Supplier Relationship Management in Intelbras

Improving quality through buyer-supplier cooperation

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Supplier Relationship Management in Intelbras; Improving quality through buyer-supplier cooperation

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Abstract

Competitive forces in today’s business world are putting firms under pressure to improve quality, delivery performance, and responsiveness while simultaneously reducing cost, which for many companies have resulted in increased outsourcing of activities. Consequently a greater dependency on suppliers’ performance in terms of quality and delivery service has evolved.

Companies are therefore exploring ways to leverage their supply chains, by developing their supply chain structure and continually evaluating the role of suppliers in their activities. As supply chains have evolved, a number of different supply chain structures have emerged, based upon the networks and the level of collaboration between the buyer and supplier. The optimization of a supply chain process has proven to lead inevitably to a growing interdependence among supply chain partners. Treating all suppliers the same is no longer feasible, and a failure to recognize that some suppliers have different needs than others.

The research conducted in this thesis was aimed at finding strategies, and approaches of effectively working with supplier relationship management.

The empirical study was conducted at Intelbras, a Brazilian electronics manufacturer, which has a large percent of its production outsourced. Intelbras has recently segmented their supply-base into two segments; suppliers of commodity type items and suppliers of critical items. For suppliers of critical items, quality agreements were developed to attend the special needs of selected items.

The findings of the research was compared and analyzed with the empirical data, which resulted in a few suggestions of possible future developments for Intelbras.

Keywords: Supplier Relationship Management, Strategic Segmentation, Total Cost of Ownership, Buyer-Supplier Cooperation, Quality Agreement
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Appendix 1 Orange Card
1. Introduction

1.1 Background

Competitive forces are putting firms under pressure to improve quality, delivery performance, and responsiveness while simultaneously reducing cost. (Kannan and Choon Tan, 2006) Furthermore, Larson (1994) states that quality and cost are the main two concerns for professional buyers. In response, Kannan and Choon Tan (2006) states that ‘firms are increasingly exploring ways to leverage their supply chains, and in particular, to systematically evaluating the role of suppliers in their activities.’

According to Scanell, Vickery and Dröge (2000) this has for some companies resulted in a reduction and streamlining of the supplier base and developing closer relationships with suppliers. As Handfield and Nichols (1999) stress: ‘Without a foundation of effective supply chain organizational relationships, any effort to manage the flow of information or materials across the supply chain is likely to be unsuccessful.’

1.2 Company profile

Intelbras is a Brazilian electronics manufacturer with its headquarters and main factory located in São José, a city in the metropolitan region of Florianopolis in the state of Santa Catarina, Brazil. They have two other manufacturing facilities located in Santa Rita do Sapucaí and Manaus. Furthermore, the company has two offices abroad, located in Mexico and China. As of 2012, the company had 1.883 employees in total. Intelbras is a manufacturer of telephones, telephone PBX systems, networks and electronic security systems which are exported throughout Latin America and parts of Africa. The company exports to 14 countries in total, however, their biggest market is within Brazil.

Intelbras is sourcing almost all of their components from China as a practice of CKD\(^1\) and SKD\(^2\). They are also a purchaser of OEM\(^3\) products which are refined by Intelbras. This is the main reason for Intelbras being a competitive force in their market, as Brazil is not one of the cheaper countries to produce in. As a consequence, a lot of pressure is put on the supply chain to perform and deliver the quality needed to make an attractive product.

Intelbras has recently segmented their supply-base into two segments; suppliers of commodity type items and suppliers of critical items. For suppliers of critical items, quality agreements were developed to proactively deal with quality issues. Consequently, Intelbras are together with its suppliers developing tests of how to detect variance in items sourced from given suppliers. Furthermore, the company is using a handful of different quality tools to solve supplier quality issues reactively including the Ishikawa diagram, eight disciplines problem solving and a series of different lean tools.

\(^1\) Complete Knock-Down – A practice where a complete set of disassembled parts are exported to a foreign country.

\(^2\) Semi Knock-Down – A practice where an incomplete set of disassembled parts are exported to a foreign country

\(^3\) Original Equipment Manufacturer – Manufactures products that are retailed by a purchasing company’s brand name
1.3 Problem Definition

Intelbras has previously had issues with quality in terms of variance and defectives. Intelbras has recently taken action to segment their supply chain and further engage critical suppliers in signing quality agreements to increase and develop self-inspection for critical items. In the past, there has not been any continuous work and development of suppliers. Furthermore, suppliers have been changed frequently to persistently find cheaper alternatives on the market. Intelbras has recently acknowledged that this strategy is not sustainable for some of their key items, which must keep a high quality. By constantly shifting suppliers, the company always has had to deal with new problems and defects for essentially the same item.

Montgomery (2009) defines ‘Quality improvement’ as the reduction of variability in processes and products. A constant rearrangement of the supply-base could cause variance in items sourced by Intelbras. Since the company is a purchaser of CKD, SKD and OEM products, the level of quality is to a big extent the result of the procurement strategy. In other words, to deliver a better product to the customer, the company has to become a better purchaser. Therefore, it is important for them to have more control over some of their suppliers and cooperate for continuous improvement. To deal with this matter, Intelbras has started to develop quality agreements with suppliers that are supplying the company with “critical items”. The initiative of developing quality agreements means a larger amount of shared information which is one of the key characteristics of a cooperative relationship with a supplier according to Harrison and van Hoek (2011). This study aims to investigate the supplier relationship management at Intelbras and to suggest a framework to further develop their supply-base towards improved quality and possibly reduced total costs.

1.4 Purpose and Objectives

The scope of this thesis is to answer the following questions:

- How are Intelbras working with supplier relationship management?
  - How can quality be improved through improving supplier relations?
  - How can one move from a reactive way of dealing with quality problems into a proactive way?

The main objective of this thesis is to look into the way that Intelbras is dealing with these issues and compare it to the academic literature to possibly be able to make suggestions of improvements to Intelbras. The goal is to create a clear vision for Intelbras to further work towards developing their supply chain to achieve higher quality and possibly lower costs.

1.5 Delimitations

Due to constraints of time and resources, this thesis mainly deals with supplier relationship management and supplier quality and situations where they both interact.

Furthermore, since supply chain and supplier relationship management is vast areas of research, the scope of the theoretical study was limited to methods and solutions applicable to the conditions of the given situation of Intelbras.
2. Methodology

This chapter will explain briefly the methods used in the data collection process in order to obtain the results presented in this thesis.

2.1 Data collection

There are many methods of data collection which can be utilized for research, and a large variety of sources. A source can be identified as the materials, data or evidence used as foundation for a research. Johnson and Onwuegbuzie (2000) state that using multiple methods for a project is essential. However, the choice of methods must be balanced and several concerns must be considered, including: credibility of sources, resources availability, analysis and the skill of the evaluator. (Johnson and Onwuegbuzie, 2000)

The different sources of information are typically divided into two broad categories: primary and secondary sources. (Indiana University, 2010) A primary source is defined as a source which provides direct or first-hand evidence about an event, object or person. Primary sources include interviews, observations, etc. In other words, primary sources are attained through immediate experience by the investigating person. (Indiana University, 2010)

A secondary source, in contrast, lacks the immediacy of a primary source. A secondary source consists of information that has been interpreted and processed in a way that it cannot give an account of the actual event or object. Secondary sources consist of books, journals, webpages, etc. (Indiana University, 2010) To construct a foundation for this thesis, both primary and secondary sources have been used to gather information. The main approaches of collecting data are presented below:

Observations
First-hand experience was gained by the author working actively for 3 months in the supplier quality department at Intelbras, in São José, Brazil. An inductive reasoning method was utilized in observation which led to the conclusions made, presented in the empirical study. The author participated in the work and procedures of the company and in some cases took part of it as a passive observer.

Interviews
Much of the empirical data presented in this thesis were collected through a series of face-to-face interviews with the staff of numerous different departments at Intelbras, including the supplier quality department and procurement department. The interviews were conducted by the author.

Literature studies
Literature sources used to gather information to this thesis are books, journals, articles and documents provided by the company studied. The approach has been to investigate previous studies of the investigated subject. The literary sources used have mainly been books used in previous courses at the International Industrial Engineering program at the University of Borås and databases made accessible by the website of University of Borås. These sources were preferable to avoid misleading information.
2.2 Validity and reliability

Watling, as cited in Winter (2000), gives the following account of validity and reliability; “Reliability and validity are tools of an essentially positivist epistemology”: by positivist, meaning that we can actually know something by either description or acquaintance. However, these assumptions are necessary for having any type of philosophical discussion and which, after all, all sciences are based upon.

Validity determines the truthfulness of the study and whether the study actually measured the event or object which it had the intention of measuring. In other words, did the research measure what it was supposed to measure? (Golafshani, 2003) Reliability gives the account of the overall consistency of the measurement. In other words, reliability is the extent to which a study’s operations can be repeated, with the same results. (Yin, 2003)

Figure 1: Validity and reliability compared
Source: Columbia Center for New Media Teaching and Learning

By these accounts of validity and reliability, it is by the author’s judgment that the study has been conducted in a manner to fulfill these ideals to the fullest possible extent.
3. Theoretical Foundation

3.1 Supply Chain Management: The role of procurement

During the development of supply chain management, Harrison and van Hoek (2011) states that purchasing has gone from being an isolated department from other elements of the business systems of the company to being greater integrated with other departments accompanied with more top management involvement; from purchasing to supply management. Purchasing focuses on the upstream part of the supply chain, and the cooperation with suppliers in particular.

As in the case of Intelbras, in sourcing from the Far East, firms have become increasingly dependent on suppliers for the customer value they generate. (Harrison and van Hoek, 2011) The role of purchasing is to create supplier value and align it with customer value creation. Therefore are firms increasingly exploring ways to leverage their supply chains, and in particular, to systematically evaluating the role of suppliers in their activities. (Kannan and Choon Tan, 2006) As Cousins and Speckman (2003) say: ‘Many firms are only now recognizing that by leveraging the expertise of their supply base gains can be made that lead to a sustainable competitive advantage.’ But it is not only in terms of cost savings that the purchasers can create a competitive advantage of a supply chain. Ensuring reliable delivery of supply with a level of quality agreed upon helps to ensure that production schedules are met and customer deliveries are not at risk.

One of the most forgotten aspects of outsourcing according to Desouza (2008) is security. By avoiding risks of discontinued supply and supply interruptions or supplier bankruptcies, are the procurement contributing to further improve the performance of the supply chain. It is important to acknowledge the difficulties in engaging with business partners. Therefore, mutual trust emerges as a crucial aspect of a supplier-buyer relationship, which can help to foster a long-term cooperation since each party depends on each other to satisfy mutual goals. (Yeung and Chin, 2004)

According to Harrison and van Hoek (2011), there are four operating principles that should be followed to encourage the procurement staff to spend more time with strategic and supplier relationship management tasks:

- ‘Align procurement internally towards its broader strategic role within the focal firm before turning to supplier relations.’

- ‘Involve procurement early and fully in supply chain design and development, not just when a contract needs to be drawn up about prices for a supplier already selected.’

- ‘Focus on total costs of ownership or customer value sought, not solely on price’

- ‘Do not consider the procurement job done when a supplier contract is signed; this moment marks the start of the supplier relationship management work that is arguably harder than the initial sourcing and contracting work, and more time and resource intensive.’
A common view is that it is hard to show such savings made from broad-based and long-term developments compared to the savings made by the purchasers to lower prices through negotiation which are instantly visible. (Harrison and van Hoek, 2011) Furthermore, it could be risky to become dependent on suppliers who may take advantage of the buyer’s perceived weakness. However, Cousins and Speckman (2003) states that ‘strategic supply implies that supply chain wide skills, expertise and capabilities are brought to bear by the full set of supply chain partners. They are united in the belief that by working collaboratively they will accomplish goals that they could not otherwise achieved.’

3.1.1 Internal business alignment
An important part of procurement sometimes neglected is the business alignment of the purchasing department. Business alignment points towards an alignment around specific business objectives set by top management. If the professional purchasers are not well informed of the objectives set by the focal firm, they might be sourcing from suppliers which are not fully right for business needs. Furthermore, the procurement could focus on the wrong supplies, wasting supplier time and reliability internally, and company credibility in the supply market.

Harrison and van Hoek (2011) states that there are a number of requirements for alignment held as a responsibility of the professional purchaser. Among these are the ability to spot business needs and identifying potential levers for alignment. Furthermore, a focus on service to center the effort on business needs and a willingness to see functional expertise as a price of entry, not a differentiator. Such an alignment should result in that performance indicators of the procurement are not only based on financial data such as savings based on purchase price variance but also based on quality and delivery reliability. To reach such an alignment the procurement staff has to take part in the vision of the top management. Procurement staff should interview executives and get invited to business meetings to understand the agenda including issues and priorities. Furthermore, a study of business plans and business training material should be made.

3.1.2 Developing strategies for procurement
According to Smock (2004), strategic sourcing can be defined as a systematic process of which the capital spent across a focal firm is thoroughly analyzed, and then organized by focusing on selected suppliers for best results on cost, quality, new product development and service. Kocabasoglu and Suresh (2006) states that strategic sourcing requires the following to be in place:

- ‘elevation of the procurement function from a traditional, transaction-processing mode to a more strategic role’
- ‘effective cross-functional coordination of procurement with other functions of the firm’
- ‘information sharing with and development of key suppliers’

Thus, the involvement of procurement in a new product development should start early, and follow the product lifecycle from design to disposal. This broad-based involvement allows the procurement to implement a more strategic, long-term role and to seek innovative opportunities to leverage supplier market value. (Harrison and Van Hoek, 2011) A procurement strategy usually focuses on a specific category of different products and can
therefore vary for different categories. Strategic issues often dealt with by procurement according to Harrison and Van Hoek (2011) would include; overview of current procured value and existing supply base, analysis of supply market trends and supply market, competitor approaches and benchmark performance in the category, consideration to buy or the opportunity to in-source and considerations of total cost of ownership.

3.1.3 Total cost of ownership (TCO)
‘Total cost of ownership’ is the approach of concentrating less on purchase price and focus more on the total costs of procurement. Direct purchase costs usually include the purchase price, transportation costs and custom duties. However, while price is an important aspect of the value exchange with the supplier, the focus is limited in being able to see the big picture of costs relating to the purchase. There are a lot of indirect costs, which include; the order administration, invoicing costs, costs related to flow of materials, quality control, storage, materials handling and return flows. There are also some long-term preventive costs for supplier evaluations, quality systems, supplier development, so forth and so on. Jonsson (2008) states that it is not uncommon for the indirect procurement costs to be higher than the direct costs.

![Figure 2: figure of the TCO iceberg](source: Jonsson (2008))

It is understandable that price is an important aspect, and often an order winner in many cases because direct cost savings are such a traditional focus of procurement. However, the concept of TCO suggests that the purchase price just might be the tip of the iceberg. Therefore, the objective for TCO, according to Harrison and Van Hoek (2011) is ‘to get below the price of purchase, and to identify how much it costs a focal firm over the product lifecycle. This includes pre-purchase costs such as supplier evaluation and quality assurance.’ While it may be difficult to fully quantify the total costs, as some variables are hard to measure, such as cost of quality, just by simply considering and acknowledging the total costs before buying a quantity of items provides an advantage in procurement. Furthermore, Larson (1994) states: ‘Total cost measurement complements movement towards more buyer-supplier co-operation,
since costs cut across firms and functional areas. The very process of measuring total costs will require buyer-seller co-operation.’

3.2 The importance of supplier selection

Jonsson (2008) states that components purchased as input goods to a company’s own manufacturing often account for more than 50 percent of the cost of goods sold. Therefore, it is crucial to work with the right suppliers for business needs. González, Quesada and Mora Monge (2003) determined that the most important factor for a manufacturing company is its suppliers. González, Quesada and Mora Monge (2003) states: ‘With the increasing importance of the purchasing function, supplier management decisions have become more strategic. As organizations become more dependent on suppliers, the direct and indirect consequences of poor decision making become critical.’

Therefore, a comprehensive method of supplier selection is essential to the buying company. (Yeung and Chin, 2004) The focal company must identify the variable in the supplier management in manufacturing related to quality, cost and productivity. (González, Quesada and Mora Monge, 2003) Furthermore, an assessment approach to acquire reliable results of supplier performance should be established. This would include an on-site evaluation of the supplier assessing supplier capabilities and quality system as well as product samples. (Yeung and Chin, 2004)

3.3 Supplier relations

Before looking at supplier relationship management, the meaning of a supplier relationship must be understood. As supply chains have evolved, a number of different supply chain structures have emerged, based upon the networks and the level of collaboration between the buyer and supplier. The optimization of a supply chain process has proven to lead inevitably to a growing interdependence among supply chain partners. (Harrison and Van Hoek, 2011)

There has naturally evolved many levels of cooperation between the buyer and its suppliers, especially with respect to ‘the choice of an appropriate level of relations for different types of suppliers’. (Jonsson, 2008) In other words, there are many types of possible relationships in a supply chain. In literature, the spectrum of the different styles of relationships usually ranges from what is called arm’s length to vertical integration. See picture below.

![Figure 3: Relationship style continuum](source: Cooper and Gardner (1993))

A focal firm does not need to have the same type of relationship with all of its suppliers. Different supply chain situations demand different types of relationships to be adopted by the
focal company. Treating all suppliers in the same way is a failure to recognize that some have different needs from others. (Jonsson, 2008) Differentiating the role of suppliers is an important strategic issue which allows a focal company to target supply chain management resources to better effect. One can say that the traditional attitude between customers and suppliers has the character of an arm’s length relationship where both parts negotiate for conditions that are as favorable as possible for themselves. In other words, in an arm’s length relationship, the buyer and supplier have a competitive relationship to each other.

The competition is over the profit margin in the supply chain, so the objective of the buyer is to get the lowest price as possible. The basic reasoning behind such a relationship according to Jonsson (2008) is: ‘if the supplier charges more and has a higher profit margin, we will have higher costs and a lower profit margin.’ The result of this reasoning is that the buyer will look for many suppliers for a single item to have a strong position for negotiating. This issue will be dealt with in more detail later in the following subheading. So, consequently, the buying company will try to avoid any long-term agreements as it may weaken their position for negotiating. (Cooper and Gardner (1993)

According to Cooper and Gardner (1993), at the extreme of an arm’s length relationship, there are no partnership elements. The long-term risk in using this strategy for a buyer, according to Jonsson (2008) is risk of a fragmentation and depletion of the supplier market. If a buyer continues to try to push the price down the supplier companies will be under continuous pressure of either lowering their costs or having a decreased profit margin which will result in limited conditions for them to improve their competitiveness.

However, as supply chains have matured, they have realized that this situation is simply not sustainable as the customer requires higher quality, delivery performance and responsiveness while simultaneously reducing costs. This has resulted in that companies are looking for alternative ways to leverage their supply chain. (Kannan and Choon Tan, 2006) Consequently, relationships, or partnerships, have started to blossom along supply chain structures. A partnership may be defined according to Cooper and Gardner (1993) as:

- ‘A relationship that attempts to build interdependence, enhance co-ordination, improve market position focus (by broadening or deepening), or to achieve other shared goals.’
- ‘A relationship that entails sharing benefits and burdens over some agreed time horizon.’

So, to clarify, a partnership arise by the right side of an arm’s length relationship (see figure 3) and the interdependence of the two parts of the relationship becomes higher the more right on the scale one moves starting from very loose to a full on collaboration. The idea of a partnership between two companies, to whatever degree, implies a transition from the rules of the open market and towards alternatives. However, these alternative structures must prove to be beneficial; otherwise they will not deliver a competitive advantage.

Consequently, in a partnership, the partners try together to increase the total competitiveness of the supply chain and in this way achieve higher profit margins for both. Thus, if successful, it becomes a win/win situation for both parties. Partnerships or cooperative relationships, according to Harrison and Van Hoek (2011), have been characterized as being based upon:
• The sharing of information
• Trust and openness
• Coordination and planning
• Mutual benefits and sharing of risks
• A recognition of mutual interdependence
• Shared goals
• Compatibility of corporate philosophies

The advantages of a partnership arise from the savings made by reduced monitoring of the suppliers, including the supply quality and productivity and being able to reduce negotiations and the drawing up of separate contracts. (Harrison and Van Hoek, 2011) Larson (1994) has in his study linked buyer-supplier co-operation to higher product quality and lower total costs. Furthermore, in terms of supplier quality, Larson (1994) states that when working together, the focal company with its supplier can develop more precise measurement tools and systems for quality and costs. Furthermore, more objective measurements may be implemented such as percent defects and mean time between failures.

3.4 Supplier relationship management (SRM)

It is not only crucial to work with the right suppliers for business needs, but also the optimal number of suppliers in parallel and with the right delivery patterns and relationships. These factors are important in every company’s competitiveness, as suppliers influence the quality of products and the ability to keep delivery times to customers to a great extent.

Jonsson (2008) states that: ‘The potential for what is operatively possible is therefore largely determined by the supply structures.’ In other words, for a buying firm to be able to compete in its respective market, it must ensure that their suppliers’ performance and capabilities equals or exceeds that of the buying firm’s competitors. (Krause and Ellram, 1996) As a consequence, firms are systematically evaluating the role of suppliers in their activities. According to Harrison and Van Hoek (2011), the basic steps to supplier relationship management are:

1. Reduce the supply-base.
2. Segment the supply-base.
3. Establish policies per supply market segment.
4. Implement vendor rating and improvement planning.
5. Assign executive ownership to most important suppliers to foster relationship potential.

This study will not follow these six steps completely but they will be used as a broad guideline to SRM to compare what other literary sources have to say about its approach to the subject.
3.4.1 Number of suppliers in the supply-base
As mentioned has the traditional focus of procurement been to lower prices and thus finding components at the lowest possible prices to supply the focal company with. Factors such as quality and delivery times have been given lower priority. Therefore, as a natural result of the focus on price, most companies have had a large number of suppliers and multiple sourcing has been used as the most common sourcing strategy. The reason for this is because of the purchasers to have a strong negotiating position; they must have relations with several different suppliers to compare them and leverage them against each other to drive the price down. Another reason behind having many suppliers is the company’s need to ensure a future supply of materials and components as to lower risk of disruption of the supply of materials. Therefore, for the sake of safety, several parallel suppliers are chosen for each item and naturally the supply-base will grow.

However, in recent years Jonsson (2008) states that ‘the importance of developing more partner-like relationships with suppliers and more integrated activities with other companies as a means of making supply chains more efficient has been given increasing attention.’ In other words, the reason for a reduction of the supply-base is due to the inability of a focal company to allocate development resources to suppliers when there are too many of them. If the supply-base is too big, the development of suppliers will be not as practically achievable and not as cost-effective.

Therefore, there is a need for a reduction of the supply-base. Furthermore, in the global market place today, the drivers of procurement are not only to lower prices. Competitive forces are putting firms under pressure to improve quality, delivery performance, and responsiveness while simultaneously reducing cost. (Kannan and Choon Tan, 2006) This has proved to be simply not possible, or hard to achieve, while having a large supply-base. Hoole (2005) states: ‘It is only common sense that if a business process can be simplified, it will usually enhance overall performance, leading to more consistent quality, lower operation costs, and inherently greater responsiveness.’
There are several methods of reducing the number of first tier suppliers, and this study will only cover it briefly since the situation of each buying company is different and thus requires different needs in terms of supplier reduction. Harrison and Van Hoek (2011) suggests that the focal company, in preparing for a reduction of the supply base, should collect a list of the suppliers used across the business units together with the amount of annual capital spent and which units are buying from which suppliers. This tends to reveal that the majority of capital spent is concentrated within a small group of suppliers, and remaining suppliers are high in number but low in capital spent. Furthermore, it can reveal that different units of the focal company are buying from the same supplier, which can be used as leverage.

![Figure 5: Supplier-buyer relationship cycle](image)

*Source: Lang, Paravicini, Pigneur and Revaz (2002)*

### 3.4.2 Strategic supplier segmentation

As previously mentioned, different suppliers play a different role in the supply chain, and therefore require different supplier’s different types of relationships. It is far from every first tier supplier that a focal company chooses to engage in a partnership with. Jonsson (2008) states that it is both demanding in time and resources to develop and maintain a cooperative relationship with a supplier. Therefore, it is not feasible to establish a relationship with a large number of suppliers. Not all suppliers are created equal. It is therefore advisable to segment the supply-base. The Japanese model of supplier management suggests dividing suppliers into two categories; strategic suppliers, and non-strategic suppliers. (Dyer, Sung Cho and Chu, 1998) See figure 6 below.
The first group illustrates the category of non-strategic suppliers where an arm’s length type of relationship which was described earlier is preferred. Non-strategic items differ from strategic items along two key dimensions; availability and component value added. (Dyer, Sung Cho and Chu, 1998) In other words, non-strategic items tend to be high in availability and do not contribute significantly as value adding to the finished product. Therefore, an arm’s length relationship seems sufficient for a supply of non-strategic items, enabling the buyer to have power.

The concept of a ‘durable arm’s length’ relationship’ introduced by Dyer, Sung Cho and Chu (1998) differs from a traditional arm’s length relationship such as the supplier selection requires a more long-term approach where capabilities are benchmarked to determine the lowest cost over a longer period of time, not necessarily for one purchase as a traditional arm’s length relationship would suggest. Furthermore, two or three suppliers can be selected as long-term suppliers and be price benchmarked once in a while to maintain a price competition between the given group of suppliers.

A strategic partnership is sufficient when sourcing strategic items. These items tend to be highly value adding and play an important role in differentiating the finished product from the focal company’s competitors. Furthermore, strategic items can sometimes be customized for the buyer and therefore require a higher degree of coordination between the supplier and the buyer. For example, for a customized item, the design engineers from the buyer and the supplier must exchange information to ensure a perfect product fit and a smooth interface. Furthermore, the buyer’s manufacturing engineers must coordinate with supplier engineers to
make sure that the supplier is capable of assembling the component at their plant. (Dyer, Sung Cho and Chu, 1998) In other words, strategic items naturally require a higher degree of coordination between the buyer and supplier. Therefore, a cooperative relationship is preferable in such situations to ensure quality and supply of a given component. However, the buyer has to benchmark supplier capabilities effectively to ensure that the best possible partners are chosen. (Jonsson, 2008)

A more detailed way viewing segmentation of the supply-base have been suggested by Kraljic (1983) which aims at segmenting the supply-base based on significance and availability even further to maximize the purchasing power for a focal firm when it can. However, the approach of this model assumes that relationships are formed simply because the supplier has power, i.e. the availability on the market for a specific item is low. (Harrison and Van Hoek, 2011)

The availability on the market means roughly how many suppliers there are available on the market in relation to the amount of buyers. An item’s significance refers to its value added to the finished product and how critical it is for product quality and performance. (Jonsson, 2008) So, in contrast to the Japanese style segmentation of the supply-base, Kraljic’s model has the added the dimension of market availability. See figure 7 below.

Items are characterized and designated according to their properties in each of the squares in the matrix. Leverage items have a large significance to the company and high availability on the market. For such items, where the buyer has ‘power’, there is no urgency to develop a partnership with suppliers. Such a partnership may likely reduce the focal company’s opportunity to exploit the market to gain better prices on better terms. (Jonsson, 2008) Both single and multiple sourcing may be applicable for leverage items. For non-critical items, an arm’s length style of relationship may be preferred. (Harrison and Van Hoek, 2011) However, Jonsson (2008) states that a reduction of the number of suppliers in this segment is important.

Since this segment often makes up a great percentage in number of items, it is not uncommon that it requires the majority of administrative activities in purchasing this group of items. Therefore, it is advisable to establish simple forms of cooperation to simplify and optimize procurement procedures. For bottleneck items, where the buyer has little power and the item is of small significance to the company, the aim is to reduce dependence on such items through finding additional suppliers. (Harrison and Van Hoek, 2011) If it is not possible, a partnership may be the only option to secure future supply. For strategic items, which are significant for the company but low in availability, the aim is to develop partnership relationships with suppliers to ensure future supplies. (Jonsson, 2008)
3.4.3 Establishing policies per segment

When the supply-base has been segmented, the obvious next step would be to apply suitable policies for each segment. It was concluded that not all suppliers are created equal. Thus, it is reasonable to say that suppliers for each segment should be treated differently. The question then becomes, what level of cooperation in a relationship is necessary for each segment? These policies, according to Harrison and Van Hoek (2011), tend to be centered on the amount of time and resources spent on the relationship. Harrison and Van Hoek (2011) suggest the following policy structures in three levels of supplier relationships:

**Strategic relationships**
- 3-5 year duration
- Board or executive sponsor from the business
- Business reviews, top-to-top, partnership board
- Joint improvement plans
- Innovation roadmap sharing

**Preferred relationships**
- 2-3 year duration
- Vendor rating
- Joint effort to compel for compliance
- Contracted and improvement expectations
Commercial relationships

- Rationalize number of suppliers
- Automate purchase to pay
- Hands-free interactions

3.4.4 Supplier evaluations
Supplier evaluation or vendor rating can be defined as ‘the process of quantifying the efficiency and effectiveness of supplier action’. (Neely, 1999) A supplier evaluation may have different purposes: It may be a purchasing procedure to assist in choosing a new supplier or it may also be the basis for a follow up and development of an existing supplier. (Jonsson, 2008) In the latter meaning, a supplier evaluation has the purpose of measuring supplier performance for the sake of jointly improving both supplier and buyer processes. (Harrison and Van Hoek, 2011)

The underlying idea behind a supplier evaluation according to Prahinski and Benton (2004) is that the results will be used as feedback and manifest itself in changed supplier behavior aligned with the evaluating company’s interests; improved supplier performance and capabilities. According to Harrison and Van Hoek (2011) a supplier evaluation is a mechanism to develop and advance a supplier relationship, and to ‘center relationship management on business-relevant improvement opportunities.’ In terms of the actual measurement, the main focus is around the three output areas: costs, quality and delivery reliability. However, with a continuous improvement focus, no performance is perfect. Therefore, there is always room for improvements and supplier expectations are always rising.

3.5 Buyer-supplier cooperation related to product quality

Hereby, the question ‘what is buyer-supplier cooperation relation to product quality and total costs?’ will be elaborated upon. It has already been mentioned that there is a link between buyer-supplier cooperation and higher product quality, but what is the nature of this relation? Poor quality can end up being very expensive. It has already been stressed that a focal company’s quality performance can only be as good as the quality performance of its supplier. Nwankwo, Obidigbo and Ekwulugo (2002) state, therefore, that ‘supplier quality has a large and direct impact on the quality positioning of reseller organizations’.

Product quality, according to Larson (1994) is conformance to customer requirements, on all relevant dimensions. Larson (1994) presents a modified version of Garvin’s eight dimensions of product quality, which describes the dimensions of quality, as quality can be described and evaluated in several ways. (Garvin, 1987)

1. Conformance – degree to which items meet specifications
2. Performance – degree to which items perform as intended
3. Reliability – frequency of item failure after purchase
4. Durability – item lifespan
5. Serviceability – ease and speed of item repair
6. Aesthetics – degree that intangibles enhance quality
7. Delivery – degree to which items arrived as scheduled
8. Packaging – degree to which items are protected
In the past, companies have relied on inspection to control quality, while utilizing arm’s length type of relationships with their supplier. However, relying on mass inspection to control quality is often ineffective and expensive according to Montgomery (2009). Mass inspection simply just sort out the defect, and at that point it is too late. The supplier has already paid to produce those defectives, while the buyer has wasted time and resources to receive those defectives. Quality results from prevention of defectives through process improvement, not inspection. (Montgomery, 2009) A cooperative relationship between supplier and buyer would suggest a process improvement simply because the realization of mutual dependence.

Supplier quality improvement can be approached from two different angles:

- Reactive – The buyer reacts to quality problems throughout the flow of materials, and quality improvement is only initiated to reduce these problems
- Proactive – A cooperation between the buyer and the supplier to prevent problems from happening in the first place

Working together, with a larger amount of shared information, buyers and suppliers can develop more precise measurement tools and systems. (Larson, 1994) To reactively deal with quality issues, most companies develop tools to find the root cause to the problem e.g. the Ishikawa diagram. If the problem is found to be in the supplier process, the buyer may help the supplier to improve the process capability. (Harrison and Van Hoek, 2011) Furthermore, it is common for quality oriented companies to require their supplier to use compatible quality systems, such as ISO 9001 as an example, which has for modern companies become an imperative qualification for their suppliers. (Theodorakioglou, Gotzamani and Tsiolvas, 2006)

Among many other things, ISO 9001 requires the company to work with continuous improvements. (Montgomery, 2009) Another way to work proactively to improve supplier quality is to, as a buyer, set aggressive targets e.g. 50 defect parts per million (dPPM) and thus force the supplier to control their quality more intensively. (Harrison and Van Hoek, 2011)

In a partnership, measures of cooperation, quality and costs can be assessed over time, as a practice of continuous improvement. (Larson, 1994) Sharing of information and experiences in a supplier-buyer relationship through performance measurement is a critical step to improve quality and make cost savings. However, it is purchasing managers which have the leading role to develop cooperative relationships with suppliers. (Larsson, 1994)
4. Empirical Study

4.1 Company background

4.1.1 History
Intelbras was founded 1976 and is a completely Brazilian company. They developed their first products themselves by means of Brazilian technology which they are very proud of. They started with producing PBX units, i.e. telephone exchanges that serve businesses. However, they have since that time evolved into manufacturing products to satisfy both businesses and the general public. Today, their catalog presents a large variety of products in the categories of telecommunications, networks and electronic security systems. This includes conventional telephones, PBX systems, headsets, wire- and wireless networks, alarms, security cameras and intercoms.

Intelbras is producing plastic cases for many of their products on their own, which is essentially the only component of their products which is produced by Intelbras in their factory. Thus, plastic is the only form of raw material that is purchased by Intelbras. The rest of the components in their products are sourced. For the company to be competitive in today’s global market, they have with many products and components moved to the practice of CKD and SKD, sourcing their components from China. However, this has been a long process, as the company started sourcing components from China almost 20 years ago. In 2003, Intelbras opened their first office in China to make purchasing easier and to manage their growing supplier-base.

In the past, Intelbras has not developed any close relationships with their suppliers and has based their purchases mainly on costs. However, an initiative of developing closer relations with selected suppliers came nearly 1 year ago and is an on-going project with the objective to create a mutual beneficial relation to improve quality and integrate some of their shared processes. The selection is based on which of the items that are identified as critical for Intelbras’ products.

4.1.2 Company Philosophy
Vision: “To develop communications and integrated solutions which empower and value human beings.”

Philosophy: “Shared management is fundamental to the success of the company and for the fulfillment of its employees.”

Values: ”Simplicity, business reliability, quality, productivity, cheerful employees, shared management, ethics, respect for human beings and transparency.”

4.2 Supply chain management in Intelbras

4.2.1 Overview
In total, Intelbras has 363 suppliers of components and raw materials. It can thus be said, that Intelbras is working with a semi-large number of suppliers. A significant majority of these
suppliers are located in China. It has been natural course of action for Intelbras to turn to Chinese suppliers due to the prices and their experience with technologic and electronic products. Although, the company also has some suppliers located in the US and Brazil. Intelbras has since their first entry into China for about 20 years ago, successively shifted their focus to almost exclusively source components from China. It has proven to be a successful strategy for Intelbras, due to the prices and availability of SKD, CKD and OEM products which then can be assembled in Brazil.

Since Intelbras are purchasing almost all of their components and raw materials for their products in China, they have set up offices to be able to work closer and manage Chinese suppliers there. The company is now active on four different locations in China; Shenzen, Ningbo, Shanghai and Hangzhou. The team that works around the offices in China is responsible for two things; supply quality and inspection. In other words, their work is to make sure that the items sent by Intelbras suppliers comply with the given specification limits set for each individual item. The main tool to deal with this issue is statistic quality control, where a specific number of samples are picked randomly from a batch to be tested to check if the given sample fulfills the requirements fixed by the specification limits set to the specific item.

The more practical management of Intelbras suppliers is done by the team in China. They are on site and ready to visit to suppliers. The more strategic and theoretical work is done at the head office in São José, Brazil. The quality department in Brazil is thoroughly integrated with the logistics and purchasing departments. The office has been set up so that one person from each of the stated departments is teamed up to work together with a specific family of items. The items are divided into families based on their function, for example capacitors, transistors and resistors.

The quality department is managed separately from the logistics and purchasing department. Though, the managers are supervised by a general manager that provides a shared strategy put in use by all departments dealing with suppliers. So what is the shared strategy of the supply management in Intelbras? The following subheading will look into this more in detail.

4.2.2 Purchasing Strategy
As in all companies, there is a conflict between the focus on cost, quality and time. In the past, Intelbras mainly based their purchases on price, but have in later years tried to become a smarter purchaser. As of Intelbras orientation towards Chinese suppliers, they are bound to accept the time of shipping. On rare occasions flight transport is used if there has been a lack of planning or some other critical situation has emerged. Therefore, the company has to plan several months ahead in making their purchases. Furthermore, this makes it very important for the supplier to deliver in time, for otherwise the company will be forced to bring the purchase by air which can be very expensive. As of the long lead time, Intelbras is also looking at the payment terms to be able to prolong the time of payment. This requires the supplier of the company to be stable and be able to deliver on time.

Since Intelbras are forced to work within the time frame set by the time of shipment, their purchasing strategy is more concerned with defining the relation between cost and quality. As said, the cost used to be the main concern of the company in the past. However, they have recently moved to looking at the TCO, which has been a big improvement to see the big picture of quality and costs. The different aspects of TCO have helped them to evaluate in detail whether the purchase of a particular component is more or less profitable than what it
seems to be at the purchase price. In terms of quality, this is a big improvement for the process of choosing the right supplier. Although, the total cost of quality often can be hard to measure, TCO brings it into awareness as something to be considered.

The company has in the past had one supplier for one type of item family. This has caused problems to Intelbras. With their focus mainly on price in combination with choosing to source from only one supplier has from time to time caused Intelbras to experience many quality issues in large quantities of components. Though, their new purchasing strategy based on TCO has helped them to choose suppliers more carefully. But they are also looking at expanding their supplier base, to be able to source one type of component from more than one supplier.

The company was unhappy with their situation in terms of supplier negotiations, because of their lack of leverage to be able to get better prices. Therefore, they are contacting new suppliers to create leverage and thus potentially getting better prices. For items that are regarded as critical items, Intelbras is aiming at having up to 3-4 suppliers to be able to get the best possible price. In other words, they are trying to increase their supplier base. So, one could state that at the same time the company is trying to create cooperative relationships with suppliers for critical items, they are simultaneously looking for alternative suppliers for the same items. This action is done to minimize the risk of being dependable on only one supplier for a critical item.

4.2.3 New suppliers
There are several reasons for Intelbras to look for new suppliers. The most obvious one is of course that they are looking for competitive prices to their current ones. If a buyer decides to change a supplier, it could also be to reduce problems with a current one. Moreover, when a new project is started, the purchasing department gets a list from the research and development department of which components are part of a new product. The buyers then start to look for new suppliers. Thus, when the new demand arises, they already have one or more suppliers registered in the system.

Depending on what item they want to purchase, they create a list of the components or the product family they want to buy to send to the potential supplier. This list includes specifications for each individual item which has been developed by the quality, research and development and industrial engineering department to suit the needs of Intelbras’ products as much as possible. Intelbras asks the company to fill in some forms to get some general information about the company and its facilities. If the buyer is satisfied, a request for quotation is asked for by the buyer. The buyer could then try to either accept or negotiate the price. When the buyer is satisfied with the price, an audit is done at the company’s factory by an inspection team of Intelbras.

However, there is also the possibility of a remote evaluation if the supplier is located out of reach for the staff of Intelbras. The audit follows a certain routine which checks all internal processes and quality testing. An audit are can result either in being approved, approved with requirements or reproved. Intelbras does not require their suppliers to be ISO 9001 certified, however, it is an advantage if they are and could make Intelbras pick a supplier over another. If the audit is approved by the inspection team, the supplier sends their part numbers together with respective data sheets to be analyzed by a technician at Intelbras headquarters. The data sheet states the specification of an item together with a drawing of it. What follows from this is the homologation process, which will be covered in greater depth under next subheading. In
terms of quality, this is the most important stage in approving a new supplier. If the homologation is approved, the system is updated with the new supplier part number and the new supplier gets registered.

4.2.4 Homologation process

An electronics manufacturer always has to be adaptable to change, thus is the homologation process an important part of being adaptable to change in choosing and testing new items, in terms of functionality, quality and design. When the datasheet of the desired items has been analyzed and approved by one of the technicians at Intelbras, the supplier is asked to send samples. If the item is completely new and not used by Intelbras before it is the responsibility of the research and development department to analyze the samples. If a similar item has been used before but bought from another supplier it is analyzed by the quality department.

At this stage, the samples are compared to the datasheets and in some cases to the previous used item of the same model. Thereafter, the samples are tested to see if they comply with the specification limits given by the supplier. If approved, the supplier is asked to send a smaller quantity of items, usually enough for a half month of production. This is referred to as a pilot run which has the purpose of seeing if the item suits the actual production and that no major problems arises.

The labeled pilot run is put in the production line by the responsible technician and is then followed through the production by the process engineers working at the production line. Simultaneously, the technician picks out samples from the ordered lot according to the AQL table to be put through a number of tests once again. This step follows certain guidelines put in place by Intelbras to make sure that the right decision is taken. A formal report is then written, where both the technician and the responsible process engineer has to approve or reprove the item. The report is then put in the system with the result. If the staff responsible for the homologation process is still uncertain about the quality or usability of this item, they can go back and decide to make another pilot run. If the homologation was successful, the new datasheet of the item is registered in the system.

4.2.5 Supplier Relationship Management

Intelbras is ranking the importance of their suppliers based on the sum of their annual purchases from the given supplier. One time per year, the staff of Intelbras goes to China to have a meeting with their suppliers. The suppliers which Intelbras has developed a good relationship with as well as the highest ranked are invited to participate. Other than that, the company does not treat their suppliers differently. Intelbras is continually looking to improve all of their supplier relationships.

Supplier evaluations are done two times per year. The evaluations are done by the team responsible for each supplier, although not all suppliers are evaluated. Suppliers selected for evaluation are picked by the use of the Pareto chart. The Pareto chart enables the company to pick the most significant suppliers which has noted most spend over the year. However, if a critical situation has emerged such as a large quantity quality issue, the company may choose to evaluate a supplier which did not fall in the given category. The suppliers are scored based on quality, logistics and ability to supply.

If the supplier gets a bad score, the team is responsible to plan an action for improvement either by using the eight disciplines problems solving method, making an audit at the supplier
or changing the supplier. As mentioned, audits are done onsite by the SQE team located at any of the offices in China. Intelbras has set up a goal of auditing suppliers of big financial value one time per year, although this is not fulfilled at the moment due to a lack of personnel in China.

Furthermore, Intelbras has decided to give extra focus on suppliers to some particular items which are regarded as “critical items”. In other words, they have segmented their supply-base into two segments; suppliers for commodity type items, and suppliers for critical items. For an item to be defined as critical it has to match one or more of the following descriptions:

- It is of extra importance to the production of Intelbras, in one of the product families electro-acoustics, mechanical or electromechanical
- It is assembled by hand in the production process of the supplier
- There has been a lot of past problems experienced with the specific item
- The item is known to have a high variation

4.2.6 Quality agreements
For critical items, the company has decided to develop quality agreements together with its suppliers. The development of quality agreements was an initiative that was taken for about 1 year ago to work closer with the supplier to control and improve quality. Approximately 100 out of 3000 items are regarded as critical items by Intelbras. There are around 35 suppliers that Intelbras will develop quality agreements with.

The quality agreement is presented as a formal contract accompanied by a checklist. The quality agreement in itself states the responsibilities of supplier and buyer with respect to the quality assurance of the product supplied to Intelbras. Moreover, the responsibilities are presented in further detail. The responsibilities include product specifications, product inspection, acceptance rules, sampling plan and procedure if an unacceptable level of major defects may get in the production line. These data’s varies from product to product and are specified in each individual quality agreement.

However, there is a general structure of each quality agreement which is presented below. The product specification data are accompanied with the data sheet which has been approved by a technician at Intelbras. The supplier is asked to follow the specifications agreed upon and in the case that any suggestion to change those may occur, Intelbras must be notified and agree to those changes. Production inspection defines the point where a minor, major and critical defect differentiates. The different grades of defects are defined as well.

The acceptance rules used by Intelbras follow the standard of ANSI/ASQC Z1.4 which is derived from the acceptance sampling system MIL STD 105E. (Montgomery, 2009) The different inspection tests that are relevant for the specific items are then stated with respective sampling plan and acceptance quality level. The procedure of the acceptance sampling of the company will be dealt with in greater detail under the headline of Quality methods used by Intelbras. The quality agreement further states that the supplier is liable to all costs and expenses if the line rejection rate of 500 defect parts per million is crossed. The agreement is should be signed by both parts to be put in use.

The checklist acts as a complementary document to the quality agreement containing practical guidelines to fulfill the settled notions of the agreement. The checklist thoroughly describes the tests stated in the quality agreement in which way they should be conducted. Furthermore,
it explains what to recognize in terms of defects in each test, in other words specifications and standards for each individual item. The specifications and standards are in some cases accompanied by descriptive pictures to further demonstrate the acceptable standard, especially in terms of appearance and packaging. Moreover, the level sample size according to the ANSI/ASQC Z1.4 standard decided upon is stated with each test as well as the acceptance quality level for each individual defect.

4.3 Quality methods used to control supplier quality by Intelbras

4.3.1 Overview
The work of improving quality in the products of Intelbras is separated in two different departments in the company. The problems which occur in the process, inside the factory of Intelbras are the responsibility of the industrial engineering department. They are managing and controlling all the processes set up at the production line. Since Intelbras are sourcing all of their components as a practice of CKD and SKD these problems are a failure in the assemblage. The Quality department is thus responsible for all quality issues originating from the supplier and works closely together with employees responsible for supply chain management. In 1996, Intelbras received their ISO 9001 certification which is a standard related to quality management systems. Although Intelbras is certificated with the ISO 9001 standard, they do not require their suppliers to be.

Due to their purchasing strategy, Intelbras has had to deal with many quality issues, which have mainly been dealt with through filtering out the defects through various tests or changing the supplier. Their regular sampling acceptance system used to pick items for tests is ANSI/ASQC Z1.4. Furthermore, the use of the Ishikawa diagram was implemented about 7 years ago as an attempt of dealing with the quality issues more effectively. The company has along the way been broadening their quality toolkit, given inspiration from various sources including Lean manufacturing and the automobile manufacturer Ford. The main tools Intelbras has adopted from Lean manufacturing are 5S, the Ishikawa diagram and ‘5 whys’. Although 5S is not a quality tool by definition, its use may result in a higher level of quality. The 5S methodology is used throughout the whole organization of the company, from the production line to the offices. It is maintained by a few employees who perform weekly inspections to make sure everything is clean and in place.

The Ishikawa diagram, also known as the fishbone diagram, together with the ‘5 whys’ questioning technique, they are the main tools which Intelbras uses to solve quality issues. They are used in combination as a part of a form which the company refers to as an ‘orange card’ due to the color of the paper. This analysis will focus on supplier quality and the main tools used by Intelbras to manage and improve the quality of the components sourced.

4.3.2 Sampling
As mentioned, Intelbras is using the sampling acceptance system ANSI/ASQC Z1.4. The sampling is done first and foremost by the inspection team in China. If the batch is approved it is shipped to Brazil. In some rare cases, where a mutual trust has been established, the batch is sent directly to Brazil without being sampled by the Intelbras inspection team. However, all items are being inspected when arrived in Brazil as the long shipping may have affected the goods. Depending on the test, the special inspection levels or the general inspection levels are used with different AQL’s. For critical items, these data is detailed in the checklist for the
quality agreement. For other items there is a more general procedure, as any performance test most often is not involved.

Sampling is one of the most important tools in the company for quality control. Since there has come along more sophisticated tools than the ANSI/ASQC Z1.4 standard during recent times which can provide a more reliable results have Intelbras looked to start using control charting techniques. This will be a further step to control the supplier quality more closely. However, as for today, they do not have the resources to implement these new tools.

4.3.3 Orange card

For whenever a problem arises, the company has developed a form for a worker to fill in. That is, when a problem has a dPPM rate that is bigger than the agreed rate of defects. This form is referred to as an ‘orange card’, as the color is orange. The form includes an Ishikawa diagram as well as the question asking technique ‘5 why’s’ which are used to find the root cause of the problem. At discovery, it is determined whether the problem is either a cause of the method or of the raw material. Whether it is a cause of raw material or method, it determines which department will take responsibility of the problem. If the problem is caused by the method, the orange card will be the responsibility of the industrial engineering department to solve.

If the problem is caused by the raw material, the problem will be the responsibility of the quality department. However, at first sight, it can be hard to determine what the cause might be. Most often the problem is analyzed by engineers from both departments whom then draw a conclusion with the assistance of the tools used and based on their analysis. The form is filled in to the fullest possible extent by a worker to document the new problem. The card also includes a section for the worker to explain the problem as clearly as possible for anyone whom deals with the follow up of it. See attachment 1.

If the orange card gets in the hands of the quality department, a quality technician will send a report to the supplier with information about the problem with respective dPPM rate. The supplier concurrently asked to make and eight disciplines problem solving (8D) report, which will be explained in more detail further on. The 8D method is used to identify the problem and make a corrective action to fix it. When the supplier has followed the 8D method and an 8D has been formulated, it is sent back to Intelbras. The report is verified by a quality engineer. If necessary, the inspection team in China can visit the supplier to confirm that a corrective action has been made. The next step in the process of the problem solving is to await the next batch to arrive. When it does, it has to be verified by the responsible quality technician before being fed into the production line. If the problem is not solved, the process is repeated, although, if solved, it is being supervised for a month to make sure things run smoothly again.

4.3.4 Eight Disciplines Problem Solving

As mentioned, Intelbras requests their suppliers to use the eight disciplines problem solving technique to follow up, find the cause, and solve the supplier quality issues. Thus, the 8D method is not used directly by Intelbras; though an engineer verifies the 8D report and makes sure the proper actions has been done to prevent the problem to occur again. Although the 8D method is not used directly by Intelbras, the company puts a lot of trust in it to be the main tool of the supplier to solve the problem.
5. Discussion

After conducting the theoretical foundation, the empirical study was presented. Hereby, the practices of Intelbras will be compared with the literary findings to analyze the methods of Intelbras and possibly discover future improvements.

5.1 Procurement practices in Intelbras

In terms of internal alignment of procurement, Intelbras seem to have found suitable solution for their organization which does not contradict the trend in literature. The professional purchaser’s works in teams together with a logician and a quality technician which on a practical level seems to be working quite sufficient. The involvement of top management is unclear by this study; however, the purchasers are aware of long term goals and strategies of the company.

The shift from looking at solely price to the total cost is a major improvement in the purchasing strategy. However, it also makes the procurement process a lot more complex. Making purchases based on TCO requires more research and a wider variety of measurements. Measuring the total cost is hard, and the result will always be an approximation, although, by simply considering it, some improvement opportunities may be identified. If a TCO methodology is properly applied to purchasing, the company can gain a more complete picture of outsourcing. Therefore, more cost effective outsourcing strategies can be applied to different situations.

The theoretical study showed how a cooperative relationship between buyer and supplier can benefit both parts by working together to lower the total cost and by making value adding improvements. Hence, the procurement job should not be considered done when a deal is made. A continuous improvement agenda must be implemented in procurement, in the form of the SRM framework presented in figure 4. The role of suppliers must be continually and evaluated. The realization that suppliers are different and therefore require to be treated differently is essential.

5.2 SRM in Intelbras

Internally, Intelbras has developed a structured approach to purchasing; however, their work externally with SRM does not seem to be quite as structured. This might be due to the history of Intelbras, as they are used to utilizing arm’s length relationships with their suppliers and often shifting suppliers. They recently took the action of creating agreements between the focal company and its suppliers of critical items. This important step for Intelbras has been to separate the suppliers of commodity type items from suppliers of critical or strategic type items. The items have been segmented based on significance and variance. Due to the nature of Intelbras’ product, the telephone; which does not experience any significant technological advancement compared to, for example mobile phones or computers, the company can enjoy a large availability of fit items in the marketplace.
Commodity type items | Critical items
---|---
- Standardized  
- Low value input | - Significant to the finished product  
- Customized  
- Assembled by hand  
- History of problems  
- High variation

*Figure 8: Intelbras segmentation of items*

The literature examined in this thesis, provided a few different options on how to deal with different segments of the supply-base. For the supplier segment of commodity type items, the literature seems to agree on at least a number of strategic issues:

- Rationalize number of suppliers  
- Price benchmarking  
- Automate purchase to pay  
- Arm’s length type of relationships

Since the commodity type items does not add any significant value to the finished product, the purchasing process should be automated for procurement to spend more time and resources towards dealing with suppliers of greater importance. This is one of the key issues in SRM, as creating cooperative relationships tends to require time and resources. Thus, a traditional approach should be utilized for commodity type items to free up time and resources to deal with suppliers for critical items.

Intelbras, as mentioned, has developed quality agreements with suppliers for critical items to ensure quality while only relying on one or few suppliers. Furthermore, the company are looking to expand their supply-base for the critical items and aims at having about 3-4 suppliers per item. Consequently, Intelbras will have 3-4 suppliers to create leverage, with whom they signed quality agreements with. This solution seems at first sight quite contradictory to some of the literature reviewed in the theoretical foundation. It seems fairly reasonable to suggest that Intelbras should try to create partnership type relationships with suppliers of critical items based on the theoretical foundation. However, this might not be applicable in all situations for sourcing critical items.

One of the key issues to Intelbras is the long lead time due to the geographical location of their suppliers. If a shipment of defective items would end up in the factory of Intelbras, it would result in big costs, both direct and indirect for supplier and buyer. Therefore, the company has focused on developing an error proof quality control overseas, to make sure that no defects leave the docks of China heading to Intelbras. The quality agreement involves a further development of the use of inspection as tool to control quality.

However, by the look of the table in figure 8, it would be fair to say that what Intelbras are referring to as critical items, does not by overlap fully with strategic items which the theoretical foundation dealt with. For this reason, a further segmentation of the critical items could be made to get a clearer picture of how Intelbras can deal with the suppliers for them.
5.2.1 Further supplier segmentation

Supplier segmentation is driven by the idea that suppliers are different, and therefore needs to be treated differently. By dividing them into separate segments, one can apply different strategies for each segment. More significant suppliers will naturally have to be given more attention since they are the ones who provide value adding items to the finished product. Intelbras have divided their suppliers into two segments. Hereby, the focus will be on the segment of critical items and a proposed further segmentation of it. As mentioned, the critical items do not strictly overlap with the definition of strategic items. A suggestion could be to further segment the suppliers of critical items into two subordinate segments:

<table>
<thead>
<tr>
<th>Suppliers for critical items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem suppliers</td>
</tr>
<tr>
<td>Important suppliers</td>
</tr>
</tbody>
</table>

*Figure 9: Further segmentation of critical items*

The category ‘problem suppliers’ would be the suppliers whom are known to supply items of high variety, i.e. not always within specification limits. This could result from a number of different reasons, e.g. the item is manufactured by hand, or some other source of variation. If a supplier are known to have a history of problem, or continuously supplies items of high variety, the obvious solution in extreme cases would be to change the supplier. If there are other alternatives on the market, it is inefficient in terms of cost and time to keep such a supplier. If there are not any alternative on the market present, this would be a textbook example of a supplier whom a buyer should try to create a closer relationship with, especially if the item is significant to the finished product. As inspection does not improve quality, just simply sort out the defectives, the supplier could act to stabilize the variation of items caused by the manufacturing process at the supplier. In other words, the buyer can create a more cooperative relationship to help the supplier improve its process capability and as a consequence reduce variation and total costs. This will be discussed further under the next sub headline.

The second sub segment of critical items created is called ‘important suppliers’, meaning that these suppliers supply either customized items or items which are significant to the finished product. In other words, the important suppliers supply items which create value to the finished product. For important suppliers, it would be beneficial for Intelbras to not be dependent on only one supplier. However, a long-term approach to this segment could be preferable due to the importance of quality, unlike the short-term approach of traditional arm’s length type of relationships utilized for commodity type suppliers. Even if there are many alternatives in the market, a more tactical approach may be appropriate due to the nature of the items. Therefore, cooperative relationships with a small number of suppliers could be preferable:

- 2-3 suppliers per item
- Quality agreements
- Higher degree of communication to motivate suppliers
- Supplier evaluations
- Process capacity benchmarking between selected suppliers
- Improvement expectations
- ISO 9001 certification required
By having 2-3 suppliers per item, the buyer still has power to create leverage in a negotiation. With the quality agreements in place, there is a security of receiving quality items at Intelbras. However, to foster a continuous improvement mentality among the suppliers for significant items, a higher degree of communication is necessary. The suppliers will be rated as a part of the supplier evaluations, and then benchmarked based on performance. Consequently, the best performing supplier will be awarded with the largest purchase. Thus, a competitive environment is created and motivates suppliers to perform even better. Another decision could be to require suppliers for this segment to be ISO 9001 certified. It is a common practice in today’s world of business for buyers to require suppliers to be ISO certified to ensure that they are quality oriented. Furthermore, since Intelbras is ISO certified themselves, suppliers with compatible quality systems should be favored. Suggestions for development of a specific supplier are discussed in greater depth below.

5.2.2 Supplier development
The quality agreement involves a larger amount of shared information between supplier and buyer. It requires the buyer and supplier to collaborate on a higher level in terms of quality; especially to develop tests together to measure quality in a satisfying way. The quality staff at Intelbras is aware of the past and present problems and can provide information to make the quality control more effective. It was mentioned that inspection is just a tool to sort out defectives; however, if the supplier is pressured to provide batches with no higher than 500 dPPM, they will be forced to improve their process and thus lower the variance of their items. That is, if their items do not comply with the limit set for each test. So, in other words, this could be seen as a preventive action to make suppliers improve their process and thus lower the variance of their items.

However, the limit of 500 dPPM is a quite high in terms of being a manufacturer of electronics. But as the nature of the company’s sampling acceptance system, they would probably not be able to measure a lower variance. A way to further improve the quality could be to start using control charting techniques to be able to measure variance more closely and thereafter set more aggressive targets (e.g. 50-100 dPPM) to pressure the supplier into further improve their process capability. Of course, the goal is to achieve 0 dPPM. Therefore, a continuous improvement mindset should be applied.

Furthermore, as to this date, Intelbras is only requiring the supplier to improve their process capability as a reaction to quality problems. They have developed successful tools to deal with quality issues, such as the Ishikawa diagram in combination with the ‘5 whys’ and 8D which are useful to reactively find the root cause of quality issues and thereafter eliminate it. However, if the company would wish a higher level of quality i.e. a lower variance of some specific items, it would require a proactive approach, i.e. the customer helping the supplier to improve its process capability. This would require a higher interdependence between supplier and buyer and result in a higher prevention cost, but will reduce the cost of quality. This might be too much of a long-term commitment for Intelbras, but could be valuable for a few selected items if a quality product is sought after. Furthermore, this is a clear example of how the measurement of TCO can be used to see the bigger picture: cooperation between buyer and supplier can move from power struggle into a mutually beneficial cooperative relationship.
6. Conclusions

Competitive forces in today’s business world are putting firms under pressure to improve quality, delivery performance, and responsiveness while simultaneously reducing cost, which has resulted in increased outsourcing of activities. Increased outsourcing has led to greater dependence on suppliers in terms of quality and delivery service.

Companies are exploring ways to leverage their supply chains, by developing their supply chain structure and continually evaluating the role of suppliers in their activities. As supply chains have evolved, a number of different supply chain structures have emerged, based upon the networks and the level of collaboration between the buyer and supplier. The optimization of a supply chain process has proven to lead inevitably to a growing interdependence among supply chain partners.

For procurement, this has meant moving from being an isolated department to a highly aligned department within the organization dealing with supply management. The practice of supplier relationship management has emerged to manage, communicate and create closer relationships with suppliers. Furthermore, utilizing a TCO approach to purchasing is essential to quality and supplier-buyer interdependence since it favors a long-term perspective.

Treating all suppliers the same is no longer feasible, and a failure to recognize that some suppliers have different needs than others. Therefore, companies are strategically segmenting their supply-base to recognize and be able to give more attention to their important suppliers, since far from every first-tier supplier is fit for a closer relationship.

In terms of internal alignment of procurement, Intelbras have found a suitable solution for their organization where professional purchaser’s works in teams together with a logician and a quality technician. Intelbras recently took action to divide their supply-base into two segments based on significance and variance; suppliers of commodity type items and suppliers of critical items. For suppliers of critical items, quality agreements were developed.

To be able to effectively attend to special needs of the suppliers of critical items, suggestions were made to further segment the category of critical items into two subordinate segments; problem suppliers and important suppliers: Problem suppliers meaning suppliers of items with high variance and important suppliers meaning suppliers of items significant to the finished product of the focal company.

In extreme cases, a problem supplier should be changed; however, if not possible because of low availability of alternatives on the market, a closer relationship would be preferred to secure delivery and to improve process capability of the supplier to proactively lower variance. In the case of important suppliers, Intelbras may benefit from using multiple sourcing of 2-3 suppliers but utilize a long-term approach due to the importance of quality of significant items.

Further development to proactively improve quality of an individual supplier of critical items could be made through; increased communication; utilizing more detailed measurements of quality such as charting techniques and consequently set more aggressive targets to pressure the supplier to improve their process capability; or practically help the supplier to improve their process capability which of course requires a higher degree of interdependence between buyer and supplier.
References


Hoole, R. (2005) Five ways to simplify your supply chain, Emerald 10


