangulation of Data Sources

Triangulation refers to the use of different data collection methods within a study in order to ensure the data are telling you what you think they are telling you (Saunders, et al., 2012). Yin (1989) finds that the use of multiple data sources helps deal with the problems of validity and reliability in case study research and are essential parts of the data collection process. The data collected will be derived from primary and secondary sources. Yin (1989, cites six primary types of data sources or evidence, as he refers to them, for case studies. These sources are: documentation, archival records, interviews, direct observations, participant observation, and physical artifacts.

### 3.5.2 Data Sources

For this study, documentation and archival records, interviews, and participant observation were the primary sources of data used in order to gain greater understanding of the relations between should-cost and supply chain integration.

Figure 3 the process of data gathering at ASSA ABLOY





### 3.5.2.1 Documentation and archival records

These types of data have already been collected for some other purpose and are known as secondary data (Saunders, et al., 2012). There are many sources for this type of data but typically they come from: organizational databases, corporate communications, corporate annual reports, newspapers, magazines, websites etc. Archival records typically are: service records, organizational records, maps and charts, list, survey data, personal records (Yin, 1989). For purposes of this paper most sources were from AA's webpage, annual reports, corporate emails and magazines, training workshop material, and web based financial information.

With regards to emails the author was given of list of the employees, who had recently completed training on the should-cost model, and the process was initiated via email. The list was comprised of employees in all units based in all geographic locations. Emails were sent to all personnel on the list with a general introduction explaining who the author was and the purpose of the study. In general, the author asked the respondents to provide feedback on the recent training session, their thoughts on should cost model, suggestions on how to improve the model, and purchasing methods in general.

Financial documentation was used in the development of a secondary form of should-cost called industry level should-cost. The information for this portion of the project was derived from multiple sources. The United States Census bureau was the source for industry costs such as material and labor costs for manufacturing firm operating in the United States. Addition financial data was taken from private sources, primarily S&P Capital IQ and Bizstats. The other forms of documentation were used to either support or contradict views expressed in other the other forms of data or to, in a descriptive manner, better illustrate the functionality of the organization and its processes.

### 3.5.2.2 Interviews

Interviewing, perhaps, is one of the most used methods in social science research. Interviewing can be seen as the methods of maintaining and producing conversations with people on a specific range of topics from which social scientists make interpretation from this data. Interviews are

used because of the rich insights they yield regarding people's biographies, experiences, opinions, values, aspirations, attitudes and feelings. (May, 2011).

The two main types of qualitative interviews are the unstructured interview and the semi-structured interview. With an unstructured interview the researcher uses a small set of written prompts to deal with a certain range of topics or topic. The interviewee is allowed to freely answer with the researcher following up with questions where it is felt warranted (Bryman 2012). May (2011) feels, that it is the open ended character of unstructured interviewing that is the main difference between the two methods. This allows the method to not only challenge the preconceptions that the researcher may bring to the interview, but also enables the interviewee to answer questions with their own frame of reference. However, this does not mean that the researcher does not have an objective when conducting the interview but, the person being interviewed is given latitude to talk freely about the subject. It is believed that through flexibility and the discovery of meaning, as opposed to standardization, that allows genuine access to the views of those being interviewed.

As a general rule, unstructured interviews are useful for exploratory investigations of new topics and ideas, or when the topic under study is not well known or understood. The idea is to allow informants to express themselves freely, with minimal control imposed by the interviewer, in order to gain the most information possible (International Training Center for Health (ITCH), 2008). Interviews were conducted either in-person or by telephone with senior management, sourcing, R&D and production managers.

Several reasons existed for selecting unstructured interviews. First, the author did not have an understanding of the culture that exists at AA and wished to gain greater knowledge in this area. It was felt that open ended questions would place the respondents in a more relaxed and trusting state. Thereby allowing them to describe themselves, their role in the organization and their thoughts on the purchasing and should cost in their own way with little guidance from the author. Here the hope was to allow the subjects to speak at their own pace and move the discussion to areas that interested them and perhaps shed light on other areas to examine.

Second, the authors thoughts on the subject were evolving and the interviews gave the author the opportunity to explore and test some initial ideas that were formulated during the literature

review. It was hoped that unstructured interviews could give greater insight into the relationship between should-cost and integration. The hope was that initial theories would be confirmed and possibly expanded upon. If these theories proved insufficient then perhaps new topic areas would be revealed in the process and explored in the future via additional interviews.

A third and final reason was that in the early stages it was not clear where the study would progress and if other types of data collection would be required. The interviews could suggest areas of exploration that would be better developed through more structured interviews or perhaps a survey.

In the present case study, emails were sent to the purchasing managers for the four divisions with the same introduction described earlier and an additional request for a phone interview to discuss the should-cost program and their roles within the organization. Three of the four managers were interviewed however only two of the manager's employees had received the training. Personnel from production and design were also contacted and interviews were arranged with a member from each function respectively. Additional interviews were conducted based on the feedback received from the emails and initial interviews. In particular the subject of sourcing in China was a common topic amongst the respondents and therefore additional interviews were sought with sourcing members with experience working in China.

### 3.5.2.3 Participant Observation

Participant Observation is a qualitative method where the emphasis is on discovering the meanings that people attach to their actions (Saunders, et al., 2012). According to Saunders et al. (2012) there are four types of participant observation: complete participant, *complete observer*, *observer-as-participant*, and *participant-as-observer*. The *complete participant* is where the researcher is attempting to become a member of the group and they do not reveal their true purposes to the group. The *complete observer*, like the *complete participant*, does not reveal their intentions to those being observed but does not try to engage in the activities of the group. The *observer-as-participant* role is one where the researchers' role is known to the group and their role is primarily observational. With the last group, the *participant-as-observer*, the researchers' role is again known and they also participate in the actions of the group.

The researcher in this paper assumed both the role as *observer-as-participant* and *participant-as-observer*. The researcher was employed by the case firm to work on the costing model and his role and purpose was made clear to all employees in the relevant portion of the firm.

Furthermore, as the case study progressed the researcher was privileged to be part of general meetings regarding the deployment of the should-cost model and his opinions and suggestions were routinely solicited by others present at the meetings. In addition the author had the opportunity to participate in a should-cost training workshop and plant tour at the AAES component and hardware subsidiary, located in the Netherlands. This training allowed the author see in person how the model and the staff being trained to use the model gained insights into the production process and how it relates to other functions in the organization.

### 3.6 Case Studies and Research Quality

Yin, (1989) believes that research design is supposed to represent a logical set of statements and that quality of such a design can be judged according to certain logical tests. Here the author suggests four tests that are prominent in case study research. They are: *construct validity*, *internal validity*, *external validity* and *reliability*.

*Construct validity* refers to the process of establishing correct operational measures for the concepts being studied. Yin (1989) describes three tactics for increasing construct validity. The first is to use multiple sources of evidence, in a way that encourages convergent lines of inquiry. Next, the researched should establish a chain of evidence. The idea here is that an outside observer should be able to follow the derivation of any evidence from initial research questions to the final conclusions of the case study. The last tactic is to have a draft of the case study reviewed by key informants and participants in the case. The study was received and reviewed by the author's handler at AA and his comments were noted and changes were made where warranted.

*Internal validity* is used with explanatory or casual studies and not for descriptive or exploratory studies and entails the establishment of a causal relationship, whereby certain conditions are shown to lead to other conditions. The goal here is to avoid spurious relationships (Yin, 1989). Since this is an exploratory case study this issue is not an issue.

*External validity* deals with the problem of whether the case study's findings are generalizable beyond the immediate study. Yin (1989) provided the assertion, regarding a single case study that external validity could be achieved from theoretical relationships and from these generalizations could be made. In order to test whether the observations and conclusions reached in this paper were generalizable to other corporate environments interviews were conducted with people with experience in the area of purchasing, and sourcing in multinational firms

Reliability, according to Yin, is where it can be demonstrated that the operations of a study can be repeated with the same results. Here the emphasis is on doing the same case over again, not on replicating the results of one case by doing another case study. The suggestions provided by him are to use a case study protocol and to develop a case study data base. A case study protocol is a formal document capturing the entire set of procedures involved in the collection of data for a case study. A case study base is simply organizing and warehousing all the case study data in a single location (Yin, 1989). Both of these suggestions were followed by the author.

### **3.7 The data gathering process at ASSA ABLOY Entrance Systems**

During the initial meetings with the author's supervisor at AA a preliminary interview list was developed. It was suggested since the program was in the early phases and training courses had not been given throughout the entire organization that the interview process should start with those employees who had completed the training program. The training programs initially started with the purchasing/sourcing functions staff. However this was later expanded to include employees from production engineering and product engineering.

The entrance systems organization is comprised of four key functional units which operate primarily in Europe, North America and Asia:

1. Pedestrian door solutions (PDS)
2. Industrial door and docking solutions (IDDS)
3. High performance door solutions (HPDS)
4. Components and Hardware (FF)

After the first group of emails was sent to the purchasing staff, additional emails were sent to the purchasing managers for the four divisions with the same induction and a request for a phone interview to discuss the should-cost program and their roles within the organization. Three of the

four managers were interviewed however only two of the manager's employees had received the training. Personnel from production and design were also contacted and interviews were arranged with a member from each function respectively. Additional interviews were conducted based on the feedback received from the emails and initial interviews. In particular the subject of sourcing in China was common topic amongst the respondents and therefore additional interviews were sought with sourcing members with experience working in China.

In addition to emails and interviews the author was given an office at AAES corporate office in Landskrona, Sweden. The office was located in a portion of the building that was once commonly referred to as the purchasing corridor. However, now the mix of personnel was equally divided between sourcing, engineering and research and development functions. From this position the author was able to gain access to vast array of employees with differing perspectives on the organization and sourcing. This location within the corporate offices allowed the author to be present at several meetings regarding the development of the should-cost model. Here the author was not an observer, but given his background in finance, was able to participate and contribute to the discussion regarding a version of SCA that focuses more on an individual suppliers financial condition referred to in the organization as "top down" should-cost.

Towards the later stages of the study the author was invited to be a participant in a should-cost and VA/VE training class at ASSA ABLOY's component and hardware manufacturing division facility located in the Netherlands. This division is new addition to the company and was acquired in 2011 (ASSA ABLOY Website, 2014) The division is a unique division within the organization due to the fact that it not only supplies component parts to the other divisions within the AA parent organization but also sells components to AA's competitors. In addition to participating in the training course the author was also given a tour of the manufacturing facilities and was able to interview additional sourcing staff.

In order to validate the data gathered over the course of the study interviews were conducted with two individuals who have extensive experience and knowledge regarding the issues affecting multinational firms and global sourcing.

## 4.0 Empirical Research

### 4.1 Case Description-ASSA ABLOY and the Entrance Systems division

ASSA ABLOY is the largest global supplier of intelligent locks and security solutions. Its products account for more than one in ten of all lock and security installations worldwide. Since its formation in 1994, ASSA ABLOY has grown from a regional company into an international group with around 43,000 employees, sales of about SEK 48 billion and own operations in over 70 countries (Assa Abloy Webpage, 2014).

ASSA ABLOY is divided into three regional and two global divisions. The regional divisions, Americas, EMEA (Emerging Markets, Europe & Africa) and Asia Pacific, manufacture and sell mechanical and electromechanical locks, digital door locks, cylinders and security doors adapted to the local market's standards and security requirements. The global divisions, Global Technologies and Entrance Systems, manufacture and sell electronic access control, identification products and entrance automation on the global market (Assa Abloy Webpage, 2014).

The Entrance Systems division is a global leader in entrance automation products, components and service. The product range includes automatic swing, sliding and revolving doors, air curtains, gate automation, garage doors, high-performance doors, industrial doors, docking solutions and hangar doors. The division has sales companies in 30 countries and distributors in 60 countries. The entrance system division has 8,200 employees' worldwide and manufacturing facilities in Europe, North America, Asia and Oceania. This division provides a wide number of products and services to customers in more than 100 countries and accounts for approximately a quarter of the larger groups' profit. (Assa Abloy Webpage, 2014). The entrance systems organization is comprised of four key functional units which operate primarily in Europe, North America and Asia:

1. Pedestrian door solutions (PDS)
2. Industrial door and docking solutions (IDDS)
3. High performance door solutions (HPDS)

#### 4. Components and Hardware (FF)

##### **4.2 The should-cost program at ASSA ABLOY Entrance Systems**

ASSA ABLOY is currently implementing the should-cost program in its entrance systems division (AAES). The program is in the initial phase at AAES where a model has been developed and training seminars have begun in the sub-units of the division. The model is still in the developmental phase and the company is in the process of evaluating the model by creating a larger database for production processes and streamlining the model for ease of usage. Here the purpose is to simplify the benchmarking and evaluation of quotations for the strategic purchasers in the company with special emphasis on: production process cost evaluation, quotation benchmarking and quotation template specialization. Once the model is model has been optimized it is the desire of management to implement its usage throughout the organizations regional and global units (Manager E, personal interview, January 31 2014).

The author, after interviews with, the VA/VE Manager, and the Global Sourcing Manager, was hired to help in the development of the should-cost program. Initially, the author was to conduct interviews with the sourcing personnel that would be working with the model and who had recently completed training on the model. The project leaders hoped to gain feedback on what the users liked and disliked about the model and how the model could be improved or simplified if necessary. Having little knowledge of should-cost methods the author was taken through a brief overview of the model and a simplified version of the training given to the companies employees.

During the course of the interviews the Global Sourcing Manager explained the rationale behind creating the should-cost program. He detailed two primary motivations behind the program. The first was that the company felt that throughout the organization, and China in particular, that the methods of cost estimation insufficient and may not be giving an accurate reflection of the true cost of the parts purchased from their suppliers. Expanding on this point he then described the typical methodology used by purchasing sourcing people within the organization (Manager D, personal interview, January, 31 2013).



*“Typically within the company and even more so in China the method used was to take three or four quotes from different suppliers and take the lowest price without examining the quotes in any great detail”* (Manager D, personal interview, January, 31 2013).

According to Manager D this tended to be problematic for several reasons: First, the organization had limited understanding as to whether the prices quoted were really the lowest and what was their relationship with the true cost of the part., Second, by choosing the supplier based solely on the lowest price there was a tendency, by the supplier, after a short period had expired, to return to AAES and ask for a price increase. This put the company in the position of either breaking the original contract and granting the supplier a price increase or searching for a new supplier. For these reasons it was felt by management at AAES and the parent company they needed to be more professional in its sourcing function (Manager D, personal interview, January, 31 2013).

The second reason proffered by Manager D was that the company wanted to develop a closer relationship between purchasing/sourcing and research and development in regards to the design of new products. According to him much of the cost of a product is set when the development process starts and the sourcing people need to have the knowledge of cost drivers in the design process in order to question decisions made by the engineers and designers. It was felt that the sourcing personnel lacked the knowledge of materials and processes to question the decisions made by the R&D personnel. It was further believed that if the sourcing employees had a better understanding of cost drivers that this could help avoid the over specification of materials and processes in design process. This in turn would help reduce the cost and increase the speed in bringing new products to the market (Manger D, personal interview, January, 31 2014).

After an internal meeting with key management personnel from the key divisions and parent company it was felt that a should-cost program, in conjunction with other cost initiatives such as VA/VE and LEAN, was a possible solution. It was felt that should-cost would lead to a more fact based sourcing methodology where cost drivers could be identified and a benchmarking process could be developed with cost targets based on best practices of their suppliers (Manager D, personal interview, January, 31 2014).

### 4.3 The ASSA ABLOY Should-Cost model in detail

The should-cost methodology was described in generic form in the literature review however it is felt that a more detailed description of the actual process used is necessary for the edification of the reader as to how the model works and how it relates to the broader concept of integration and supply chain management. As provided in the introduction, Ellram (2002) defines, Should-cost analysis as a cost management approach where the buying organization determines what a product, service, or piece of equipment should cost. This is determined by looking at the elements that make up the cost of that purchase, and adding a reasonable margin for profit, administrative expenses, and reinvestment into the business. This becomes a benchmark for whether a supplier quotation/bid is reasonable. The model developed by AA is similar in structure.

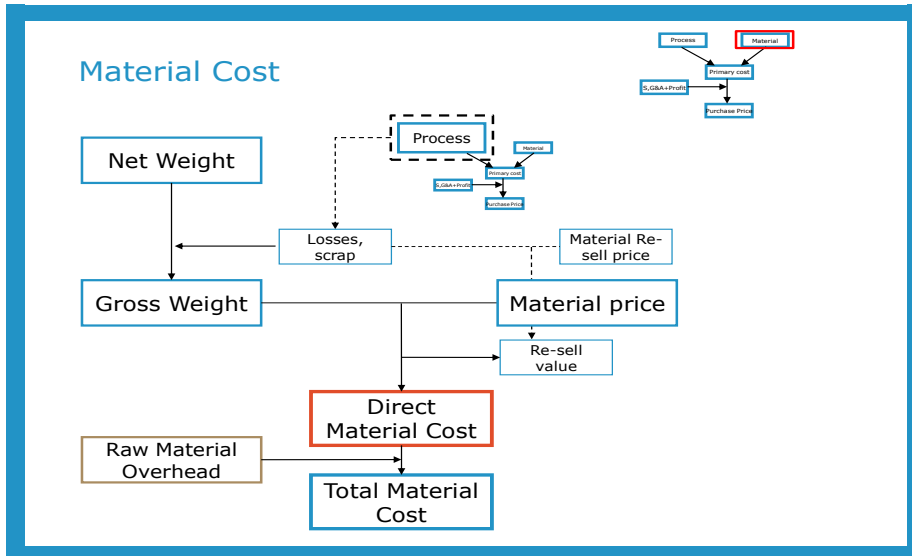
The AA model is a four step process:

1. Divide the spend in categories and sub-categories
2. Evaluate price per piece
3. Cost breakdown benchmarking
4. Value management

The first process involves breaking down spending in categories and sub-categories. Electronics, steel and aluminum account for forty four percent of the total spending and typically the starting point for the analysis. Once this is accomplished a part is chosen for a more detailed cost breakdown. This step is the most complex in the process and involves breaking the part cost into its various components (AAES Professional Sourcing PPT).

The part is divided based the material cost and process cost, which comprise the main cost of the part, and from there an estimate SG&A and profit is added to generate an estimate of what the part should cost. Each element of the cost structure is broken down in greater detail (AAES Professional Sourcing PPT).

Figure 4 Material Cost

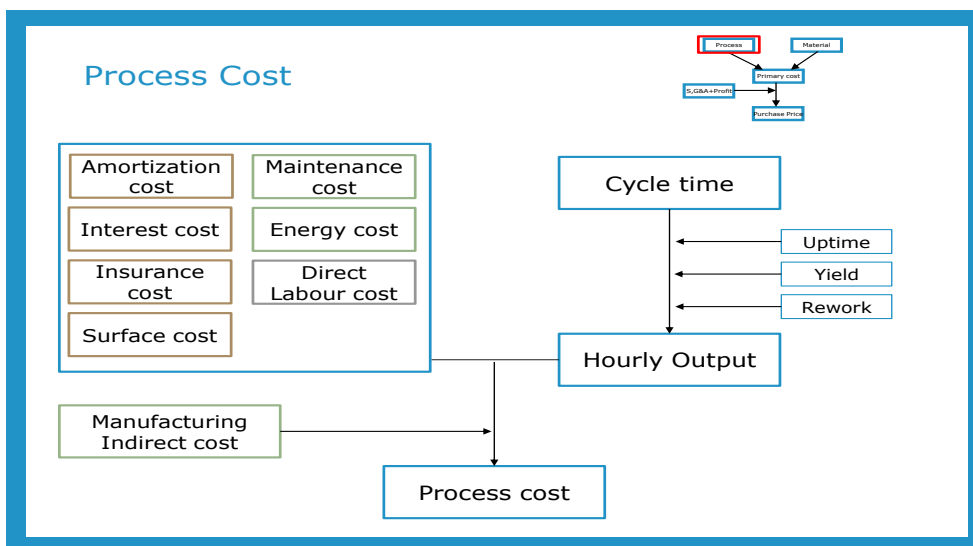


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Here the model looks at what the material used in the process really costs the supplier by looking at scrap rates and resale value for any scrap materials left over in the production process. In addition, estimation for overhead, which typically entails storage costs and financing of materials purchased by the supplier, is added to the final material cost. The scrap rates are generated by the estimate of process costs. The process cost breakdown is illustrated below:

Figure 5 Process Cost



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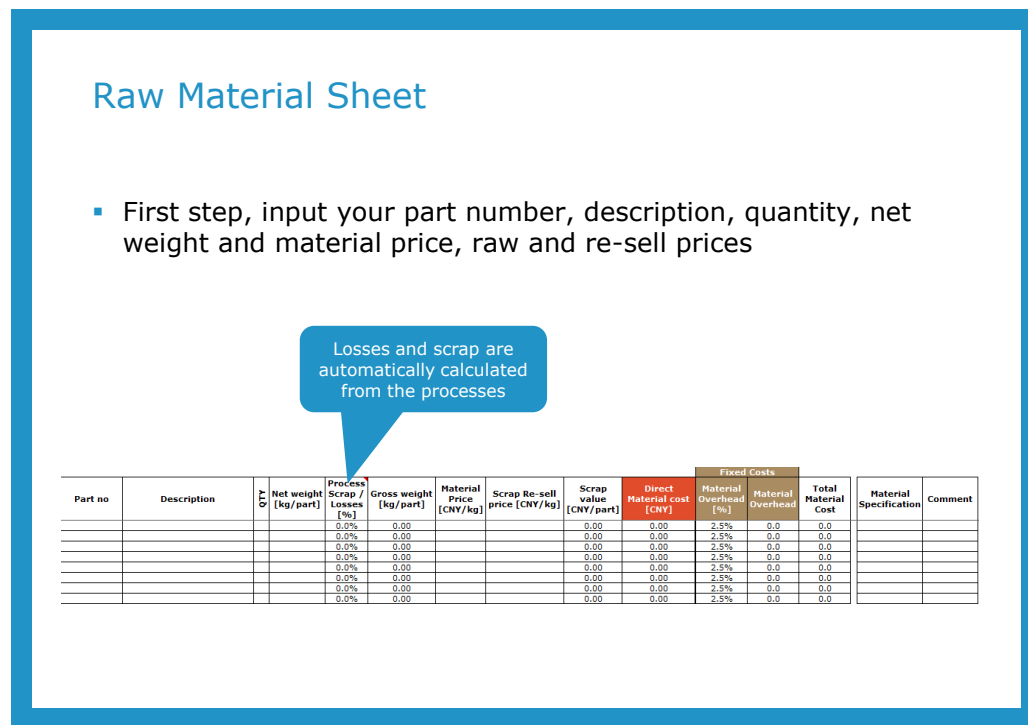
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The process cost includes the cost of making the part this includes not only the cost of the machine but the costs of operating, maintaining and financing the machine. In addition, estimations are created, based on the type of machine, for the hourly production output. Labor costs and overhead are added to form the cost allocated to production (AAES Professional Sourcing PPT).

In the final step an estimate is added for SG&A and profit. The company typically uses and estimate of 15-20 percent for this component unless a reliable estimate can be found. For China a reduced estimate of 12 percent is suggested (AAES Professional Sourcing PPT).

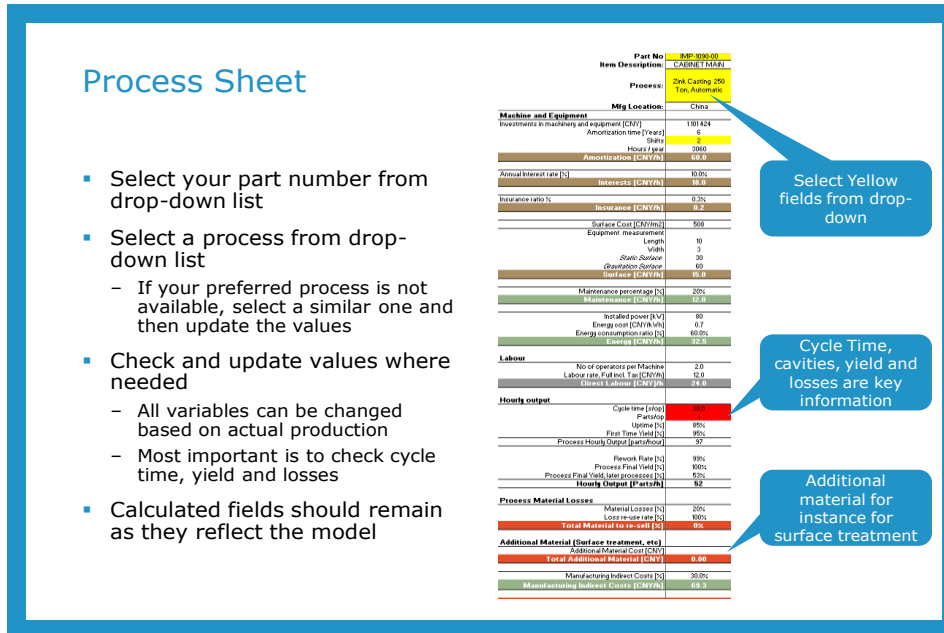
Fortunately for the sourcing employees the Excel based model performs most of the calculations. The user needs only to the input the part number, description, quantity, net weight and material price, raw and re-sell prices. The program also calculates losses and scrap rates which are based upon which manufacturing process the user chooses in the next step (AAES Professional Sourcing PPT).

Figure 6 Raw Material Estimate



The user next chooses the type of machine used in producing the part. In the example below a 250 ton zinc casting machine was chosen. By selecting a process the model automatically generates the data (AAES Professional Sourcing PPT).

Figure 7 Process Description



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From this a cost driver summary sheet is created and the user needs to add their estimation of SG&A and profit to produce the final should-cost of the part (AAES Professional Sourcing PPT).

With this estimate the purchaser can then use the estimate created by the should-cost model when benchmarking quotes from suppliers. The company believes that benchmarking allows the purchaser to better understand the cost of their product and to identify, clarify and benchmark cost drivers. In addition, it can help them manage and control costs and understand their suppliers cost build structure which in turn allows them to target these key cost drivers for improvements. With the information gained by performing the SCA the purchaser can use this information in a tactical manner where the goal is to drive down the price of the component. Alternatively, it can be used in a more strategic manner where a supplier may be identified a

potential candidate for further development and improved relationship (AAES Professional Sourcing PPT).

Lastly, the model can help identify opportunities for value management activities such as; VA/VE and lean. ASSA ABLOY defines VA /VE as a methodology that serves to maximize product value by reviewing how product functionality can be fulfilled at the least possible cost. VA is short for value analysis and involves looking at an existing part and assessing areas where costs can be reduced or value can be added without sacrificing quality or functionality. VE stands for value engineering and is essentially the same process but applied to new product prior to being launched (AAES VA/VE training and workshop presentation 2014).

#### **4.4 Initial indications based on interviews and emails**

The author was given a list of managers and their staff that had received training on the should-cost model. Primarily interviews were conducted with managers while emails were used to communicate with their respective purchasing staffs. The managers' thoughts on the should-cost training course were generally positive. All of them believed that their staff needed additional training in regards to the production processes and methods used in the manufacture of the components. In addition it was noted by all that their employees needed further development in their negotiation skills and that the training and the model gave them the tools to negotiate with their suppliers with more confidence since their arguments were based on facts and not simply a demand for a price reduction. In fact one manager noted that simply the belief, on the part of the supplier, that a detailed SCA conducted was sufficient to negotiate a price reduction with a supplier. Manager C the production and supply chain manager for a divisional unit elaborated:

*“My staff and I are extremely busy and lacked time to do a proper should-cost analysis....instead we solicited three detailed bids from our suppliers and took the lowest cost in each category and presented this price to the suppliers as the cost breakdown from our should-cost analysis. We asked them to explain their price and if the explanation was not sufficient we would start to look for a new supplier...the end result was that the supplier accepted the should-cost based on benchmarks as the new contract price”*  
(Manager C, personal interview, February, 24 2014).

Another manager commented that the training not only gave his staff greater insight into the production process but it presented to him a fresh manner in which to approach price negotiations with a supplier. Here the supervisor was considering switching from a European based supplier to one based in China. The part was comprised of 10 smaller parts and a SCA was performed on all 10 sub-components. The analysis revealed that the Europeans suppliers cost and the should-cost were almost identical and further price reductions could not be achieved. However, in regards to the Chinese supplier, 8 of the 10 sub-component prices matched the prices derived from the model while 2 parts differed greatly in price. During the negotiation process the 8 correctly priced sub-components were accepted while the vendor was asked to explain the cost difference in the remaining units.

The end result was that a price reduction was negotiated with the supplier. The manager later commented that “that typically we would have attempted to negotiate a reduction in price based on the unit as whole ...now by breaking the price down in greater detail based on the should-cost we can concentrate our efforts on the sub-components based on facts” (Manger I, personal interview, February 17 2014), (Manager E, personal interview, February 15 2014). For these reasons the respondent added that he intends to introduce the requirement that his staff must present at least one should-cost example at the unit’s monthly meetings.

On the negative side and common to all to interviewees was the belief that they and their staffs did not have the time to conduct the should-cost reviews. All felt that while the method was potentially valuable in terms of education and cost reduction it was not necessary to use it on all the parts purchased and that do so would be incredibly time consuming. Some respondents added that the model itself was time consuming to use and that staff had also made similar comments. However, one supervisor later admitted that although the model, initially, seems complex that after using it several times it became easier to use and time devoted to using it decreased rapidly.

In addition, all felt that the model was lacking in many regards and provided suggestions as to remedy the flaws in model. A common complaint was that not all the processes, involved in the production of some of their parts, were found in the model. Furthermore it was noted that certain elements in the calculation process such as currency rates, labor rates, and raw material prices would need to be updated frequently and they did not feel that they or their staff had the time to update the model. Another manager commented that “ that some of the assumptions seemed to

simplistic...for example SG&A varies greatly between producers ...aluminum manufacturers have higher SG&A levels than bulk steel producers and it varies between regions producers in China have lower levels than European and American producers” (Manager C, personal interview, February, 24 2014).

Responses via email from the individual purchasers were similar to those of their supervisors. Almost all indicated that using the model not only helped them understand the production process better but also gave them a better understanding as to how this method could be used in a negotiation situation. Lack of time was again the greatest issue with tool. Nearly all that responded commented that they were not convinced that the tool was necessary for all purchasing situations. Issues with the model were also similar. Typical responses were “the model does not have the production process I need to do the analysis”, “the model does not account for minimum order quantities”, “and an estimate of 15-20 percent for gross margins seems too low for my supplier”. Most emails were answered promptly however; some received no reply while others suggested another staff member who was more qualified to answer the questions regarding the model.

A final common element that emerged during this portion of the research was the subject of sourcing in China. Many respondents expressed that they felt uncertain about what was the true price of the products that they were sourcing from China. Other expressed doubt regarding the abilities of their staff in China. A few even went so far as to suggest that at the best some staff were merely incompetent and at worst possibly dishonest. On the whole almost all felt that they were “leaving money on the table” as one senior manager commented. As this theme occurred more often the author discussed the subject with his supervisor at main office to gain further insight into the issues regarding sourcing in China. The supervisor confirmed that these issues were a concern to management.

#### **4.5 Participant Observation Data**

Part of the work on the research project involved being present observing the day to day interaction of staff in the sourcing wing of the headquarters in Landskrona, Sweden. Here the noticed that a great deal of time was devoted to the issue of cost. For example whether a part could be produced cheaper somewhere else or could a component be made cheaper with losing



its functionality etc. In general the management emphasis on reducing costs is well understood by its employees.

By being allowed to be present for several meetings regarding the should-cost model and its more financially based relative it was quite obvious that management felt the need to improve the skills of its sourcing team were paramount and that they wanted to provide their employees with the proper materials, whether improved cost estimating tools or financial data, in order to more effectively fulfill their role. Here the author was often asked for feedback from emails and conversations with staff with regards to using the model and how it could be improved or modified.

Furthermore, the managers also expressed concern that perhaps they were giving their staff too much material or that they may not know how best to use the knowledge derived from the new methods. The old English proverb “you can lead a horse to water but you can’t make it drink” was commonly used by management to express their frustration with the limitations of some of their employees.

Towards the end of the project the researcher was invited to observe a discussion regarding VA/VE reviews and participate in a should-cost training exercise at the components and hardware manufacturing facility in the Netherlands. In addition, a tour of the manufacturing facility was also included prior to the meetings.

During the course of the factory tour it was noted that one of the components being produced at the factory were large springs and that machine used in the production process was not included in the list of processes in the should-cost tool. This observation led to both the author and his supervisor asking questions regarding the steps and processes involved in creating the final product. It had been assumed by the supervisor that the process involved one step which was basically feeding metal wire into a machine that coiled the metal and cut it into preset lengths. However further inquiry revealed that two additional steps were required to complete the part. The coiled metal was then put through another process that served to strengthen the spring and then was coated in a protective paint that further added to the springs strength and longevity.

The knowledge gained regarding this process and the extra steps involved in the manufacturing of the part were later used as an example during the should-cost training session the following

day. Part of the should-cost model requires the user to know, or to find out, the steps involved in the manufacture of the component they wish to do the cost breakdown upon. Here the supervisor shared with the participants his misconception regarding the number of steps involved in the process and how it illustrates the need for purchasers not only to know how a part is made and if they are uncertain the need to visit the suppliers and find out the correct details of the production process.<sup>2</sup>

This elicited a comment from the sourcing manager, who remarked that typically that there is only one step involved in the production process and their facility adds the extra steps as part of their marketing position to be the makers of the best products. He further added that springs manufactured in low-cost countries such as, China, do not do these extra steps and that many customers do not realize this and purchase solely on the basis of cost. The manager responsible for the training workshop then remarked that he will have to bring this up with the sourcing personnel in China regarding the number of steps involved in the spring production process.

The discussion then progressed to a new aspect when one of the staff asked if their customers really needed or demanded the extra steps involved. From there addition comments were made suggesting that this part might be a possible candidate for a VA/VE exercise or that someone should talk with sales to see what quality features the customers want and if they are willing to pay extra for the added benefit.

The discussion was cut short due to time constraints and the training session was started. Prior to the actual training on the tool a presentation was given. In the presentation the reason behind the need for a should-cost were explained. In addition video footage was shown from the company's prior annual meeting of the top 300 managers. The footage featured ASSA ABLOY's CEO who proceeded to talk about the new should-cost program and how it is necessary to further drive purchasing professionalism and cost reduction throughout the organization.

A common complaint regarding the use of the model from the emails exchanges was that it was time consuming to use. However, the staff using the model in the training exercise completed the sample reviews quite easily and their speed improved with the more they used the model. The

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<sup>2</sup> Here management stresses the need for purchasers, in regards to supplier visits, to see themselves as fact finders not merely production facility tourists.

author who has a very limited knowledge of production process was able to complete the exercises in a reasonable amount of time once the production process was explained to him in greater detail.

## 5.0 Analysis and discussion of the empirical data

### 5.1 First research question:

*How does a strategic cost management program, (should-cost), aid integration in a corporation seeking growth and cost reductions via acquisitions and global sourcing?*

#### 5.1.1 The Antecedents of integration

Stevens, (1989) found that true supply chain integration includes both upstream and downstream players but it is internal integration that provides the foundation for both. Academic literature purports that integration should lead to higher performance however, as Pagell (2004) states the evidence of actual integration is rare. Furthermore, the literature primarily has looked at the relationship between integration and performance. What has been lacking is research describing the manner in which integration is achieved (Pagell (2004).

Models of purchasing maturity suggest that the process occurs in stages and that firms should focus on the development functional coordination before moving on to cross-functional integration (Keough, 1993), (Van Weele et al.,1998) A recent study by Foerstl et al. (2013) examined the relationship between cross-function integration and function coordination and purchasing and firm performance. In this study, Foerstl et al. (2013) find that functional coordination has a stronger effect on purchasing and firm performance than cross-function organization. The findings suggest that firms may want to continue to focus on coordinating processes within the PSM function before moving on to developing more cross-functional integration. Foerstl et al. (2013) suggest firms by harmonizing processes like category management and supply chain management, applied across a global firm, can have a profound impact on purchasing performance and thus firm performance.

One interesting finding from this study was that the temporal progression from function coordination to cross-function integration could not be validated by the data. However, Foerstl et al. (2013) did find a strong correlation between the two elements which they suggest helps support the findings of Lawrence and Lorsch (1967) that cross-functional integration and functional coordination go hand in hand.

As described in the previous text, coordination among internal functions has been seen as a critical antecedent in effective supply chain integration (Fawcett and Magnan, (2002).

Anderson's (1982) constituency theory finds that coalitions within firms have different interests and that inter-functional dependence and rivalry can occur. Here each group, in pursuit of its own objectives, becomes constrained by the objectives of the other self-serving functional areas. Integration is believed to help effectively manage inter-functional relationships and conflict and increase inter-functional efficiency (Chen et al. (2007).

In a study involving managers from the logistics, purchasing and manufacturing functions Fawcett and Magnan, (2002) asked the managers to indicate the degree to which cooperation/takes place among personnel in their organizations. The general level of function-to-function interaction was found to be greater than the broader area of cross-functional process integration. This was partially attributed to the fact that the different groups must work together on a day-to-day basis in order to perform their normal responsibilities. However, they also posit that the findings also suggest that a foundation was being established to move towards greater process integration.

Fawcett and Magnan, (2002) contend that this implication is fundamental to increased supply chain integration given that cross-functional and inter-organizational teams are the essential building blocks of supply chain projects. Fawcett and Magnan, (2002) further elaborate on this concept,

“The ability of cross-functional teams to navigate through a firm's history and culture, while attacking the supply chains problems at hand, has a tremendous impact on that firm's success in satisfying customers. Companies that have difficulty navigating the “waters of their own harbor” must spend the majority of their time and resources on these issues, rather than collaborating with supply chain partners”.

Fawcett and Magnan, (2002) found that purchasing had the strongest relationship and interacted at high levels between with both manufacturing and logistics. Together these three functions have the primary responsibility for the entire order fulfillment cycle and increased cooperation between will augment the companies' goals of increasing customer satisfaction while simultaneously increasing productivity and reducing costs.

However, the data also suggested that room for improvement in all the relationships. In particular, three of the four relationships involved in integrated product development received

low interaction scores. In addition, interviews revealed that there remained “tremendous angst” in regards to the dearth of clear and consistent communication and cooperation amongst the functional areas. Fawcett and Magnan, (2002) suggest some normative solutions for increasing cooperation and communication amongst the functional elements such as; training, job rotation programs, and additional programs designed to help managers better understand the roles and responsibilities of the other functional managers.

However, these were merely suggestions and what is lacking in academic literature is a comprehensive study of the factors that truly enable or inhibit integration across key internal supply chain functions such as purchasing, operations and logistics (Pagell, 2004).

Pagell's 2004 study attempts to fill this research gap by developing a model of the drivers of internal integration. In particular, his study attempts to provide guidance as to how companies actually create integration between manufacturing, purchasing and logistics. The author's study borrows from the product development literature and to develop the base of his integration model. From his study these factors were found to be significant in enabling and inhibiting integration: structure, culture, communication, reward measurement, and consensus. Some of the factors that have been observed in past research as being important enablers and inhibitors of integration were also found to be influential in this study. However, Pagell finds that many of these factors are interrelated and dependent upon each other and from this concludes that integration is more complex than previously indicated.

Pagell (2004) provides some guidelines for future research that prescribe the behaviors that can create integration. Integration starts from the top down. Therefore, top management support is required in strategic initiatives to create an internally integrated supply chain. A consensus, between functional managers, on the overall firm strategy needs to be reached otherwise there will be low levels of integration. Communication is a factor that is interrelated with other integrating factors. The greater the level of communication between function managers the greater the level of integration. When this communication is of an informal real-time nature, as opposed to formal structured meeting, the influence on integration is greater. Furthermore, the greater the use of cross functional teams and/or job rotation the greater the level of communication which in turn leads to higher levels of integration.

In terms of reward systems, those that tie a manager's pay to the performance of the plant or the organization and not on individual or functional levels goals the greater the level of integration. The effect of structure was found have varying impacts. Pagell's key observation was that structure, whether centralized or decentralized, needs to fit the flow of goods and services with the flow of information through the organization. When this mismatch exists it is more likely that these organizations will have lower levels of communication and reward systems.

As Pagell (2004) points out integration starts at the top with the support of top management in regards to strategic initiatives. In regards to the should-cost program, top management at ASSA ABLOY saw not only a need to reduce product costs but also a need to elevate the performance of its purchasing/sourcing function in regards to how it procures its components but also how they interact with other function units, particularly production and research and development. It has also been suggested by Chen et al. (2009) that cost reduction as a strategic priority within an organization is a crucial antecedent of chain integration. In addition as Foerstl et al. (2013) note supply chain management initiatives aid in the development of function coordination which is a necessary step towards cross functional integration. Furthermore as Fawcett and Magnan (2002) have noted increased job training and other initiatives foster greater understanding amongst managers as to the roles and responsibilities of the other functional managers.

Initially the training was intended for the purchasing staff and interviews and emails with both management and purchasers revealed that a greater understanding of the process involved in manufacturing process. This increased knowledge was believed to be beneficial when interacting with the other functional units during the VA/VE exercises. Here they felt they had a better understanding of the other functions roles but they better able to express their thoughts regarding cost saving and design changes.

Later as the program was expanded to include production and design engineers these employees also expressed gaining a greater understanding of the cost drivers involved their products. At the should-cost training exercise a manager from the R&D and design department expressed that he came away with a greater realization that a design created by him, with certain ascetic features, may involve extra steps in the production process which in turn raises the cost of the product. This in turn led him to question whether the ascetic feature was really necessary for the part or whether the part could be redesigned in manner that did not involve the additional steps in the

process. Additionally, the R&D manager, during discussions during the training, realized that the location of where the part was to be produced had to be considered during the design process. For example, many manufactures in high cost countries have invested in more advanced production machines that are more automated hence saving them labor costs which have become prohibitively high. However, in lower cost countries such as China, where the labor cost is lower, there is less need for more advanced machinery. Therefore the part if produced in the low cost country may involve additional steps which could entail the use of additional processes and labor. Having this knowledge the design engineer can take into consideration when working on future projects how the design choices made by him can affect the later decisions made by the other functional managers in production and purchasing.

The increased level of communication as Pagell points out is one of the antecedents to internal integration. However, it must be noted that these interactions were of a more formal nature which Pagell found to reduce effect on integration. However, from observation, the author feels that an open an open and honest dialog was created during the should-cost training session between all participants despite the more formal setting of a training exercise.

Since the should-cost model will be used primarily by the purchasing staff there was little examination in regards to the incentive systems at AAES. Upon completion of the training the purchasing staff is expected to use the model in all future purchasing situations. However it was unclear as to how this edict would be enforced. One manager had noted that he intended have his staff present examples of SC estimates at monthly meeting. While others had suggested use of the model will be considered in the staffs annual reviews. However, no uniform system exists at the present.

In regards to incentive conflict between functional units again this aspect was not explored in great detail. However, there is anecdotal evidence that there may be a conflict in regards to incentives. During the training workshop in the Netherlands the author observed a discussion between an R&D manger and a manger from the larger corporate group regarding the status of cost reductions reviews. The R&D manager commented that, "his hands were full with new projects and they he did not have to time or manpower to devote to cost reviews like VA/VE". The design manager later commented "what is more important getting out new products for the customers or cutting cost?" The VA/VE manager commented "both are equally important".



This exposes a possible incentive conflict and raises the question: is the design manger reviewed and ultimately compensated on the basis of new products launched or is cost reduction issues also included in the review? The VA/VE manager later expressed that commented that “ *he (design manger) was most likely reviewed on the basis of new product issues but if cost reduction were included in his review that the designer would certainly find the time to engage in more cost reviews*”.

Here should-cost reviews may hinder cross-functional integration in the organization. In the process of breaking down the cost of a part some parts will undoubtedly be found to candidates for future VA/VE reviews and as noted previously VA/VE reviews involve personnel from multiple functions. However, there may be resistance to these measures if they feel they are not being reviewed or rewarded for participation. In the case of the R&D function they may see the increased attention devoted to VA/VE as less time devoted to new product development which could adversely affect their annual performance reviews. This may lead to staff, in order to avoid involvement in these exercises, restricting the flow of information and reduce communication with the purchasing function.

The studies mentioned earlier by Fawcett and Magnan, (2002), Pagell (2004) and Foerstl et al. (2013) illuminate the issues concerning the internal issues of the purchasing function and its relationship with the function area of logistics, manufacturing and engineering and provide some practical solutions as to how to improve the functions internal coordination and its relationship with these functional groups in order to further integration. However, these studies do not examine the relationship between the purchasing element and another key function; marketing.

The study by Fawcett and Magnan (2002) found that the functions of purchasing, manufacturing, logistics, engineering ranked the degree of cooperation and communication with the marketing function as amongst the lowest among the other dyadic relationships. Fawcett and Magnan issue a warning to managers regarding this aspect of functional integration,

“A functional divide exists between the purchasing and marketing sides of most organizations. This chasm often consists of physical and emotional distance and is embedded in the companies’ organizational structures and culture. At many companies, it is easier to develop cooperative relationships with external supply chain members than it is to break down the silos that exist around individual functions. No standard organizational form has emerged to bridge the chasm”.

Despite the strong words of Fawcett and Magnan (2002) little attention has been given to the cross-functional relationship between purchasing and marketing (Ivens et al., 2009). The dearth of research could be explained when viewed from the perspective of classical value chain where these two operations represent the extreme ends of a firm's value chain and are therefore considered having a weak relationship (Ivens et al., 2009). However, as Ivens et al. (2009) contend they are ends of a *unique* chain where resources arrive in the firm via purchasing. From there the resources are combined and transformed to represent a new resource which leaves the firm in large due to the efforts of the marketing/sales function (Ivens et al., 2009).

Given the lack of research on the subject there is also, unfortunately, a limited amount of practical guidance from academia as to how to improve the integration of these two functions. However, Esper et al. (2009) have developed a conceptual framework for demand and supply integration. This new construct comes mainly from the marketing side of academia but this thought process also borrows from supply chain management theory to create its foundation. Here the framework rests upon well-established theoretical foundations of (1) customer value theory of the firm, (2) knowledge management and (3) supply chain management to show that demand and supply-focused processes should be integrated and should, in part, rely on superior intelligence generation, dissemination, interpretation and application to maximize creation of customer value (Esper et al. 2009). Here, as in other studies, in different areas of supply chain integration, communication and information sharing are seen as important factors that promote integration within a firm.

Marketing and sales personnel were not involved in should-cost training programs at AAES and to the best of the author's knowledge there are no plans to include this function. Given this it can be said that should-cost does little to aid integration with these functions directly. However the greater scrutiny of how a part is manufactured leads to greater understanding of the manufacturing process. This greater understanding by the purchasing staff has been observed to lead these employees to begin to question aspects of a parts design and function. Commonly heard comments during the study were, "why do we need so much material?", "if we replace this with a cheaper material would the customer see it as a lower quality product?"

These questions lead to purchasing to suggest that a part or product may be a good candidate for a VA/VE exercise to see if the part can be modified without reducing the quality or image of the product. These VA/VE exercises involve production, purchasing, R&D and marketing.

Marketing is commonly referred to as the “voice of the customer” within AAES. It is here that one can make the argument that should-cost, by spotting issues in a parts design for review in the more multi-functional involving VA/VE exercises, can be a bridge to more effective communication and information sharing between the purchasing and marketing functions.

Should-cost can have indirect influence on cross-functional integration within an organization.

The relationship of the should-cost program with the finance function was not examined in detail primarily due to nature of the function as AAES. Although the finance department had some input in regards to features of the should-cost model their role at AAES is more accounting in nature and they do not develop cost saving programs or have influence on sales forecast which has been observed in other organizations (Oliva and Watson, 2011).

### **5.1.2 Purchasing knowledge and skills and integration**

According to Giunipero et al. (2006) the role of the purchasing/supply management (P/SM) function in many organizations is becoming more strategic. This increased importance of the P/SM function has led to companies expanding the core processes to include activities such as: supplier coordination, supplier development, supplier market research, cost analysis, sourcing strategy formulation, benchmarking, and outsourcing decisions (Giunipero et al. 2006).

Strategic level purchasing has been linked with integration (Narasimhan and Das, 2001).

Purchasing integration refers to the integration of strategic purchasing practices and goals with a firm’s objectives (Narasimhan and Das, 2001). In their study, Narasimhan and Das (2001) found that purchasing integration was found to moderate the relationship between purchasing practices and manufacturing performance. In addition, increased investments in purchasing integration were observed to lead to higher performance returns than from investments in purchasing practices. In addition some authors have suggested that one of the key roles of the purchasing function is to effectively integrate the supply activities between the firm’s external suppliers and internal organizational customers (Pauljaj et al., 2006).

In terms of external integration, Pauljaj et al. (2006) found that the more advanced levels of strategic purchasing were associated with increased levels of supply integration and, in particular, improved cooperation and collaboration between a firm and its key suppliers. This increased level of integration was also linked to the improvement of overall firm performance. The study found that purchasing functions are at different stages of strategic evolution and that the higher the function was along the developmental path the higher the levels of integration and firm performance (Pauljaj et al., 2006).

According to Pauljaj et al. (2006) firms at the most advanced levels of strategic purchasing were found to be in a better position to seamlessly integrate logistics activities such as distribution, transportation and warehousing. In addition it was found that firms with highly strategic purchasing functions are better able to work closely with their suppliers as to eliminate obstacles that may cause delays in obtaining materials and services from suppliers. Lastly, Pauljaj et al. (2006) found that not only was increased level of purchasing sophistication associated with higher firm performance but that their suppliers also had higher levels performance. This was attributed to the belief that firms with more advanced purchasing functions are better able to develop stronger relations with their suppliers that create sustainable competitive advantages that lead to a win-win situation for both parties (Pauljaj et al., 2006). In their conclusion the authors suggest for further study examination of what effect the strategic dimensions of knowledge, skills and resources have on the development of purchasing towards a more strategic level (Pauljaj et al., 2006).

Carr and Pearson (2002) note that the goal of a strategic purchasing function is to support a company's efforts to achieve its long term goals. Furthermore if purchasing has an integrative role in the firm's strategic planning process then the purchasing function can be seen as a strategic function. Giunipero et al. (2006) who develop this further, state that the key to success in achieving integration lies in the skills and capabilities found in the people who work in the purchasing function. Many leading firms now recognize the strategic role of supply management and the importance the role plays in maintaining a firm's competitive edge. However this increased strategic role has elevated the need for firms to develop and maintain a world-class staff of purchasers (Giunipero et al. 2005). Giunipero and Percy (2000) provide a definition of world-class purchaser:

A world-class purchaser is an individual who visualizes and approaches his/her job from a strategic perspective in dealing with the supplier firm-purchaser firm-customer linkage. This individual continually embraces and leverages his or her skills and knowledge of critical supply chain activities to provide value in meeting corporate and customer objectives.

The growing importance of the purchasing function has led industry and academia to explore the issue of what are the skills necessary to move purchasing from a clerical to a more strategic function? Giunipero et al. (2006) find that this is a trend that will continue with a more strategic role being required of supply chain management professionals. They conclude from their study that in the future purchasing will need to build strategic relationships, focus on total cost and strategic cost reduction, yet still being able to collaborate and integrate their processes with those of their suppliers. In order to accomplish these strategic initiatives new skills sets for employees will need to be developed. Here supply chain professionals will need to possess a good combination of communication, technical and financial skills.

As noted in the beginning of the empirical section management at AA initiated the should-cost program with two primary goals to achieve. The first was move the purchasing function to a more profession level by changing the manner in which price quotations were analyzed. This goal is emphasized in the current annual report where management notes that new sourcing demands on the purchasing organization have lead to it moving from a simple call off roll to one of a more professional nature (ASSA ABLOY Annual Report, 2013). The second was to develop a closer relationship between purchasing/sourcing and research and development in regards to the design of new products. This decision not only has the support of the top management of the parent company but was initialed by them. As mentioned by Pagell (2004), key management support is crucial in the integration process. Here the company not only values the function but wants to broaden its role so it can achieve strategic cost reductions in the procurement process. In addition, the desire to improve the manner in which a function interacts and develops relationships with other functions has been noted as moving purchasing from a tactical to a more strategic level (Ellram et al., 2002).

The question then is whether a should-cost program helps develop the knowledge and skills of its user in a manner that helps promote the firms larger strategic goals? This in turn will elevate the

status of the purchasing function and promote integration. As Giunipero et al. (2006) propose supply chain professionals will need to possess a good combination of communication, technical and financial skills.

Through the author's interaction within the organization via interviews, emails and participation in the should-cost workshop in the Netherlands, evidence to support the development of the first two skill sets was found. The vast majority of purchasing personnel that responded to emails commented that the training and use of model have greatly increased their understanding of the technical processes involved in manufacturing. This in turn has given them greater confidence in evaluating supplier quotes based on fact and not just the lowest price. The detailed cost breakdowns developed by the model, when used in a negotiation setting, seem to promote greater communication with the supplier. Although the actual number of occasions where the results of a should-cost breakdown were used in a negotiation situation are few the initial feedback seems to indicate that the detailed analysis forces supplier to explain in greater detail why their costs deviate from the purchasers estimates.

In addition, with regards to China, the detailed RFQ system used by one product manager and is similarity to the should-cost model being developed division wide, seems to aid in improving communication both externally and internally. Externally the model seems to help with the issue of trust regarding quotes by suppliers. The greater detail seems to help expose areas where suppliers are hiding profits and in turn gives management greater confidence that they are not being overcharged by their suppliers. In terms of internal integration, again the greater detail helps management understand the decisions made by their purchasing staff. The staff now will have to justify their decisions based on facts and not just that this was the cheapest price. Poor choices that were once seen as possible indication of unethical behavior now seems to demonstrate purchasers lacks of skill which management can then work to improve.

In addition, the model by improving the user's technical knowledge seems to promote greater communication with the other functional departments within the organization. Comments by purchasers, at a recent training session attended by the author, such as, "oh I will bring that up with our production people at the next meeting" or "this will help me when I talk to design" were common.

As for improving the financial knowledge and skills of the user there was little evidence to demonstrate that the model or training aided in this area. However, the management at AA is aware of the need to improve the financial knowledge of its sourcing people and a training program the focuses on the analysis of a suppliers financial statements has been started. The need for this was elaborated upon at a meeting with manager D, the global purchasing manager. Manager D stated that “ *we had a situation where a supplier went bankrupt and the company lost its deposit on some of the machines we had order from this supplier...this led to us (management) to ask if this was we and our purchasing people should have known about sooner*” (Manager D, personal interview, March 20 2014).

This training program is referred to as “top-down should-cost analysis” by the management team responsible for its development. However, the training program has only been given to one group of purchasing staff and is still being refined. The manager responsible for the first training class reported that feedback from the seminar was “generally positive with many saying that they had a greater understanding of how to use financial statements to help in negotiations and looking for signs of financial distress in a supplier (Manager E, personal interview, April 15, 2014).

Should-cost by promoting the development of knowledge and skills of key employees and in particular those of the purchasing staff at AAES can be seen as integrator of supply chain integration. This process can be below in figure 8:

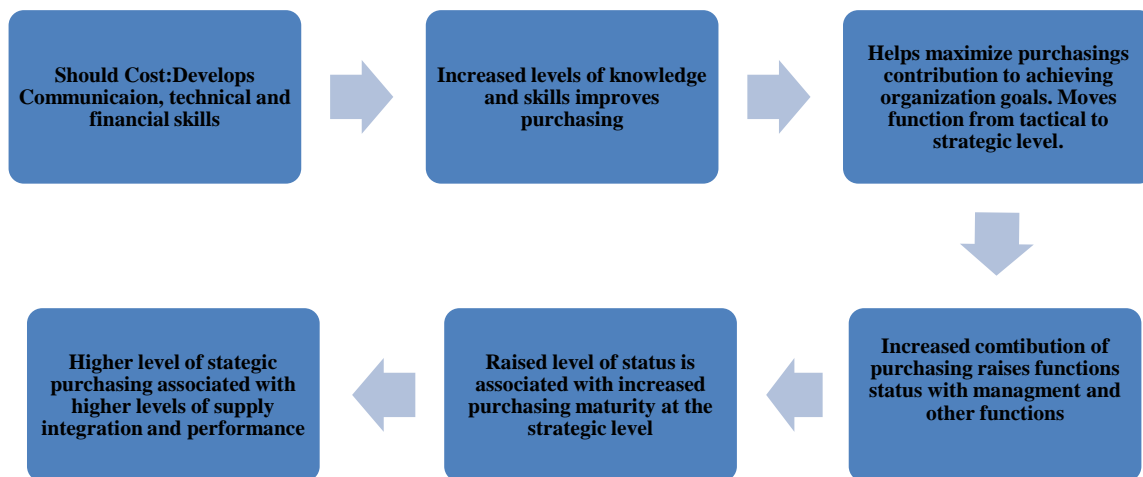


Figure 8 Should-Cost Integrator Model

These improved knowledge and skills allow the personnel to do their jobs more effectively by giving them more confidence to interact and communicate with their internal colleagues and also with external suppliers. With greater confidence and abilities the function is able to work more effectively towards the strategic goals of the firm and in doing so moves purchasing from a tactical to more strategic position within the firm. This in turn raises the perceived status level of the function in the eyes of not only upper management but in also in the eyes of key people in other functional areas (Eltantawy et al., 2007). The increased perception of the purchasing function within the firm has been seen as sign of increased purchasing maturity and having a higher level of strategic value (Carr and Smeltzer, 1997). Finally it has been shown that firms by moving towards more advanced levels of strategic purchasing can achieve better supply chain integration. Furthermore higher levels of strategic purchasing can also have a profound impact on supply chain performance for buyer and supplier firms (Pauljaj et al., 2006).

### **5.1.3 External Issues**

According to Fawcett and Magnan (2002) the many managers see supply chain integration, in its ideal form, as a seamless connection that goes from a firms suppliers 'supplier to customers'' customer. As discussed in the literature firms can look to further integrate with their customers, this is referred to as upstream integration, or they can attempt to integrate downstream with their suppliers and of course they can choose to do both simultaneously. In this study there was no evidence to support the notion that should-cost promotes upstream integration.

In regards to downstream integration again there was little evidence to illustrate a direct link between SC and integration however, it can be said that argued that may promote integration in an indirect manner. The request for detailed cost information from suppliers that is part of the should-cost review process has had varied reactions from AA's suppliers. Many suppliers have outright refused to provide such intimate details of their cost structure while others have honored the request but give incomplete or inaccurate data. However there has been on occasion where a supplier has been forthright and prompt in supplying the information requested. Several of these customers have singled out for closer cooperation via a new supplier development program that has been initiated at AAES in the third quarter of 2013.



An additional indirect link to external integration is suggested in the literature but not observed during the study. Raising the level of knowledge and skills of the purchasers to a more strategic level has been associated with increased levels of supply integration and in particular improved cooperation and collaboration between a firm and its key suppliers (Pauljaj et al., 2006). Should-cost by raising the knowledge and skills of its users can have a positive, but not observed, influence on external supply chain integration.

#### **5.1.4 Summary of conclusions from the first research question**

Factors supporting integration at case firm:

- Upper management support of cost saving program seen a key antecedent of integration.
- Improved functional coordination promoted through knowledge gained in should-cost training.
- Should-cost training promotes greater understand of processes which improves the ability of purchasing function to communicate effectively with other functions.
- Should-cost training improves understanding by production and research and design of other functions role and duties within the organization.
- Should-cost training further develops the knowledge and skills of the purchasing function which ultimately improves the strategic level of purchasing which is linked with improved integration.
- Evidence of should-cost promoting external integration by exposing possible candidates for supplier development program.
- Evidence of should-cost promoting external integration indirectly by improve the level of users knowledge and skills.

Factors limiting integration at case firm:

- Misalignment of incentive systems may inhibit cross-functional integration.
- Should-cost has limited interaction with key functions of marketing/sales and finance.
- Little evidence of upstream external integration with customers.

## 5.2 Second research question:

*If the should-cost program is found to promote integration can the program be improved, based on the factors revealed in the study, to further promote integration within a firm?*

### 5.2.1 Industry level should-cost analysis

The greatest concern expressed by sourcing managers and their staff was they felt that there may not be sufficient time to conduct should-cost reviews on all their purchases. In addition some elements of the estimation process were considered easier than other to accomplish than others. When using the model it was felt that estimating the cost of materials was the component of the total cost of the part that was easiest for the users to estimate. Furthermore, it was felt by management that knowing the material cost of part was a key element of a purchaser's job requirement and if they were unable to have grasp on material costs then they were not doing their job properly.

On the other end of the spectrum the elements of a parts cost that were felt most difficult by management and sourcing staff to estimate were the levels of SG&A and profit. During the education course given to users of the model management suggested that for SG&A and profit an estimate of 15 to 20 % could be used as an approximation if the user lacked more reliable information. However, as the research project progressed it was found that the levels of SG&A and profit varied greatly based on the type of industry, the size of the producers company, the country where the product was produced and even varied between regions in a country.

A possible solution to the time factor and margin estimation issues is the creation of an industry level should-cost model. As mentioned in the literature review it was noted that SC analysis has many different forms and that the different forms can be used to support or augment the method being developed at AA. Two alternate approaches were found in the literature: firm specific and industry level should cost. Sower and Sower (2011) developed a version of industry cost analysis that utilizes data from a variety of public sources to determine direct labor, direct material, variable costs, SG&A and profit margins to evaluate the reasonableness of a supplier's price. These industry-specific models are often adequate as a means to develop expectations for reverse auctions, budgetary planning, preparation for price negotiations, and for estimating new or redesigned product costs.

The process suggested by Sower and Sower (2011) follows closely a method formulated by Monczka et al. (2009). The starting point for both approaches is to find the most current information for revenue, direct labor and direct materials cost for the industry in question. Both authors are located in the United States and their analysis is based on U.S. manufacturing firms. An easily accessible source of this kind of information can be obtained from the U.S. Census Bureau's Annual survey of Manufactures. This survey is an extensive review of industries, classified using the North American Industry Classification System (NAICS), and geographic locations, balance sheet and income statements, and other sources of information.

Using the suppliers NAICS code it is then possible to retrieve the information for the total annual revenue, total materials and total labor for the industry which best defines their structure. This material is then supplemented by information regarding cost of goods sold (COGS), SG&A, and profit margins from a secondary source such as; Morningstar, Bloomberg or DataStream. The author was able to use S&P Capital IQ and Bizstats for this part of the cost model.

Using the NAICS code 33261, which represents the spring and wire product manufacturing segment, the following information was downloaded from the U.S Census Bureau's website:

**Table 1 NAICS Code**

2007 NAICS codes and NAICS-based rollup code	Meaning of 2007 NAICS codes and NAICS-based rollup code	Year	Annual payroll (\$1,000)	Production workers wages (\$1,000)	Total cost of materials (\$1,000)	Materials, parts, containers, packaging, etc. used (\$1,000)	Value of products shipments (\$1,000)
33261	Spring and wire product manufacturing	2011	1,684,047	1,040,863	4,547,418	3,854,222	8,278,022

The column labeled "Value of product shipments" is the estimate for the annual revenue for the industry while "Production worker wages" and "Material, parts, containers, packaging" represent

total wages and material costs, respectively. Using these figures the relative percent of revenue for labor and materials is then determined for the industry.

**Table 2 Direct Costs**

Revenue	100%
Direct Material	47%
Direct Labor	13%

Other adjustments were made for direct labor and materials but since for simplifying the example are not explored in detail. For example electricity and fuel consumption was removed from the cost of materials since this would be part of the estimate for manufacturing overhead which is derived from the secondary information.

From S&P Capital IQ and Bizstats, detailed information was retrieved. This information was based on income statement, balance sheets and cash flow statements compiled from firms in the plastics industry.

From this source the following margin information was found:

**Table 3 Margins**

Sales	100,00%
Cost of Sales	62,71%
Gross Profit	37,29%
SG&A	30,13%
EBIT	7,16%

With the margin data now obtained it is possible to determine the amount of variable costs and manufacturing overhead by taking the COGS amount from the secondary data and subtracting the percentages for labor and materials from the primary data. The balance of 2, 71% is the amount allocated to overhead. SG&A and EBIT estimates are then added to the primary data and a complete cost breakdown is then created.

**Table 4 Combined Figures**

	Revenue	100%		Revenue	100,00%
Cogs	Direct Material	47%	62,71%	COGS	62,71%
	Direct Labor	13%			
	Overhead	2,71%			
	SG&A	30,13%		← SG&A	30,13%
	EBIT	7,16%		← EBIT	7,16%

Using this information and the purchaser’s best estimate of the cost of the materials, used in the production of the part in question, a rough estimate of the cost elements can be created. For example if the purchaser estimates the cost of material used in the production of a metal spring to be 30 € then the total cost of the part is 30€ divided by the percentage direct material in the cost structure. In this example it is 47% which gives and a total part cost estimate of 63, 83 €. The total cost break down is given below:

**Table 5 Hypothetical Breakdown**

Material Cost	Should Cost	63,83 €	Revenue	100%
30,00 €	Direct Material	30,00 €	Direct Material	47%
	Direct Labor	8,30 €	Direct Labor	13%
	Overhead	1,73 €	Overhead	2,71%
	SG&A	19,23 €	SG&A	30,13%
	EBIT	4,57 €	EBIT	7,16%

With the breakdown of cost at the industry level the user can then compare the results with the breakdowns created by the deep process orientated should-cost. Large discrepancies may illuminate parts where further analysis may be required. For example, a large difference in manufacturing overhead may indicate that energy costs or rent paid for space used by production machinery may be over or under estimated.

In addition, to providing a validity check on the more detailed bottom up analysis, the industry level tool can be used as a standalone method to analysis the quote provided by a supplier.

Granted this method is a very general and lacks the detail breakdown of the other method. However the model can establish a starting point for a discussion with a supplier. Should a supplier offer a price which is in conflict with the model, the supplier can be asked to demonstrate why the model is inaccurate in this situation. This places the supplier in a position where they must either provide definitive cost data which support their position against the model or accept the validity of the model. Negotiations then can proceed in light of the new information. For example, if the supplier provides information that the model underestimates direct material costs, the discussion may then focus on the reasons for the difference. With the exception of an actual error in the model, the discussion may then focus on scrap rates, whether the supplier uses appropriate process controls, whether the supplier is using appropriate process optimization technologies, or whether the supplier is sourcing materials properly. Should issues be identified in one or more of these areas, the discussion may then turn to joint efforts that may be taken to improve the situation (Sower et al. 2009).

Beyond the realm of price negotiations, the industry level should cost model can be useful in discussions with those suppliers who freely share their cost information. Comparing this supplier's specific cost with the industry model can be valuable way illuminating areas of inefficiency in the supplier's processes which can be subjected to joint programs for improvement (Sower et al, 2009). As mentioned in the prior section, a supplier, who provided detailed cost breakdowns as part of their quote, was chosen as part of AA's new supplier development program. In the course of working closer with this suppliers inefficiencies in a production method were exposed and the correction of the method led to cost saving for both AA and the supplier.

An additional benefit of the industry level model is that is gives management an additional tool to review the results of the purchasing staffs more detailed should-cost review. Results similar to the industry level review can be seen as confirmation that the estimates are reasonable and that staff can act can then use the results as they best see fit. However, results that deviate from the industry analysis may point out an area for management and staff to examine in greater detail. A final use for the model as it may be used as an alternative for the more detailed analysis for purchases of a low priority.

### 5.2.1.1 Using the model in a real purchasing situation at ASSA ABLOY

The use of the bottom should-cost analysis at AA is still in the beginning stages of usage in the entrance systems division with training sessions being conducted routinely. Because the process is still under development there were no practical examples in which to conduct research on regarding the accuracy of the bottom up approach and the industry level should-cost models. However, during the course of the study a successful SCA was conducted by a sourcing team member who had recently completed the training course for the original model. The SCA was performed on a component that is a protective cover for the electronic component of a revolving glass door. The protective cover is composed of five sub-components, all of which are comprised of a plastic material. The five sub-components were broken down into detail, with the sourcing personnel visiting the suppliers manufacturing facilities and evaluating and recording the different processes involved and the machinery used in production. Additional information was provided by the supplier in the RFQ. The cost breakdown is presented below:

**Table 6 Practical Example**

Part Number	Material description	QTY	Direct Material		Direct Labor		Overhead		COGS	SG&A + Profit	Total Cost
			Value	% Total Cost	Value	% Total Cost	Value	% Total Cost			
N000916	ABS UV	1	5,45	<b>67,3%</b>	0,29	<b>3,5%</b>	1,35	<b>16,7%</b>	<b>87,5%</b>	<b>12,5%</b>	8,10
N000917	ABS121H BK	1	2,97	<b>62,5%</b>	0,17	<b>3,6%</b>	1,01	<b>21,4%</b>	<b>87,5%</b>	<b>12,5%</b>	4,74
N000918	ABS121H BK	1	2,93	<b>62,3%</b>	0,17	<b>3,6%</b>	1,01	<b>21,5%</b>	<b>87,5%</b>	<b>12,5%</b>	4,71
N000919	PC 143R	1	0,02	<b>6,6%</b>	0,06	<b>25,0%</b>	0,14	<b>55,9%</b>	<b>87,5%</b>	<b>12,5%</b>	0,25
N000912	Luran 368R	1	4,62	<b>64,8%</b>	0,29	<b>4,0%</b>	1,33	<b>18,7%</b>	<b>87,5%</b>	<b>12,5%</b>	7,13
											<b>24,93</b>

Unfortunately this detailed should cost was created by a team based in China with Chinese suppliers. This exposes a very serious limitation to the industry level should cost analysis. The level of detail in the model cannot be replicated for Chinese industries. The model developed

was derived from U.S. Census Bureau and is applicable only to firms in the U.S., Canada and Mexico. The industry percentages suggested by this model illuminate many of the issues the company is dealing with when trying to evaluate and supplier costs in different regions. The table below shows the breakdown for the plastics industry in North America:

**Table 7 Plastics Industry Margins**

U.S. Industry Description	Direct Materials	Direct Labor	Overhead	COGS	Gross Margin	SG&A	EBIT
Plastics and rubber products manufacturing	49,70%	12,49%	6,00%	68,20%	31,80%	23,94%	7,87%
Plastics product manufacturing	<b>48,71%</b>	<b>12,21%</b>	<b>10,20%</b>	<b>71,12%</b>	<b>28,88%</b>	<b>22,23%</b>	<b>6,65%</b>

In general labor rates, SG&A and profit margins are higher in the U.S. and Europe when compared with China. Using the information above to create a part cost breakdown resulted in a price of 32,83 which is 32% higher than the cost estimate based on the in depth SCA performed by the sourcing team in China. The results are presented below:

**Table 8 Industry Level Comparison**

Part Description	Part Cost	Direct Material	Direct Labor	Overhead	SG&A	EBIT
ABS UV	11,19	5,45	1,37	1,14	2,49	0,74
ABS121H BK	6,10	2,97	0,74	0,62	1,36	0,41
ABS121H BK	6,02	2,93	0,73	0,61	1,34	0,40
PC 143R	0,04	0,02	0,01	0,00	0,01	0,00
Luran 368R	9,48	4,62	1,16	0,97	2,11	0,63
Total Cost	<b>32,83</b>	15,99	4,01	3,35	7,30	2,18

Unfortunately it has not been possible to find similar information on material and labor costs from the Chinese governments statistical service. However, margin breakdowns on the industry



level were found using S&P Capital IQ. After discussion with the supervisor at AA responsible for the development of the should-cost program it was decided that even partial cost breakdowns could be beneficial for sourcing personnel. In particular, and as mention earlier, margin levels for suppliers were found to be the most difficult for purchasers to estimate. Here the purchasers can use their estimates for materials, labor and overhead and substitute the estimates provided by the industry tables if they feel their own estimates are unreliable or for sake of comparison.

With this in mind and using S&P Capital IQ margin breakdowns at the industry level were created based on region and material and labor costs were added if a reliable information source was found. A sample of some of the cost margin data available for Chinese industries is given below:

**Table 9 Industry Margins, China**

China Industry Classification	COGS	Gross Margin %	SG&A Margin %	EBIT Margin %
Plastic and Synthetic Resins, China	91,27%	8,73%	4,83%	3,30%
<b>Plastic Products, China</b>	<b>87,03%</b>	<b>12,97%</b>	<b>7,97%</b>	<b>4,30%</b>
Glass, China	76,50%	23,50%	9,13%	15,30%
Steel, China	93,03%	6,97%	3,87%	2,67%
Iron And Steel Foundries, China	93,20%	6,80%	3,57%	2,87%
Aluminum, China	91,23%	8,77%	3,07%	6,13%

By substituting the gross margin of 12,97 percent, for the plastics industry in China, into the into the original cost model the total price estimate is now 25,07 RMB. This is difference of ,14 RMB. The original estimate of gross margin for the supplier of 12,5 was in retrospect quite close to the historical estimates provided by S&P Capital IQ.

The actual price quote provided by the supplier was 29,45. This price included costs for assembly, packaging and shipping which totaled 4,3. Removing these costs from the quoted price we have 25,15 which represents the price of manufacturing the parts. This puts the accuracy of the detailed SCA and the industry SCA at 99,1% 99,6% respectively. However, the accuracy of the model is not the main benefit to be derived from the purchaser. Here with both estimates of

SG&A and profit margin have very close estimations the purchaser can now focus on other aspects of the suppliers quote for deviations in cost. In this case it was found that the suppliers estimate for materials was higher than the detailed SCA. This was attributed large to the fact that the supplier made no provision for scrap rates and the reuse of scrap material which has an economic value. The supplier attributes to the unique of the material and its structure which tends to crumble easily and therefore has limited scrape value. The purchasing team finds this a dubious rationale and is currently negotiating with the supplier for cost reduction based on this element of the cost structure.

#### **5.2.1.2 Model improvements and integration**

The industry level should-cost model will in conjunction with the primary should-cost model will improve the reliability of the model. Through triangulation of the results areas of under or over- estimation may be revealed led to further investigation of the results. In addition the model can be used as a starting point for the negotiation process. The additional information regarding industry level margins also aids the purchasers by providing them with greater financial information on their suppliers which helps fill a gap in their knowledge and skills which was revealed during the study. By increasing the reliability of the model and increasing the financial knowledge of the purchasers it is hoped that this leads to greater confidence in the results of the final results of detailed should-cost analysis. The greater confidence in the results will promote better and more accurate fact based negotiations and possible cost reductions in components the end results. By helping the firm achieve its strategic goal of cost reduction the purchasing function, with an improved costing model, promotes its status within the firm. This increased status of the purchasing function will in turn promote greater internal integration with the larger organization.

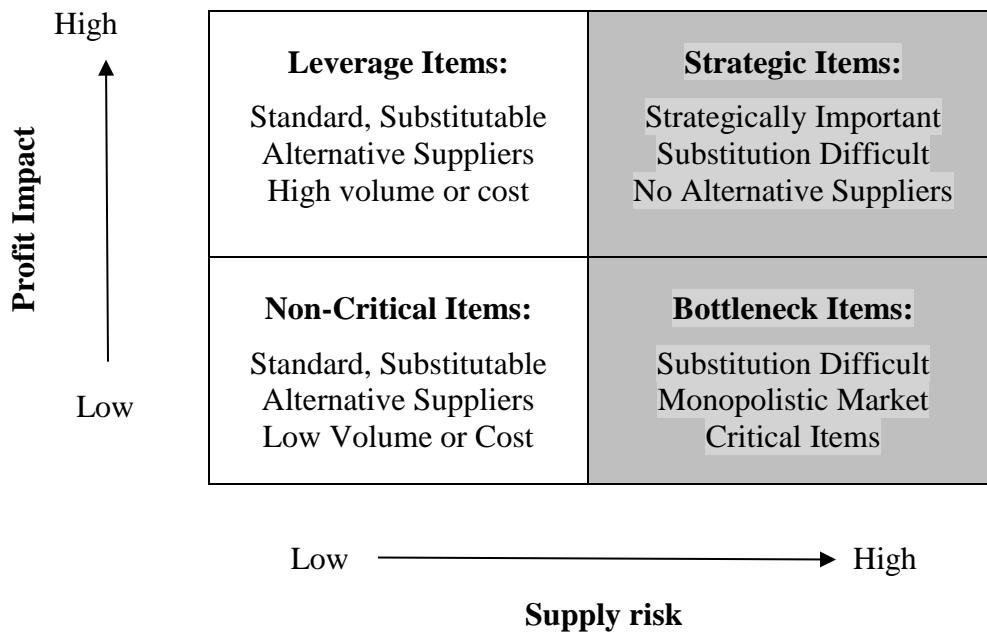
#### **5.2.2 Purchasing portfolio models and should-cost analysis**

During the initial interviews and emails exchanges a common issue among manager and their purchasing staff was that they had limited time and that conducting a should-cost analysis on all purchases was not possible given due time constraints. Furthermore, some had stated that even if there was time to review all parts they doubted if the results would justify such an effort. One possible solution, suggested by Kraljic, (1983) is to categorize purchases into different categories or portfolios and from there apply a unique strategy for each category. Gelderman and Van

Weele (2005) maintain that “purchasing portfolio analysis has subsequently become the dominant approach to what the profession regards as operational professionalism”.

Kraljic introduced the first comprehensive portfolio approach for purchasing and supply management. Kraljic’s approach includes the creation of a portfolio matrix that classifies products on the basis of two dimensions: profit impact and supply risk (‘low’ and ‘high’). The result is a 2 by 2 matrix and classification of purchases into four categories: bottleneck, non-critical, leverage and strategic items Kraljic (1983).

Figure 6. Kraljic model (Kraljic, 1983)



Kraljic (1983) contends that the profit impact of purchase can be defined in terms of the volume , percentage of total purchase cost, or impact on product quality or business growth. Supply risk is assessed in terms of availability, number of suppliers, competitive demand, make-or-buy prospects, storage risks and substitution alternatives. Using these criteria, the company sorts out all its purchased items into four groups: strategic (high profit impact, high supply risk),

bottleneck (low profit impact, high supply risk), leverage (high profit impact, low supply risk), and noncritical (low profit impact, low supply risk).

Each of the four categories requires a unique approach towards suppliers. Non-critical items require efficient processing, product standardization, order volume and inventory optimization. Leverage items allow the buying company to exploit its full purchasing power, for instance through tendering, target pricing and product substitution. Bottleneck items alternatively can cause problems and potentially shut down production therefore tactics such as; volume insurance, vendor control, security of inventories and backup plans are recommended (Kraljic, 1983).

For strategic items Kraljic (1983) suggests a more detailed approach but essentially a company wants to maintain good relations with these suppliers and modify the relationship based on the relative strength of bargaining power between the organizations. This is achieved by plotting the buying strengths against the strengths of the supply market, three basic power positions are identified and associated with three different supplier strategies: balance, exploit, and diversify.

The exploitation approach is recommended when the purchaser has the stronger bargaining position. Here the organization should make the most of your high buying power to secure good prices and long-term contracts from a number of suppliers, so that you can reduce the supply risk involved in these important items. You may also be able to make "spot purchases" of individual batches of the item, if a particular supplier offers you a good deal. Where power is balanced Kraljic (1983) recommends a middle path between the exploitation approach and the diversification approach described below. Diversification is accomplished by reducing the supply risks by seeking alternative suppliers or alternative products.

Alternative purchasing portfolio approaches have been developed since Kraljic's groundbreaking work. For example, the portfolio model developed by Olsen and Ellram (1997) focuses on supplier relations. A conceptual framework was developed for determining which cost analysis method was appropriate. In this framework purchases are classified along two dimensions: (1) whether they are ongoing or one time and (2) whether the relationship desired with the supplier is an arm's length one or a strategic alliance. The result is a matrix of four types of purchases. Purchases that are one time, repetitive, but of a low-monetary value, and that the buyer wishes to

maintain at arm's length are labeled "low impact". However, continuous purchases and an arm's length relationship are deemed "leverage purchases". Where the buyer wishes to have a strategic alliance involving a onetime purchase the purchases are labeled "critical projects". Finally, for continuous purchases where a strategic alliance is desired are called "strategic purchases".

Ellram, (1996) finds that should-cost analysis is appropriate for purchases of the leverage type.

Whether using the Kraljic's model or an alternative version leverage type purchases seem a logical starting point for prioritizing the use of the should-cost tool. In Kraljic's model, leverage purchases are of high profit impact but low supply risk. With many suppliers to choose from the company has greater bargaining power and use this to demand greater details regarding costs from their suppliers. These detailed cost breakdowns can be used in conjunction with the should-cost model to find areas for potential cost reductions.

Purchases of a strategic nature may also be suitable for should-cost reviews. Here Kraljic recommends developing stronger relations with the suppliers and a should-cost review of these suppliers may reveal inefficiencies in their processes that AA may be able improve either through VA/VE or other efficiency programs, like lean, with benefits accruing to both organizations. Purchases of the non-critical and bottleneck type should be of a low priority with consideration given to whether the time devoted to the analysis is justified by any potential cost savings. Furthermore the non-critical and bottleneck items, if in a suitable geographic location may be suitable for review using the industry-level model.

There is however one caveat to these suggestions and that involves the purchasing situation in China. Through the course of this project the author has noted multiple instances where purchasing staff and management have stated that they do not have a good handle on what is the true cost of materials procured in China. In addition some managers have expressed doubt regarding not only the integrity of their suppliers but also their purchasing staff in China. For these reasons it is suggested that should-cost reviews need to be prepared on all purchases made in China following the priority guidelines from the purchasing portfolio model. As explained earlier in the paper detailed SCA cost analysis and RFQ's force the suppliers to provide cost details that must later justify in relation to the should-cost results. Furthermore, a purchaser must later justify a purchasing decision that seems to be in conflict with what the results of the should-cost results suggested.

In addition should-cost reviews must be supported by an independent should-cost team comprised of company employees from different functional units that do not have direct contact with the suppliers under review. If the relationship between the purchasing staff is under suspicion for questionable actions is it not reasonable to assume that there should cost reviews may also be problematic. Purchasers and suppliers can develop close relations which do not have to be of a disreputable nature and because of these relationships it is not uncommon for purchasers to have suppliers they consider their favorites.

This can be for various reasons not directly related to cost for example, a supplier may preferred based on quality or reliability issues. However, cost issues can force a purchaser to move to another supplier when faced with a bid lower than the current vendor's price. Alternatively the purchaser can suggest informally that if the current provider wishes to keep the business they have to reduce their cost to match the new bid. This manner of informal communication is not uncommon and has been confirmed through conversation with purchasers and managers within and outside the subject organization. Maintaining a good relationship with a supplier that has proved their worth over the years and the method chosen to maintain the relationship is understood given its context.

However it is not difficult to imagine that a purchaser may have a preferred relationship with a supplier based on other but less justifiable reasons. In addition this informal communication can flow both ways with a supplier providing a purchaser with sufficient cost information to make their should-cost estimate appear accurate but not delivering much in terms of actual cost reduction. For this reason it is suggested that should-cost estimates of the staff in China be reviewed and evaluated intermittently by a team of independent should-cost auditors.

### **5.2.3 Development of should-cost training, team and database**

#### **5.2.3.1 Should cost training workshops**

In their review of the U.S. Air Force should-cost program, the Rand Corporation made numerous suggestions to improve the program. Two of these suggestions seem relevant to the present situation. The first suggestion was that the military's should-cost program staff be expanded from its current status, where reviews are done on an ad-hoc basis and then disbanded once the review was completed, to a more permanent staff that conducts reviews routinely throughout the organization. The primary reason cited for expanding the program was that under the old method

the collective knowledge gained from the reviews were lost and when new teams were created key factors needed to be relearned by the review staff. Here it is hoped by having a permanent staff time is saved by not having to start at ground zero for each new review. Instead the teams have a sound base of knowledge from which to commence new reviews and then use the team's collective knowledge to adapt to the new purchasing situation.

The Rand review provided alternate forms in which the program could be expanded. Initially the SC staff could consist of a small team that provides training and works with local teams to conduct reviews or it could be a larger staff consisting of personal from different functional units that conducts reviews independently throughout the organization. However, the additional cost incurred in expanding the staff was cited as the main disadvantage to this alternative (Boito et al., 2012).

A similar format could be adopted at AAES where the program is expanded over time with alternative forms chosen to suit the goals of the organization. The first alternative/suggestion is to expand the training program. It has been observed that involving employees for different functions has had a positive effect promoting communication and understand between the various function. However, the training is limited to personnel in the sourcing, production and design functions and does not include representatives from the marketing/sales, logistics and finance functions. All functions can benefit from of greater understand of the cost drivers involved in the creation of the firms production. Additionally the addition of functions can also provide insights that are unique to their function. In particular the marketing function can provide insight regarding the needs of the customer and the customers' customers. Reciprocally the marketing staff can develop a greater understanding of how meeting the demands of the customer affects the objectives of the other functions involved in bring the product to market.

The training program, in its current form, includes the training of staff that generally works within the same sub-unit. Expanding the training to include employees form the other sub-units of AAES and the other divisions comprising the larger ASSA ABLOY organization is another suggestion. The logic for this is similar to rationale for expanding the training to include more functional representatives. Greater involvement of people from different sub-units and division promotes greater communication and understanding of each other's role within the larger organization.

In addition to expanding the training program on a functional and organizational level it is also proffered that the education be expanded on a cultural level. During the course of this study the issue of China and AAES's purchasing staff were a frequent topic of discussion. One issue in particular that mentioned by management was the deficiency in the negotiation skills of its staff in China. This could be in part due to different cultural approaches to negotiations.

A former purchasing manager for a large multinational corporation commented that her organization had similar issues with their local Chinese staff. In this case the staff was uncomfortable taking the initiative in regards to negotiation and supplier dealings unless they were given specific guidance from higher management as to how react to any divergence from the original negotiation strategy. It was felt that, in a similar situation, the European sourcing personnel were more comfortable making decisions without prior consultation with their superiors.

The company's solution to this issue was to further develop the sourcing staff's negotiation skills. This was accomplished by having negotiation skills workshops that were comprised of local staff from the different geographic locations, primarily Europe and China. Here the Chinese staff received insight as to how their colleagues in Europe would deal with different negotiation scenarios while the European staff was educated on the norms and practices of doing business in China.

The suggestion for the current should-cost training program is two-fold: First expand the training to include more practical guidance as to how to use the results from the should-cost review in subsequent negotiations, second expand the composition of the training sessions to include staff from different geographic locations thereby promoting the sharing of local knowledge amongst the different groups.

A final suggestion in regards to the training workshop, in its current form, is to include more financial statement analysis and financial benchmarking. Giunipero et al, (2006) find that supply managers of the future will need to be more strategically orientated and to do so they must have the correct skill set. Improved communication, technical and financial skills were found by Giunipero et al, (2006) to be necessary to maximize purchasing contribution to an organization. In regards to financial skills the authors feel that individuals with a solid knowledge of financial



income statements, balance sheets, and the mechanics of financial accounting will be required to establish the business case for sourcing strategies. Since AAES has already developed a financial analysis training prototype it would not be difficult to incorporate this material into the current should-cost training material.

### **5.2.3.2 Should-cost teams**

Currently the should-cost tool in practice is only used by staff in the purchasing function. However both Ellram's (2002) study and the review by the Rand Corporation cite the benefit derived from having should-cost teams that were multi-functional in composition (Boito et al., 2012). This was found to be particularly beneficial in the area of new product development. As Ellram, (2002) noted, in the example of Deere Company, should-cost was used in conjunction with other costing methods to determine whether cost gaps were due to design or supply cost issues. The suggestion here is that each division has a dedicated should-cost team to work with R&D during the early phases of new product design in order to promote greater cost efficiency.

Cost savings were an important issue exposed in the review of the United States Air Force's use of should-cost by the Rand Corporation. The study found little evidence of actual cost savings. Granted the lack of savings was partially attributed to the unique nature of the military contract process, where potential cost savings were lost due to bureaucratic incompetence (Boito et al., 2012). Therefore there suggestion was that, before expanding the program, the U.S. Air Force should determine whether should-cost actually finds cost savings and if these savings are any better than the savings generated by other cost saving techniques.

Since the should-cost program at AAES is still being developed there have not been any examples of how using the model has led to cost reductions from suppliers. It is suggested here that instead of waiting for the purchasing staff to eventually use the model and deliver their results to management in a price meal basis that an should-cost audit team be created.

This team could conduct reviews independently and the results reviewed to determine whether the cost savings achieved outweighed the cost of conducting the reviews. Since the hardware and components division is in the unique position of supplying components not only to its sister companies but also their competitors the author feels that this may be the logical starting point for this enhanced manner of review. Any potential savings will be passed on to internal

customers while the components divisions profit margin would expand on the sales to external customers.

If real savings can be demonstrated that outweigh the costs incurred in achieving them then perhaps a permanent team can be created that reviews purchasing costs throughout the various sister companies. These teams could be rotated on a permanent basis with departing members returning the various companies within the larger group and using the knowledge gained to improve their procurement process.

### **5.2.3.3 Should-cost Database**

The last suggestion offered by the Rand study was that the U.S. Air Force follow an industry best practice and create and maintain a corporate-level knowledge database that can be used for contract negotiations (Boito et al., 2012).

The industry best practice is to assign people the responsibility to maintain it and for that duty to part of their job description and performance appraisal. In the Air Force, relevant data, such as those on cost, schedule, earned value, and technical issues, are collected by members of various disciplines or organizations but are often not shared. These estimates and schedules could be used to build databases and develop better cost-estimating relationships which reduce redundancy in time and effort (Boito et al., 2012).

A similar suggestion is offered here. As the use of the model throughout the organization expands there undoubtedly will be an occasion where staff in one location is conduct a review on a part that is similar to one that has been conducted previously in another part of the organization. A centralized should-cost database at AAES could help purchasers make more informed decisions when they can compare their results with previous estimates. A possible disadvantage to having a centralized database is having too much sensitive cost information in one location. The potential for this information to fall into the hands of a competitor cannot be overlooked.

However, these should cost reviews are only estimates and not the actual price paid for a component. In addition the information contained in the database could be limited to the part type, where it was produced and a breakdown each cost elements percentage of the overall cost. The actual prices for each element can be omitted. With this information a purchaser can have a

better grasp of for example, what the percent of labor is for a similar type of plastic part produced in China was without knowing what the actual price estimate.

#### **5.2.3.4 Additional Suggestions**

During the course of this study the author was frequently asked, “Who will be responsible for the maintenance of the model” or “will we get monthly updates of the model”. These questions bring up the larger issue of ownership. That is to say, who will take responsibility for not only maintaining the model ensuring that the model is being used by the staff in the manner it was intended to be by management. Comments from managers from outside AA revealed that many times programs are initiated with great fanfare in the beginning but eventually that lose energy and eventually are forgotten or rarely used in practice. It was suggested that not only does someone need to be given official responsibility for the program but also act as an ambassador to promote the initiative with the larger organization.

In the Ellram (2002) study, finance was typically the owner of the should-cost program. However, since the model and training is currently handled by the VA/VE managers and given the strong relationship between should-cost and VA/VE analysis it seems logical that care of the program remain with these managers. However, what is suggested is that one of the VA/VE managers or an additional employee be given the responsibility of taking ownership of the should-cost model and the database. In addition this person will also act as liaison between the other VA/VE managers in the other divisions within ASSA ABLOY. This employee will not only maintain the model but share information with the other divisions regarding how the model has been used effectively by staff in the other divisions. In addition this person can take ownership of the processes in the model and make improvements based on feedback from the purchasers and consultation with manufacturing staff that have process specific knowledge.

#### **5.2.4 Summary of conclusions from the second research question**

Suggestions to improve should-cost program based on factors revealed in question one.

- Technical improvements made to improve user’s confidence in the end result.
- Addition of industry-level should cost and financial margin tables to improve reliability of results and augment users financial acumen.
- Integration of should-cost model with purchasing portfolio models to prioritize components for should-cost analysis based on purchase category and cultural elements.
- Expand training to include more functions.

- Expand training to promote cross-unit and cross-divisional interaction.
- Expand training to promote cross-cultural interaction.
- Combine should-cost training with financial statement training (Top-down should-cost).
- Expand use of should-cost to include more functions in the development phase of new products.
- Demonstrate actual cost savings through use of independent should-cost pricing team.
- Develop organization-wide should-cost database.
- Suggest upper management clarify ownership of the should-cost program and provide necessary support.

## 6.0 Conclusions, Contributions, Limitations and Suggestions

### 6.1 Conclusions

The primary purpose of this study was to examine whether the new cost saving program (should-cost) initiated at ASSA ABLOY Entrance Systems could aid in the promotion of supply chain integration within an organization. The results seem to indicate that should-cost does indeed promote integration, primarily internal integration. The should-cost methodology with its emphasis detailed cost breakdown serves to promote the education and improve the skills of purchasing personnel in regards to the processes involved in the manufacturing of the components for which they are responsible for purchasing. With this greater knowledge they are better able to access the price quotations, from their suppliers, and base their decisions based on facts and not just the lowest price. Furthermore the knowledge gained from the should-cost process, by revealing areas in the supplier's quotation breakdown in which to focus, allows the purchasers to be more adept in the negotiation process. More effective negotiations, and the potential cost savings that come with them, will promote the parent companies larger cost savings objectives. Improved functional coordination has been cited as one of the key steps in the development of internal integration within a firm (Fawcett and Magnan, 2002).

Beyond improving the abilities of the purchasing staff to work within their own function the should-cost program also improves their knowledge of other internal functions, particularly production and R&D. The greater knowledge of how the production process works allows the purchasing staff to communicate more effectively with these functions. Similarly these functions are also better able to communicate with their colleagues in other functions. Improved communication with other functions has been found to be an important antecedent of internal integration (Pagell, 2004).

Furthermore, improving the knowledge and skills of the purchasing function which gives the staff the ability to better achieve the firm's strategic goals has been demonstrated to promote integration (Giunipero et al., (2006); (Paulraj et al., 2006). By moving away from routine activities such as order placement and expediting, to strategic value-added tasks like value analysis and participation in product and process design the purchasing function has become a more strategic in nature (Narasimhan and Das, 2001). Greater levels of strategic purchasing have

been associated improved supply chain performance for both buyer and supplier firms (Paulraj et al., 2006).

The should-cost program has found to have little direct impact on promoting integration externally. Upstream integration with customers was not the intention of management when they implemented the should-cost program, at ASSA ABLOY so the lack of support for improved integration was of little surprise. In terms of downstream integration the detailed quotation requests, that are part of the should-cost quote evaluation process, may indirectly promote integration by revealing quality suppliers for inclusion in the new the supplier development program at ASSA ABLOY Entrance Systems. In addition the improved ability of the purchasing function to act strategically may have a positive, but indirect effect, on external integration with its suppliers.

In regards to the limitations of the program: it should be noted that while should-cost seems to promote integration among the functions of purchasing, production and R&D this may be limited by the incentive programs between the functions. If cost reduction is the strategic goal of upper management then the incentive programs of all functions must reflect this imperative. Another limitation of the program is that these cross-function training sessions currently only involve members from functions within the same division of ASSA ABLOY Entrance Systems. However, the training sessions do not involve members from other divisions and this limits the extent to which should-cost can improve cross-functional integration within the organization.

The second research question involved improving the program in order to promote its role in integration and it appears that this goal was also achieved. In regards to original model improvements were made over the course of the study. Additional material was added to help the purchasing staff better estimate material and labor costs. Currency rates were updated and additional processes were added to the model.

The results of interviews and emails exposed the need for better estimates of profit margins and overhead estimates to use in the final stages of pricing in the model. Further exploration of the issue in conjunction with the evolution of the literature review led to the development of the industry level should-cost model. The model can benefit both purchasers and managers by providing an alternate estimate to use as a check on the results of the information produced by

the more detailed model. Comparison between the two estimates can help spot areas in a supplier's quote that need further examination.

In addition normative suggestions, based on best practices from military and commercial uses of should-cost reviews, were given. In particular use of purchasing portfolio models, to help prioritize the use of the should-cost model based on the type of the purchase, was a key take away from the literature review. Additionally a modified version of the Kraljic model was suggested for purchases made in China. Finally, practical suggestions were given to expand the use of training and should cost teams to encourage greater communication and understanding of the roles within the organization which in turn helps further internal integration (Pagell, 2004); (Fawcett and Magnan, 2002).

## **6.2 Academic Contribution**

This study through, primarily, interviews, email correspondence and participant observation explored a subject area that is under researched in academia. There is a dearth of information in academic studies regarding the use of the strategic cost method of should-cost in academic research. This study adds to the body of knowledge on this subject by examining its implementation and use at a large corporation.

In addition as Pagell (2004) notes that there is lack of study regarding the antecedents of integration and how integration is actually achieved. Similarly as Gelderman and Semeijn (2006) observe, little is known about the actual integration of purchasing across worldwide business units. The strategic cost method, should-cost, was observed to be an integrator and promoter of internal integration at various levels within the case study organization. Consequently this study helps narrow these research gaps and adds to the body of knowledge regarding integration.

Additionally the study suggests an additional use for the Kraljic (1983) in costing situations where firms sourcing decisions are obscured by possible ethical issues regarding suppliers and possibly their own purchasing staff. A final contribution is that should-cost can also aid in external integration by illuminating potential vendors to develop a closer relationship with through supplier development programs. This serves to add to the body of knowledge regarding downstream integration.

### **6.3 Practical Contributions**

On a practical level should-costs greatest contribution could be as an educational tool. Firms, by implementing a similar program, can not only promote the development of its purchasing staff but also raise the knowledge of the other functions within the firm. Should-cost provides the user with increased knowledge of the processes that are involved in the manufacture of the purchased components. In addition it leads to greater knowledge of their particular suppliers use the processes in their production and also their cost structure.

Should-cost analysis can be time consuming depending upon the number and complexity of components so users may need to prioritize their efforts. With this in mind suggestions were made as to how firms can prioritize their effort based upon the purchase type and purchase situation. In addition, a method for analyzing a suppliers cost at the industry level was developed. Here this model can be used to triangulate the results from a should-cost analysis of a part and a financial analysis of the individual supplier. In addition the model can be used by managers to compare with the results of their staffs more detailed company level should-cost analysis. Additionally suggestions were given as to how best develop should-cost training, teams and database for greater effectiveness and efficiency. The improved effectiveness of the model leads to improved employee skills, which have been found to be an important factor in promoting integration with a firm (Giunipero et al., (2006).

### **6.4 Limitations of the Study**

One limitation of the study was that the interviews were primarily with management and the dialogs with the purchasing staff were via email. Here the author loses some of the insights and thought development that come with unstructured interviews. Additionally the viewpoints of the purchasers based in China were not represented in the paper. Here the author felt that the issues of corruption were of too sensitive an issue to pursue and not the primary purpose of the paper. The issue of corruption is a concern to companies sourcing in China and was validated with interviews with managers outside the ASSA ABLOY organization who have worked with multinational firms in purchasing and sourcing in China.

### **6.5 Suggestions for Future Research**

As mentioned in the limitations section this study involved only a single division with an organization it would be logical to suggest an examination of other companies that are using



should-cost for comparison and to see how different organizations use the methods and how these differences either promote or hinder integration. In addition this study discussed only briefly the issue of organizational culture and integration. It would be interesting to examine how organization culture will affect the development of strategic cost programs, such as should-cost, in an organization and ultimately what that affect has on integration.

The author believes that the real strength of the should-cost program and its application at ASSA ABLOY Entrance Systems lies in its educational merits. However the primary reason for its introduction at ASSA ABLOY and the Entrance Systems division is cost reduction. There has been little academic research in regards to whether should-cost-reviews actually lead to cost savings. A possible suggestion would be to examine the should-cost program at ASSA ABLOY, at future date, to review the results of the program quantitatively to determine if any significant reductions in procurement costs have been achieved. Furthermore it would be of merit to examine should-cost in relation to other strategic cost programs not only in regards to cost savings but also how they develop or deter integration.

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### Appendix 3. Interview List

<b>Manager</b>	<b>Position</b>	<b>Interview Type</b>	<b>Time/Hr.</b>
A	Sourcing Manager	In-Person	1
B	Product Designer	In-person	1
C	Sourcing Manager	Phone	1,15
D	Global Sourcing Director	In-Person	1,15
	Global Sourcing Director	In-Person	1
E	VA/VE Manager	In-Person	2
	VA/VE Manager	In-Person	1
	VA/VE Manager	In-Person	1
F	Senior Project Manager, R&D	In-Person	1,5
G	Group Senior Buyer	In-person	1
H	Production Manager	Phone	1,15
I	Sourcing Manger	In-Person	1
	Sourcing Manger	Phone	1
J	President AAES	In-Person	1
K	External Sourcing Mgr.	In-person	1
L	Senior Executive MNC.	Phone	2