Management of Regional Local Content Regulations at Dell Computer Corporation

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ABSTRACT

Along with globalization of Dell's products and services comes the ability to provide products in a competitive manner to all regions. Many emerging nations have local content requirements that must be realized in order to sell products in that country. Often times these requirements conflict with Dell's current fulfillment strategy. The goal of this project is to develop a Local Content Strategy and implementation plan that effectively balances country specific local content requirements with Dell's fulfillment model.

A two-layered approach is taken to this problem. The first layer focuses on improving information flow between the relevant parties involved. The second layer focuses on the set of tools developed to achieve consistency across Dell's manufacturing regions. These tools assess the impact of supply chain disturbances – namely, new products or commodity shifts that change the current supply chain equilibrium. These events are analyzed from the perspective of local content, and the output fed into the decision making process as a decision criteria of those managers in charge of the action.

This thesis shows that addressing local content requirements and tax regulations during supply chain design, as opposed to supply-chain execution, leads to more informed decisions and ultimately saves the company money. Local content regulations must be incorporated into the procurement managers' decision-making process, preferably incorporated into their existing tools to promote use.

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AMF – Americas Manufacturing Facilities

APCC – Asia Pacific (Malaysia) Customer Center

BCC – Brazil Customer Center

CCC – China Customer Center

COGS – Cost of Goods Sold

CPG – Client Product Group

DAO – Dell Americas Operations

EMEA – Europe, Middle East, and Africa

EMF – European Manufacturing Facility

ESG – Enterprise Server Group

FDI – Foreign Direct Investment

LOB – Line of Business

MIT – Massachusetts Institute of Technology

NIC – Network Interface Card

OCM – Operational Commodity Manager

PFP – Procurement Functional Plan

PPB – Basic Productive Processes law in Brazil

SChM – Supply Chain Manager

WTO – World Trade Organization

WWP – Worldwide Procurement

WWPA – Worldwide Procurement, Asia division

1 Introduction and Overview

The work presented in this thesis was completed as a part of a six and a half-month internship in the Worldwide Procurement organization at Dell Computer Corporation in Austin, Texas. This internship is a result of the partnership between Dell Computer Corporation and the Leaders for Manufacturing fellows program at the Massachusetts Institute of Technology.

1.1 Project Description

> "There is little chance that companies trying to do business in the developing world will escape this riding tide of local content demands"
>
> -*Wall Street Journal*, July 1984

This quote underscores an issue that many global manufacturing firms are facing today. Many governments of developing countries set up Local Content Regulations to attract further Foreign Direct Investment (FDI). The idea is that if a corporation is going to build a factory in their country, they will achieve additional FDI by requiring or incentivizing the company to source a certain percentage of its raw materials from that country as well. These regulations, while mostly effective, also sometimes have the negative effect of scaring off potential corporations from building facilities in the country.

Initially a U.S. company based in Austin, Texas, Dell did not have to deal with such concerns. But as it has grown dramatically over the past decade, it has looked to international locations to produce and sell its computers. As a consequence of this global expansion, Dell is facing many local content requirements as it grows internationally. Prior to this project, Dell lacked the processes and tools to effectively manage and meet these regulations. These requirements differ in their structure and intensity across all of Dell's regions, causing confusion and uncertainty for the global company.

The objective of this project is to develop for Dell a local content strategy and implementation plan that effectively balances country-specific requirements with Dell's fulfillment model. This thesis will show that addressing local content requirements and tax regulations during supply chain set-up, as opposed to supply-chain execution, leads to more informed decisions and ultimately saves the company money.

The Worldwide Procurement (WWP) organization within Dell is tasked with sourcing components and raw materials for all of Dell's manufacturing facilities at the lowest overall cost to Dell, while maintaining Dell's quality and customer experience requirements. Embedded in this task is the responsibility of managing the local content needs of the regional facilities. As such, this project is managed within Dell's WWP organization.

1.2 Thesis Overview

First, we will provide an overview of Dell Computer Corporation. This will include some background on the history of the company, how it is structured, and how its business model allows it to be successful in a difficult industry. We will also discuss Dell's corporate initiatives, including globalization, and give an overview of its international manufacturing facilities. Chapter 3 will present the local content problem at Dell, including the underlying regional laws, as well as a historic perspective of how Dell has managed them in the past. Chapter 4 will outline the methodology used in developing the new local content strategy. In this chapter we will introduce the two-pronged approach. Chapter 5 will discuss the first prong, which is improving information flow within the organization. Chapter 6 will detail the second prong, which defines tools and processes for a consistent local content approach at Dell that achieves the optimal sourcing strategy. The thesis will close with Chapter 7 – a discussion of the key findings as well as the current implementation status of the results.

2 Company Background

2.1 Chapter Overview

Since this thesis is focused on the Local Content project at Dell Computer Corporation, this chapter will provide an overview of the company. It will provide some history on the company from a corporate, product, and manufacturing perspective. A look at the industry, as well as an examination of Dell's business model, its most noted competitive advantage, will also be provided.

2.2 Company Overview

Dell Computer Corporation, headquartered in Austin, Texas, is the world's leading manufacturer of computers, based on market share. Dell's growth was built on the premise of selling computers directly to customers without intermediate retailers. This concept allows Dell to eliminate unnecessary time and cost, while tailoring products directly to each customer's needs. The products Dell offers are based on industry standard technology, as opposed to proprietary solutions. This drives down Dell's manufacturing costs as well as end price, saving money for their customers. While the initial focus of the company's offerings were desktop and notebook computers, it has expanded to include servers, workstations, monitors and projectors, software and peripherals, and switches. Its primary customers are large corporations, making up about 64% of Dell's business in 2001, while only 17% came from consumer customers.

Dell has grown from a local company based in Texas to a global provider of computer solutions. It has five manufacturing regions – the United States, Ireland, China, Malaysia, and Brazil. While growing internationally, a large portion (70%) of its revenue still comes from the Americas.

2.3 Company History and Position

CEO Michael Dell founded Dell Computers in Austin as a 19 year-old freshman at the University of Texas in 1984. With $1,000, Michael obtained a business license, building made-to-order computers in his dorm room. The business's success pushed Michael to put his education on hold, as Dell grew to 250 employees and $34 million in annual revenue by early 1986. The company went public in June1988, offering 3.5 million shares at $8.50 per share. By 1990, Dell expanded its manufacturing capabilities internationally, opening a plant in Limerick, Ireland. In 1991, Dell branched away from its traditional desktop PC's by introducing its first laptop computer, which helped propel the company to $2 billion revenue in calendar year 1992, and into a spot in the Fortune 500. By 1993, Dell was one of the top five global computer manufacturers, and in 1996, opened a manufacturing facility in Penang, Malaysia. 1996 also marked the first year that Dell began selling its computers over the Internet via the company's website. Also noteworthy by that time, Dell had exited its traditional retail distribution channels such as WalMart and Price Club, to more effectively connect directly with its customers. It also had successfully began its push into the market for higher-end servers and workstations. In 1998 Dell opened the doors on its manufacturing facilities in Xiamen, China, and in 1999 its factory in Eldorado do Sul, Brazil.

During April 2001, Dell finally reached its goal of being the largest manufacturer of computers based on market share with $50 million in sales via the Internet per day. While it temporarily lost that position in 2002 due to the merger of its two largest competitors, Hewlett Packard and Compaq, the company returned to its top perch in October 2002 (Figure 2-1).[2][3] Dell's current revenue for the past four quarters is $32 billion, with a stated goal of $60 billion per annum within five years. Dell's offerings have expanded to include desktops, laptops, servers, workstations, storage, switches, projectors, software and services. The company has also announced plans to offer Personal Digital Assistants (PDA's) and printers.

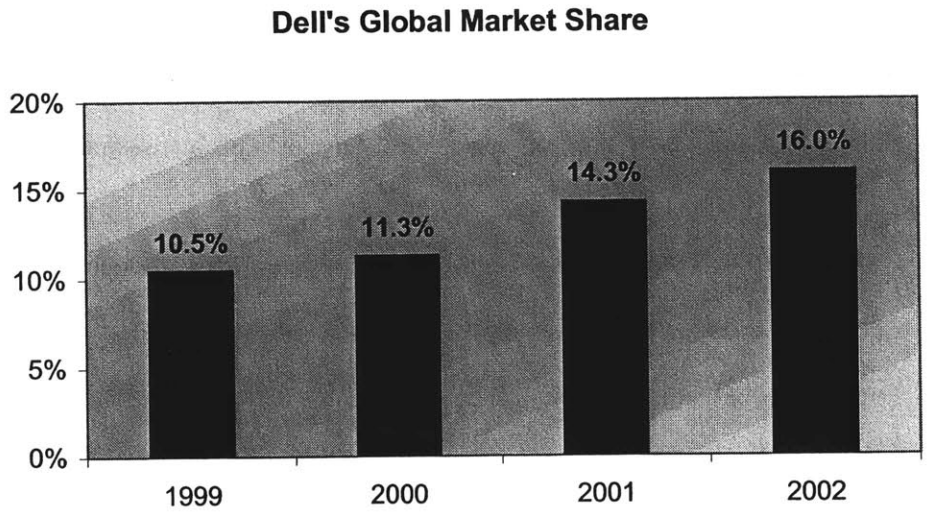


Figure 2-1: Dell's Worldwide Market Share

2.4 Dell Business Model

Much of Dell's success is attributed to its "direct" business model for both selling and manufacturing. On the sales side, this means direct relationships with customers, from the home consumer all the way up to the largest corporate client. On the manufacturing side, it means direct contact with parts producers and a two-hour raw material delivery cycle. The direct model captures five major factors:

- Eliminate dealer mark-ups – by owning direct customer relationships, Dell eliminates mark-ups from retail stores and resellers.

- Build-to-order – Dell's manufacturing is configured to handle lot sizes of one. This allows customers to get exactly, and only, what they want.

- Service and support – Dell uses its knowledge gained from direct customer interaction to be able to tailor its service offerings to each customer segment.

- Time-to-volume – through its model, Dell is able to quickly produce new products. It does not have to empty the sales channel of old technology before it introduces new technology.

- Low inventory and capital management – by building to order, Dell does not have to stock a sales channel with volume. This reduces the amount of capital deployed, as well as losses from excess and obsolete inventory. Direct relationships with suppliers allow Dell to own minimal inventory in its manufacturing facilities, allowing Dell a negative cash conversion cycle. Dell owns on average 6 days of inventory, compared to 40-50 days industry average.

This model has helped Dell record profits, even while much of the rest of the computer industry struggles with losses (Figure 2-2).

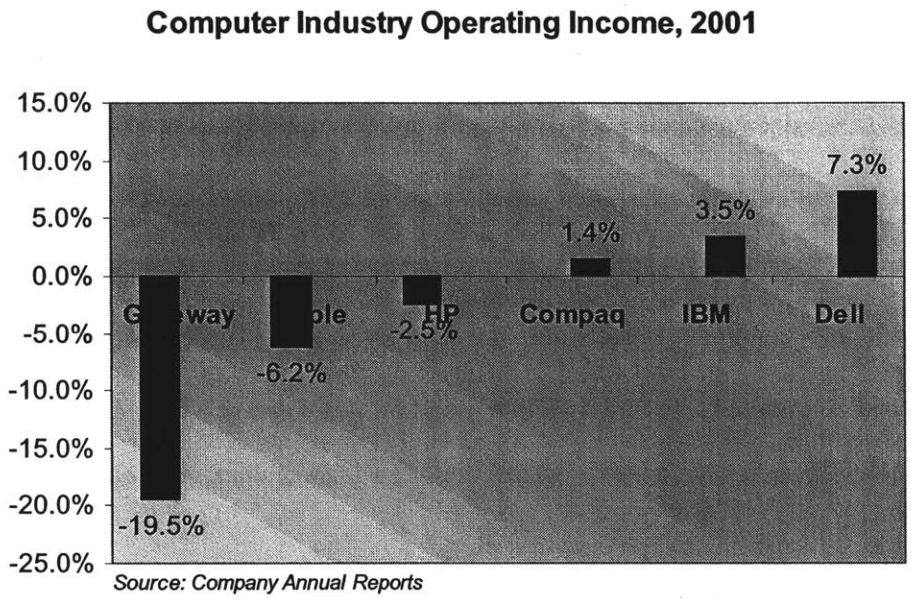


Figure 2-2: Computer Industry 2001 Operating Income

2.5 Dell's Corporate Initiatives

Dell has four key internal corporate initiatives that it feels will keep the company at the top of the computer industry. These are Product Leadership, Customer Experience, Winning Culture, and Globalization [4]. The firm's executives are measured on metrics from these four areas, and compensated accordingly.

Product Leadership refers to Dell's effort to offer standards-based technology at low cost. The goal is to never be caught at a disadvantage in features, availability, reliability and

value. This initiative also encompasses the desire to expand outside of the core desktop business into other attractive and faster-growing products. The focus on non-proprietary technology leads to Dell's strategy of using its low-cost advantage to put pressure on competitor's margins and commoditize new products.

The mission of the Customer Experience initiative is to leverage Dell's direct model to deliver the best possible customer experience across all points of contact with Dell. These contact points include the buying process, installation process, ownership timeframe, and beyond-the-box support. By delivering a superior experience, Dell hopes to build and sustain customer loyalty. Fred Reicheld's literature, *The Loyalty Effect,* argues that this loyalty will in turn have positive effects on Dell's market share and earnings.[5]

The Winning Culture initiative centers around the push to create a diverse and open work environment. Dell claims to be a meritocracy – a culture that rewards successful actions, not tenure or relationships.

The final initiative, Globalization, is most relevant to the Local Content Project. To achieve the stated goal of $60 billion annual sales in five years, Dell believes it will not only need to enter new product markets, but will also have to expand its international presence. Four of the top six markets for computers are regions in which Dell does not have a top-three market presence – China, Japan, France, and Germany. To serve these markets, Dell will need to expand the scope of all of its functions, not just sales. This means manufacturing, procurement, HR, and finance will all need to adapt to be global organizations.

2.6 Market Conditions

The computer industry Dell competes in is a cyclical market (Figure 2-3) [6]. While the overall growth over the past 20 years has been an explosive 17%, the industry in late 2002 is currently in the midst of a downturn. This downturn has led to aggressive price wars between competitors and industry consolidation.

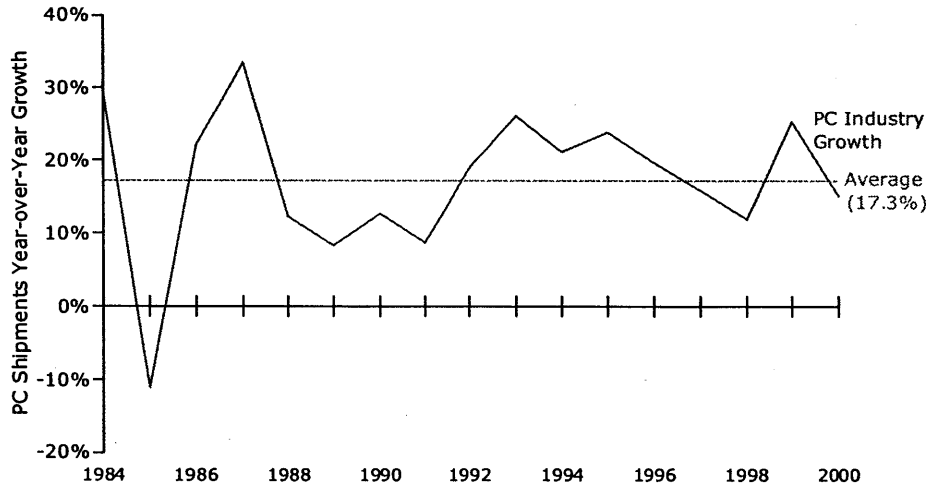


Figure 2-3: Computer Industry Cylicality, 1984 – 2000

This industry downturn has been driven by a souring global economy, and corresponding softened demand for computers and technology. Dell sees these troubled times for the industry as an opportunity for growth. Using its low-cost position, Dell has led the price wars in an attempt to gain market share. It has also expanded its efforts to grow internationally, while its competitors struggle to focus on their home markets.

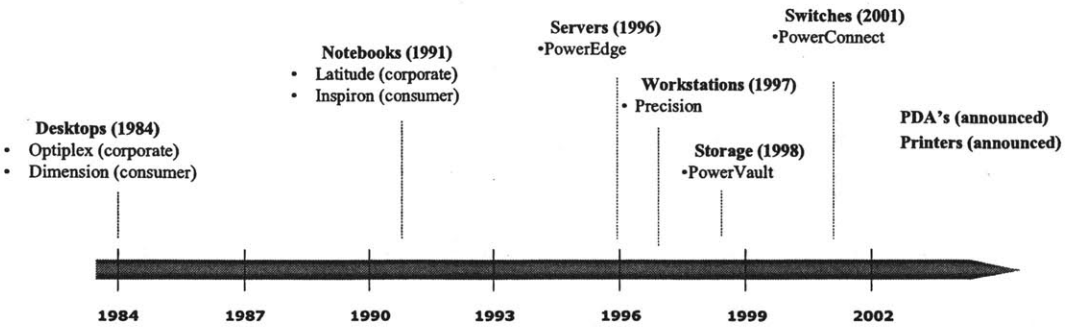
The results of Dell's efforts have been impressive. It surpassed Compaq in 2001 to become the largest computer producer in the world. Hewlett Packard and Compaq then

merged in early 2002 to regain the top spot, but the position was fleeting as Dell surpassed the new company in late 2002.

2.7 Product Overview

Dell's two largest competitors, IBM and the HP/Compaq company, have other profitable product lines that are able to subsidize their computer division during this industry downturn. IBM's global services and HP's imaging and printing divisions have very high margins which allow their parent companies to make a profit even though their computing divisions are losing money. Dell has seen this effect, and is looking to expand its offerings to compete against these two giants. Dell's goal is to enter these higher margin industries with a low cost advantage, start a price war, and bring down margins in the industry. This will reduce its competitors' ability to subsidize their PC lines with earnings from other parts of the companies. To this end, Dell is aggressively pursuing the IT services industry and has announced plans to enter the printing and imaging business (Figure 2-4).

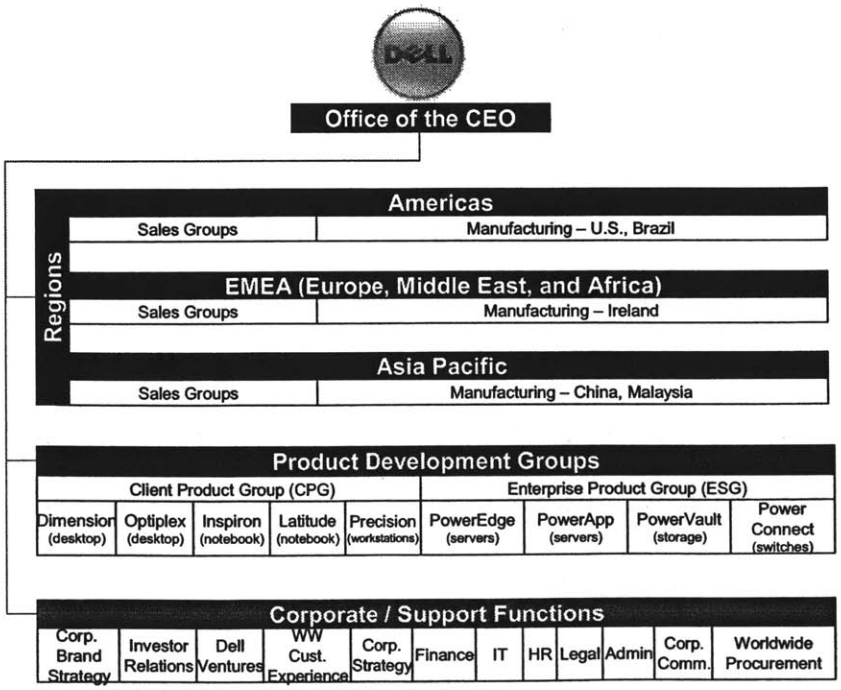
Figure 2-4: Dell's Product Lines



2.8 Organizational Structure

Dell has created an organizational structure to allow it to expand globally. (
Figure 2-5) At the top is the Office of the Chairman, encompassing CEO Michael Dell and COO Kevin Rollins. Reporting to the Office are the regions, the product groups, and corporate support functions. Each region represents both sales efforts and any manufacturing operations with that region. The sales efforts within each region are organized by customer types (e.g. government, higher education, etc.). The product groups manage product development and consist of the Client Product Group (CPG) and the Enterprise Systems Group (ESG). Corporate support functions include HR, Branding, Legal, and Finance. Worldwide Procurement (WWP) is one of these functions, and is organized by commodity types. This project was sponsored by a sub-segment of WWP – OEM Desktop Supply Chain Management.

Figure 2-5: Dell's Organizational Structure



2.9 Manufacturing Regions

As mentioned, Dell is divided into three regions that report into the Office of the Chairman. These three high-level regions encompass five manufacturing regions:

- **Americas** (71% of company revenue in Q2 2002)
  - Americas Manufacturing Facilities (AMF) – sites in Austin, Texas as well as Nashville, TN, serve North America
  - Brazil Customer Center (BCC) – opened in 1999, in Eldorado do Sul, Brazil, serves Latin America

- **Europe, Middle East, and Africa (EMEA)** (19%)
  - European Manufacturing Facility (EMF) – opened in 1991, in Limerick, Ireland, serves all of EMEA

- **Asia Pacific** (10%)
  - Asia Pacific Customer Center (APCC) – opened in 1996, in Penang, Malaysia, serves Asia and Australia regions. Also manufactures a large percentage of all Dell notebooks sold worldwide
  - China Customer Center (CCC) – Opened in 1998, in Xiamen, China, serves China and Japan

2.10 Chapter Summary

Dell has grown from a small company in a dorm room into a leader of the technology industry. This success has been driven in large part from its direct model and low-cost advantage in the markets it serves. To be successful on a global scale and achieve growth goals, Dell needs to expand internationally and apply its model in new regions. The Local Content project at Dell is an effort to manage the regulations and laws that come internationally, allowing the company to maintain its low cost advantage that is needed for success abroad.

3 Project Definition & Background

3.1 Chapter Overview

This chapter will discuss the Local Content Project context. It will define "Local Content" and investigate why the regulations exist. It will examine research done on the subject, as well as discuss how it was historically handled at Dell prior to this project. It will then elaborate on the specific laws Dell is facing in its manufacturing regions. Once this context is established, it will define the Local Content Project and the approach taken towards it.

3.2 Sourcing Options for OEM's

When opening a manufacturing facility, a company has a choice of where to source raw component materials to feed the factory – either A) source the components locally or B) import the components from another market. This "other" market can either be the home country of the corporation, or an existing global supply base used by the company. Both of these choices, of course, have their advantages and disadvantages [7]. Sourcing components locally reduces logistical and freight costs while creating goodwill with local governments, which may be returned in the form of subsidies. The downside includes potentially higher component cost. Sourcing materials abroad may lower those component costs and allow the company to take advantage of economies of scale across

all of its operations. This could result in additional complexity and logistics costs, as well as the ire of the local government for not supporting the local economy.

In general, a company may decide to source abroad for three main reasons [8]. First, if the company is new to the country, it may be unfamiliar with local suppliers or supplier network. Second, the local suppliers may potentially be under-qualified or prohibitively expensive to do business with. Thirdly, the company may already have supplier relationships and contracts abroad it does not want to break. While the decision to source locally or not is individual to each company, Mol, van Tulder, and Beije argue that 'assembly industries' such as automotives and electronics are more likely to source in the local country [10]. This is because these industries tend to operate under just in time (JIT) principals, and cooperation with suppliers is easier if both parties are geographically close to each other.

3.3 Sourcing for the Desktop Computer Industry

The market for desktop computers ("PC's") is a mature industry. Most desktops available today are assembled from standard parts. Computer manufacturers have taken different approaches to the question of whether to stay vertically integrated or not. IBM is the classical vertically integrated computer company – it still develops and designs most of the parts such as hard drives, motherboards, and CD drives, that make up a PC. Dell is on the opposite side of the spectrum. It acts more as an assembler of best-in-class parts. Because of this approach, Dell faces many sourcing options on each key computer component. Some of the key components Dell sources are highlighted here.

Processor (CPU) - The CPU runs the actions of the computer. It has been called the "brains" of the machine. Intel is the leading supplier of CPU's, supplying 80-90% of all CPU's to desktops.

Motherboard – If the CPU is the brain, the motherboard is the central nervous system. It is generally the largest component of the computer. It connects all the components such as the CPU, the hard drives, and output devices.

Chassis - The chassis is analogous to a person's skin – it's the outside casing of the computer. The chassis defines the look of the computer.

Power Supply (PSU) – The power supply is equivalent to the heart. Just as the heart pumps blood to all parts of the body, the PSU pumps electricity to all parts of the computer.

Memory (RAM) – RAM is the computer's short-term memory. The CPU uses memory to process files and requests that are current and need fast access.

Hard Drive – The hard drive is the computer's long-term memory. It stores all the computer's information and files.

Peripherals – The peripherals are analogous to the eyes, ears, nose and mouth. They communicate with the world outside the computer. Common examples of peripherals include CD drives, floppy drives, modems, network interface cards (NIC's), keyboards, and mice.

3.4 Defining "Local Content"

3.4.1 What is Local Content?

Local Content requirements, in general, are regulations set by a government that force firms to purchase a certain amount of their raw materials from suppliers located in that country. This "certain amount" is usually measured as a percentage. These regulations vary in shapes and sizes in how this percentage is measured and what are the repercussions. Some of the common key parameters are discussed below.

Physical vs. Value based – some requirements may require a percentage of the physical volume be sourced locally, while others may require a certain percentage of the cost or value be sourced locally. All of the requirements Dell faces are value-based.

Cost vs. Selling Price – Some requirements are a certain percentage of all raw materials that go into the end product (COGS). Others are measured against the total selling cost of the product (COGS + transformation costs + margin)

Law vs. Incentive – Some requirements are strict laws that must to be met in order to do business in the country. Others provide huge incentives or tax breaks for meeting the requirements, or impose hefty taxes if the requirements are not met. All the requirements Dell currently faces are of the second type.

Annual Production vs. Individual SKU – Some regulations monitor the annual local content percentage of the company. This means a company with a 50% (of selling price) requirement with two equal products selling for $100 can meet the requirement by having

one product be 10% local and the other being 90%, assuming similar volumes across products. In contrast, other requirements enforce the local content percentage requirements on each individual good that is sold. So in the above example, only the second item is considered to satisfy the local content requirement..

3.5 Local Content Research

Local Content affects many corporations, as Lion (1994) found that 83% of private sector respondents in a U.S. Commerce Department survey replied that local content rules had a great effect or some effect on their industry.[9] To-date, most research in this field examines the economic effects of these requirements on the country, or examines what is the optimal level of such regulations, or addresses the question of where to set up a plant given these regulations. While there is some work done from the point of the view of an individual company, and the effect of the supply chain function, it is fairly minimal.

3.5.1 Why do Governments have Local Content Regulations?

Belderbos, Capannelli, and Fukao (2002) state that local content rules exist "to provide a number of benefits to the host economy." [11] These benefits include promotion of local industry growth, increased employment, and transfer of technical know-how.[12] Not only do the governments wish to promote under-developed industries, but they are also trying to fight discrimination newer local firms face when competing with established firms.[13] This uphill battle is made even tougher as Mol, van Tulder, and Beije (2000) found that multi-national corporations are more likely to source abroad, as opposed to local.[10]

While these requirements are preferred over straight tariffs, they still have a negative impact on overall economic welfare. This is because if the requirement, LC_1, is lower than the natural local content level, LC_0, it will have no effect. If LC_1 is higher than LC_0, as shown below (Figure 3-1), the result is an increase in the price of components, and thus the overall price of the final good. Veloso (2001) examined quantitative data to support this argument in the automotive industry, and his results are shown here (Figure 3-1) [14]. The data supports the claim that setting the requirement, LC_1, higher than the natural level of local sourcing, LC_0, results in a higher cost of raw materials and ultimately a higher price of the final good.

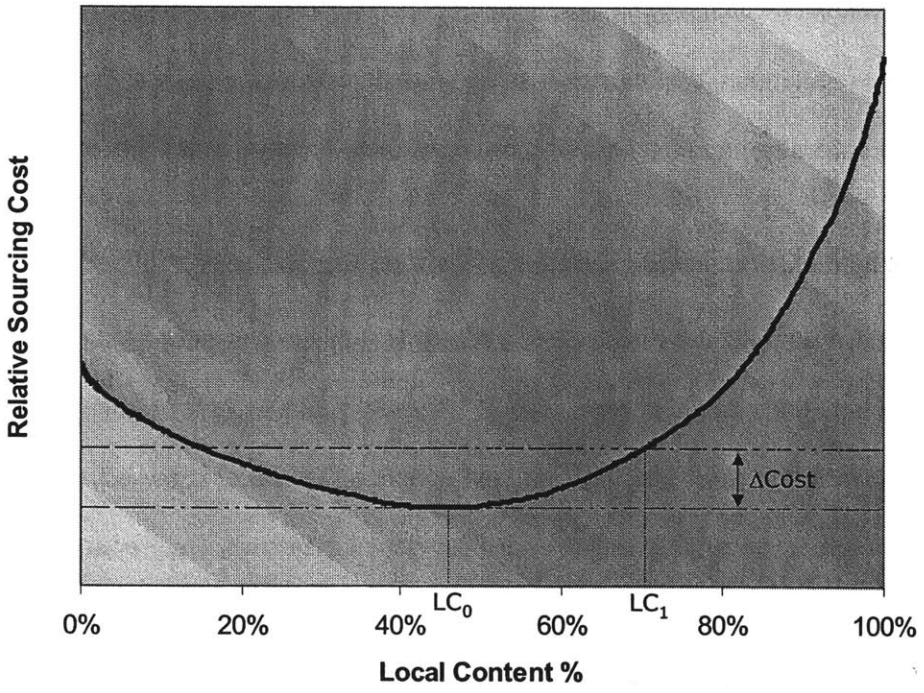


Figure 3-1: Local Content Requirements and Supply Chain Cost

3.5.2 Examples of Local Content Rules

Local content regulations are not unique to a single country or single industry. In the automotive industry, sample local content percentages include 40% in the Philippines, 50% in Mexico, 54% in Thailand, 60% in China, 70% in Taiwan, 75% in Pakistan and 85% in Australia.[16][17][9][9] The incentive in China has been an exemption from having to apply for import licenses. The penalty in Australia has been a 35% duty on imported components.[18] North America is even affected, as Symonds (1993) illustrates: "As NAFTA (North America Free Trade Agreement) is phased in, cars assembled at the factory Mercedes-Benz is planning in Alabama would eventually need to have 62.5% of their components made in North America to enter Mexico or Canada duty-free."[19][19] Other industries are affected as well, such as televisions and refrigerators in Taiwan and tobacco and agriculture in Australia.[20][21][21]

3.5.3 Local Content and The Supply Chain Function

The most in-depth examination of local content from an operational, as opposed to economic, perspective is from Munson and Rosenblatt (1997).[8] They developed a general quantitative model for selecting suppliers to optimally meet local content requirements in both a single plant and multi-plant corporation. Their major conclusion is that when deciding which component-supplier pairs to source locally, firms should seek out local suppliers for components with the lowest relative cost penalty (local cost of component / cheapest worldwide cost). By doing this, the problem can be transformed into the common knapsack problem and solved with efficient algorithms.

Arntzen, et al. (1995) conducted additional research, at Digital Equipment Corporation (DEC).[22] While their work focuses on modeling the whole supply chain at Digital, they factored in local content and tax regulations.

3.6 History of Local Content at Dell

Local Content regulations have historically been dealt with purely on the regional level of the organization. Prior to this project, there was little global visibility within Worldwide Procurement into the local content status in each region. The key parties involved were the procurement managers in Austin who negotiated with suppliers and made commodity sourcing decisions, and the regional buyers in each region who made actual purchase orders and handled inventories.

A regional buyer who worked at a specific manufacturing site was in charge of monitoring what percentage of raw materials were being sourced locally versus how much was being imported. If this percentage was too low to meet the government requirement, the regional buyer would communicate with the procurement managers in Austin. They would push the procurement managers to change their supply base to raise the amount of local procurement in the region.

Local Content was not much of a decision factor at the time when commodity and supply-chain managers in Austin chose their suppliers. One of the main reasons it was not a focus was because of the second reason described in section 3.2. Doing business with new suppliers in a region with the express reason of increasing local content was

deemed too expensive. Setting up new smaller suppliers for one region would prevent Dell from taking advantage of its economies of scale globally. Additionally, the tooling costs associated with setting up a new supplier was extremely expensive. These beliefs were consistent with Vickery's (1989) findings: "Achieving global economies of scale and efficiencies through international sourcing may be incompatible with developing high proportions of local content in all countries."[23]

Another reason local content was not a decision factor on the global level was because of a lack of metrics. There was no central operating committee that kept track of the local content percentages to report to supply chain managers. Commodity managers were judged on total landed costs of their products: this included component cost, tooling costs, freight, transformation costs, and incoming tariffs. It did not include post-manufacturing taxes that were based on local content regulations.

3.6.1 Local Content Steering Committee Structure

As Dell continued to grow internationally, these local content regulations gained visibility within the Worldwide Procurement organization. More and more often, regional buyers were contacting commodity managers in an attempt to increase their local sourcing. There were a couple instances where WWP was forced to "fight fires" and scramble to increase sourcing from a region at the end of the year in order to meet the requirements. Seeing this, the Vice President of OEM and Supply Chain Management (within WWP) commissioned the Local Content Steering Committee, and from that, the Local Content Project was born.

The steering committee is a cross-organizational structure – it brings together the regions, the product groups, Corporate Finance, and Worldwide Procurement. (Figure 3-2) The charter of the committee is to coordinate all local content efforts in four of the five manufacturing regions (European laws were deemed unachievable) and provide global visibility to how Dell is doing relative to its requirements.

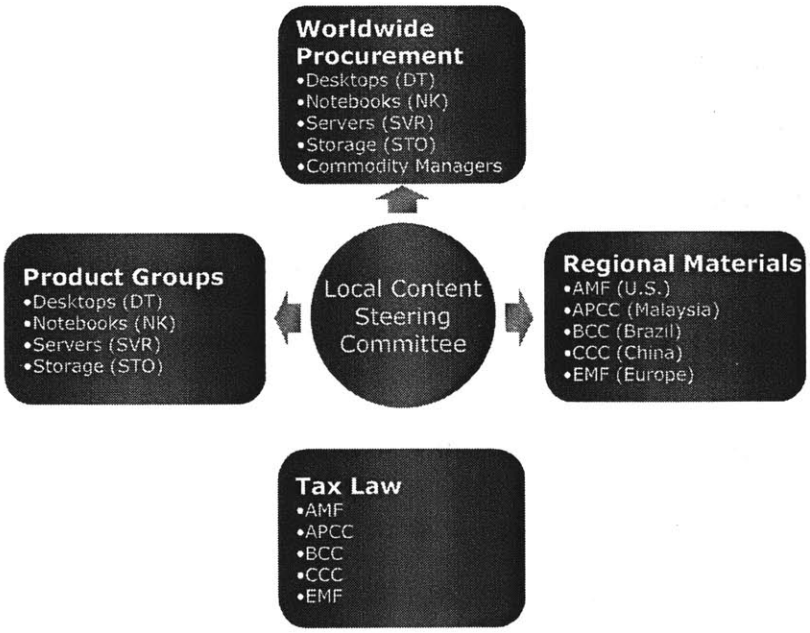


Figure 3-2: Local Content Steering Committee Structure

3.7 Regional Local Content Laws for Dell

As discussed, Dell currently has five manufacturing regions, each with its own unique local content regulations. The Local Content Steering Committee's work focused on Malaysia, China, Brazil, and the U.S., and this section will provide a description of each of those region's regulations (Figure 3-3). The fifth region, Europe, was not included in this Local Content Initiative because of the regulations there. The requirements were considered excessively high for minimal incentive, and therefore the effort was considered unwarranted.

3.7.1 Malaysia

The Malaysian government started the Pioneer program in 1999 to encourage Foreign Direct Investment (FDI). This program stipulates that any company meeting its local content requirements are exempt from the current tax (28%) on profits from manufacturing activities. While specific figures are confidential within Dell, this amounts to a potential savings in the tens of millions of dollars annually for the company.

The requirements to reach this "Pioneer Status" were negotiated with the Malaysian government. The requirements are broken down into specific lines of business (LOB) – Desktops, Notebooks, Servers & Storage. For desktop computers, 50% of Dell's raw material costs for their Malaysian manufacturing have to be sourced in Malaysia. Additionally, all motherboards (a computer system component) that go into desktops made in Malaysia have to be sourced locally. For the other LOB's – Notebooks, Servers & Storage – the requirement is much more qualitative. For these products, Dell has to show "best-effort" to source locally or encourage FDI into Malaysia. On top of sourcing

locally, Dell can show it is encouraging FDI by negotiating with suppliers to set up call centers and repair facilities in Malaysia.

3.7.2 China

Dell achieves savings on import duties of its components if it meets China's local content requirements. These duties are cut in half, from 6% to 3%. To realize these savings, local components have to compose at least 41% of all raw materials used in Dell's China manufacturing. This requirement is measured on an annual basis.

The Chinese local content requirements are being reduced over time, in accordance with their agreement to enter the World Trade Organization (WTO).

3.7.3 Brazil

Brazil, while Dell's smallest manufacturing facility, imposes the most complex local content regulations on the company. Dell must meet these requirements in order to have competitive pricing in Brazil and the other Latin American countries.

The main law that imposes local content requirements in Brazil is the Basic Productive Processes (PPB) law. If the requirements of this law are met, the Federal Excise tax is lowered from 15% to 1.5% of the selling price of the goods. Given the low operating margins of the computer industry previously discussed, led by Dell's 7.3%, meeting this requirement is a large determinant of whether a product is profitable or not.

The requirements for the PPB law are measured on a box-by-box basis. This means that while one box may meet the requirement and be only subject to 1.5% excise tax, another

box may not and be subject to the larger 15% tax. The requirement states that specific components of each computer must be sourced locally. These components are the motherboard, memory, video card, network interface card (NIC) and modem.

Additionally, Dell can earn "part exceptions" as a way around this requirement on some notebooks and servers. For every 1,000 computers Dell produces in Brazil that meet the above requirement, it earns 100 (10%) "server exceptions" that can be used to import server parts. That means if Dell sells 1,000 desktops with all five of the above components sourced locally, it could sell 100 servers that had imported motherboards, for example. Similarly, for every 1,000 computers Dell produces meeting the above requirement, plus an additional requirement of sourcing the power supply and chassis locally, it earns 250 (25%) "notebook exceptions" that can be used to import notebook parts.

These exceptions are valuable to a computer manufacturer such as Dell since notebooks and servers use less commoditized parts than desktops (especially the motherboards on servers). Since these parts are more technologically complex, it is difficult to find local suppliers who can supply the components at an affordable cost. These "exceptions" that are earned from compliant desktops allow the company to remain competitive in the server and notebook product lines.

3.7.4 United States

In the United States, the Extra-Territorial Income tax law is the only regulation with local content implications to which Dell is subjected. This law is meant to encourage U.S.

companies to keep manufacturing facilities domestic. It is only applicable to goods produced in the U.S. and then exported abroad, not on goods sold domestically.

The ETI law reduces the federal tax rate for exported goods from 35% to 8/23 * 35%. Adding to further complexity, it is only applicable to 23% of the company's exported profits. As a hypothetical example, if a company had $1million in profits from exports, without the ETI law it would pay $350k in taxes. With the ETI law, the company only pays $298k in taxes (35% * (8/23 * 23% + 77%) * $1M). For Dell, these savings amount to millions of dollars.

To be eligible for the savings, no more that 50% of the "fair market value" of the end product can come from imported materials. Note that "fair market value" is synonymous with selling price, which includes component costs, labor costs, and company margin. So for example, a product that sells for $100 may have $60 in raw materials, $20 in labor, and $20 in margin. For this product to be eligible under ETI, no more than $50 of the raw materials can be imported, which is actually a majority of the total materials cost.

The ETI law is a descendant of the Foreign Sales Corporation (FSC) tax law in the U.S.. The WTO forced the U.S. to abolish the FSC law, deeming it an unlawful subsidy to domestic corporations. In response, the U.S. developed the ETI law, which while not liked by the WTO, has not been forced into extinction.

In addition to the ETI law, the U.S. government requires that in order to sell the computer to the Federal government, the computer must be assembled in the U.S. "Assembly" has an objective definition – in the words of the government "significant transformation must occur in the U.S." The wording basically refers to the motherboard/CPU integration. Motherboards and CPU's are made in different locations and different suppliers. At some point in producing the computer, a manufacturer must place the CPU in the motherboard. This action satisfies the "significant transformation" stated by the U.S. government.

	Regulation	Incentive	Requirement	Measurement
Malaysia	▪ Pioneer Status	▪ Waives 28% tax on operating profit from manuf. activities	▪ 50% LC on DT's, ▪ 'best effort' for NK's, severs and storage	▪ Dell Malaysia on the whole, annually
Brazil	▪ PPB Law	▪ Reduces excise tax from 15% to 1.5% per system	▪ Specific components must be sourced locally	▪ Box-by-box
China	▪ LC Req.	▪ Import duties cut in 1/2	▪ 41% LC across all manufacturing	▪ Dell China on the whole, annually
U.S.	▪ ETI Law (exported systems)	▪ Reduces Federal Tax from 35% to 12% on export profit – Applicable to only 23% of profits from exports	▪ <50% of 'fair market value' is imported	▪ Dell U.S. exports on the whole, annually

Figure 3-3: Local Content Requirements: Regional Summary

3.8 Local Content Project Scope

Dell's largest product line by far is desktop computers. Because of this fact, most of Dell's local content status in each region is determined by the status of desktop computers. As a result, the Local Content Project was focused on desktops. Additionally,

Dell's European region did not participate in the project, deeming their local content regulations unachievable.

The main Local Content Project thrust would be limited to the six and a half month timeframe defined by the MIT/LFM internship.

3.9 Project Definition

Globalization is one of four major company wide initiatives. Along with globalization of Dell's products and services comes the ability to provide products in a competitive manner to all regions. Many emerging nations have local content requirements that must be realized in order to sell products in that country. Often times these requirements conflict with Dell's current fulfillment strategy. The focus of this project is to develop for Dell a local content strategy and implementation plan that effectively balances country specific requirements with Dell's business model. The goal is to have tools and processes that are practical and usable, not just academic, and to develop these in the six and a half month window.

3.10 Project Approach

The major stakeholders of the project are Worldwide Procurement and the Regions, but also include product groups. The original idea was to build a quantitative model similar to Munson and Rosenblatt's, discussed earlier. In interviews with the stakeholders, it became apparent that this approach needed to be modified. The biggest shortcoming, in this case, of such a model is the assumption that all parameters such as demand,

component costs, supplier base, and supplier locations are defined and known. Unfortunately, these parameters are not only unknown, but very complex to uncover. To build a complete model of the supply chain to incorporate local content as a decision factor would require an effort similar to the model developed at DEC, which evolved over six years. This was not possible given the project scope.

An additional constraint was the full schedules of the stakeholders. While interested in local content as an important issue, the stakeholders were not able to devote all of their time to the subject. That means that the tools and processes developed had to be simple and quick to use. This brought us to the approach of developing tools that could incorporate local content as a decision factor into their current toolkits and processes.

3.11 Chapter Summary

Local Content is emerging as an important issue for Dell, stemming from the company's globalization efforts. Governments use local content regulations to encourage foreign investment, but these rules place a strain on manufacturers such as Dell. Much of the research to date regarding local content has examined the welfare effects on the host economy, but there are a few examples in literature that examine the effects on the supply chain operations at a corporation. The Local Content Project was commissioned by Dell to help the company handle these regulations in an effective, practical, manner.

4 Methodology for the Design of the Strategy

4.1 Chapter Overview

This chapter will discuss the design of the local content strategy at Dell. It will discuss the supply chain structure that effects local content, and examine the key stakeholders involved. Next, a key list of desired outputs from the project are reviewed based on interviews with these stakeholders. The chapter concludes with the introduction of the two-pronged approach to the local content strategy.

4.2 Supply Chain Set-up and Regional Execution

The supply chain function at Dell can be thought of in two pieces – supply chain design and supply chain execution (Figure 4-1). The supply chain design encompasses the materials decisions for the products as well as the supplier relationships and negotiations. The supply chain execution is the placing of actual purchase orders and handling of inventory. At Dell the design is handled globally in Austin, while the execution is the responsibility of each region.

Two groups in Austin impact the supply chain design. These are the commodity teams and the product teams. A commodity team will "own" a specific commodity – such as motherboards. The main responsibility of this team is to negotiate with suppliers of that commodity. This includes determining contract terms, deciding which suppliers to source from, and rationing out the split between these suppliers. The commodity teams also map

out the roadmap for the commodity across all of Dell's products. For example, the hard drive commodity team may decide that Dell will offer 10GB, 20GB, and 40GB hard drives across all its desktops. It will also negotiate with suppliers as to when a new hard drive, say 80GB, will be available.

Product teams, on the other hand, decide which materials go into each specific product. A supply chain manager from Worldwide Procurement is a member of the product team, and serves as an interface to all of the commodity teams. For parts that are unique to that product, the commodity team needs to find a supplier to produce the piece. For parts that are common across many products, the commodity team needs to make sure there is enough supply and capacity to fulfill each product's requirements. The supply chain manager on the product team is responsible for informing each commodity team of his/her product's needs, and making sure there is sufficient supply for all the required commodities.

Supply chain execution is managed at the regional level. Once commodity teams have negotiated contract terms with suppliers, the regional buyers are responsible for placing purchase orders. They must make sure the inventory in their factory is at the optimal level – too much and there are increased inventory handling costs and capital requirements; too little and they risk not being able to fulfill orders. Additionally, these regional buyers track the local content status for their region, and interface with the local governments.

Figure 4-1: Supply Chain Function at Dell

While this structure allows Dell to be flexible to meet regional demand needs, it does pose some challenges. The main challenge with respect to local content is the lack of visibility into local content status. The managers in Austin only hear about local content when a problem situation arises. Furthermore, the decisions made during supply chain design do not consider local content as a decision factor.

4.3 Key Stakeholders

There are many stakeholders in the Local Content Project at Dell. First, there are the Regions. They are responsible for meeting their country's requirements. Given the drawbacks of the supply chain structure discussed above, the regional buyers are very interested in the output of this project. On the global level, there are a couple of groups of stakeholders both within and outside of Worldwide Procurement. First there are the commodity teams in WWP who manage each part. Additionally, there are the supply chain managers who sit on the product teams. Finally, the Sales & Marketing organization also has a keen interest in the project, since it affects overall selling price of the products in each region.

4.4 Stakeholder Interviews

As previously mentioned, the initial thought was to develop a supply chain model similar to the one at DEC, with local content as an optimization constraint. It quickly became apparent that this approach would not be feasible given the project's scope and Dell's culture. This led to an investigation into potential benefits that could be derived from the project. This investigation consisted of approximately 50 interviews of the key stakeholders. A few themes were recurring:

- Commodity managers and supply chain managers in Austin did not have a good understanding of the local content laws in each region. Illustrative quote: *"We really don't have any insight into the regulations that drive local content. What are the requirements? How are they measured? What are the benefits? We need to have at least a basic understanding of these questions." – commodity manager*

- Local Content was not a decision factor in most commodity managers' and supply chain managers' selection process. Illustrative quote: *"We do not currently consider local content when determining our suppliers." – commodity manager*

- Commodity managers were not well integrated into the local content process in the regions. They only became aware of local content when a problem arose. Illustrative quote: *"We need to be able to understand local content issues as soon as they arise, and we are not currently." – commodity manager*

- Regional buyers had difficulty bringing local content to the attentions of the Austin decision makers. Illustrative quote: *"We need to be able to better bring these [local content] issues to the attention of procurement managers in Austin." – regional buyer*

4.5 Key Desired Benefits

The potential objectives of the Local Content Project that came out of the stakeholder interviews fall into two categories – information flow, and consistency and optimization. These two categories form the two-pronged approach that is now taken towards local content at Dell.

4.5.1 Information Flow

A key finding from the stakeholder interviews is the realization that Dell's globalization efforts are placing additional communication requirements on the organization. In the case of local content, this means communication between different parts of the

organization, such as product groups, manufacturing, and procurement, as well as between the different geographic regions. One of the key goals of this project is to ensure the appropriate information is flowing to all relevant members of the organization.

4.5.2 Consistency and Optimization

The second category of objectives revolves around the need to have local content issues for all regions as an evaluation factor in sourcing decisions. While the regional requirements are different across countries, the need for a consistent process to consider all regional requirements is existent. The question for this category of objectives is how to develop processes and tools that allow global decisions to be made with the correct inputs from all regions.

4.6 Chapter Summary

The supply chain function at Dell is split into the design at a global level, and the execution at the regional level. This structure provides flexibility to meet different sets of needs, but also poses challenges when it comes to local content. Based on interviews with key stakeholders, the Local Content Project aims to accomplish two key objectives (Figure 4-2).

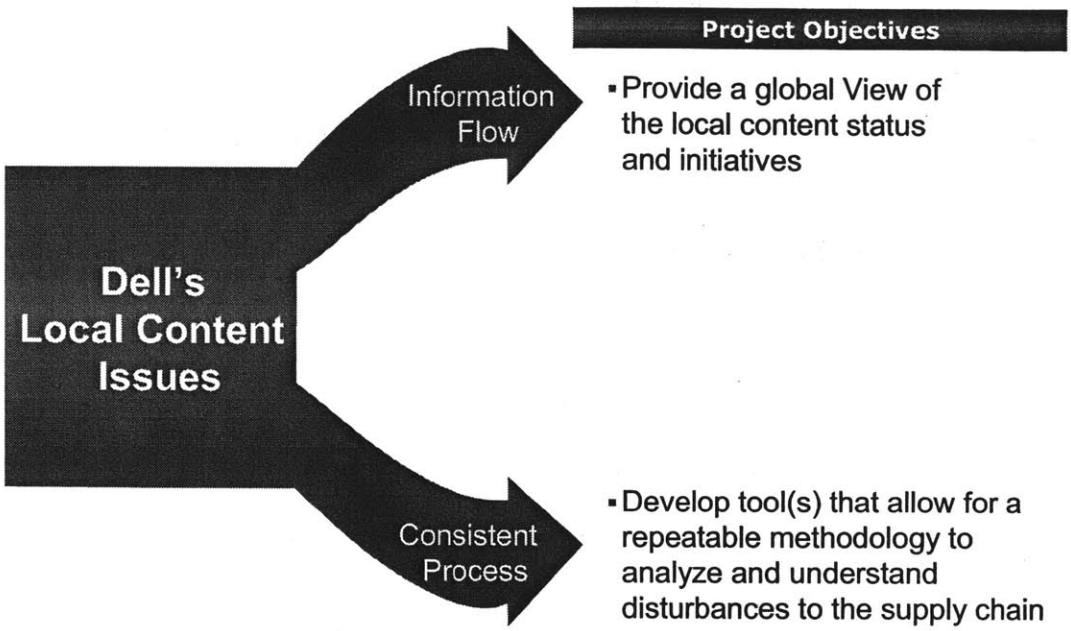


Figure 4-2: Local Content Project Objectives

The first objective is improving information flow between the regional groups and the global managers in Austin. The second is achieving a consistent methodology across all the regions to assist in managing local content issues.

5 Information Flow

5.1 Chapter Overview

This chapter discusses the first prong in the local content strategy – information flow. It will discuss why the information is important, and then discuss the project initiatives tied to the objective.

5.2 Need for Global Visibility

Dell has grown organically to be the $30 billion company it is today. As it grows, the company tries to continually develop its processes and systems to support the new business. Since much of the current and future growth of the company is tied to its globalization effort, it needs to define business processes that can handle the various geographic expansions.

Back a few years ago, when 95% of the work force and revenue were located in the U.S., information flow was simpler. When gathering information to make a decision, most of the time one simply needed to walk to a neighboring cubical and speak to the appropriate person. Dell is discovering that is no longer the case. As employees, manufacturing facilities, and data systems have become disperse, more effort into information flow between all groups becomes much more important.

Dell has a culture that prides itself on "dealing with ambiguity" – that is, if not all the information is available, make the best reasonable decision rather than churn too much time looking for every last piece of data. The advantage of this culture is that it has allowed Dell to be quick and nimble to stay ahead of the market. The downside is that not all decisions are completely informed.

This is the case of local content at Dell. As previously discussed, the decision makers during supply chain design did not incorporate local content requirements into their thinking. From the stakeholder interview comments we see that this is not because they did not think it was an important consideration – rather, it was because the relevant information was not readily available.

The approach historically was for Austin-based supply chain designers to consider local content regulation only when it became a dire issue. That approach was manageable when Dell had only a couple manufacturing regions, but has broken down today for a few reasons. First, with five manufacturing regions handling $30B in revenue, the system is too complex. To gather the appropriate information that is related to local content, a supply chain manager must have information from the product groups in Austin, commodity managers in Austin, sales and marketing in Austin, corporate law in each region, and the regional buyers in each of the five regions (Figure 5-1).

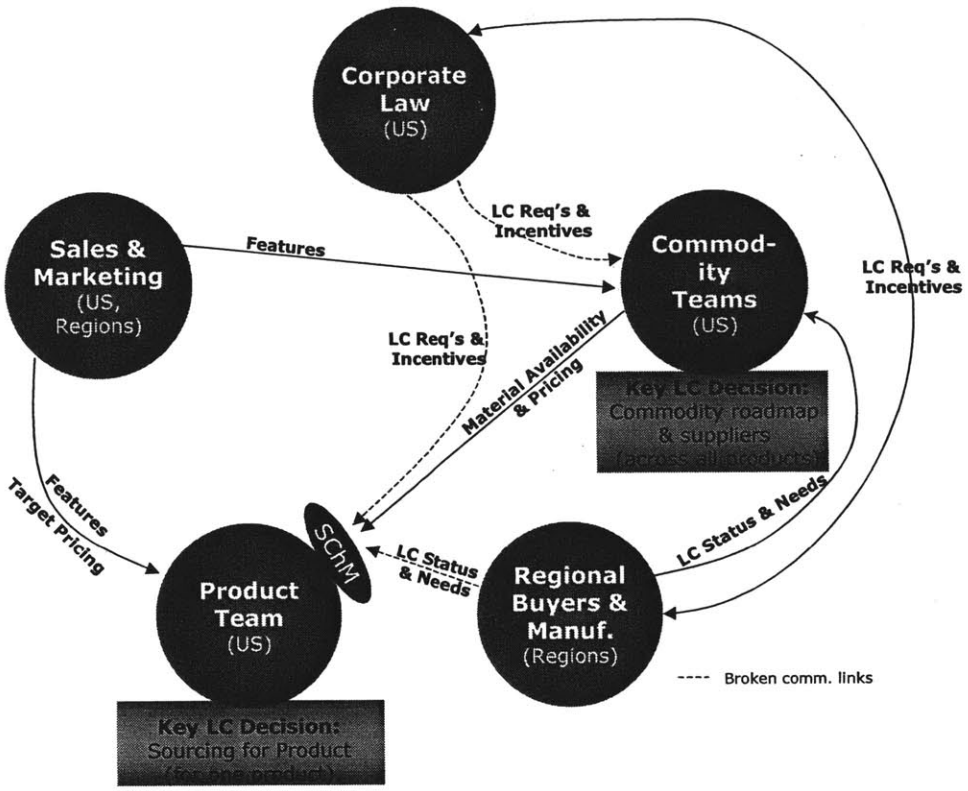


Figure 5-1: Local Content Decisions - Communication Links

The diagram shows the various communication links required to make an informed sourcing decision. In the case of Dell, the dashed arrows represent broken communication links. In the absence of information from each of these groups, the supply chain manager makes a "best guess."

The second downfall to this approach is that the stakes are much higher. The total local content incentives and penalties amount to 2.5% - 3% of profits. While this does not seem like much, it amounts to tens or even hundreds of millions of dollars per year for the company.

5.3 Information Flow: Actions and Initiatives

The key to this first prong is to define processes to re-establish those broken communication links. At Dell, this consisted of three main initiatives.

5.3.1 Steering Committee Meetings

The first push was to form a cross-functional Local Content Steering Committee, discussed in section 3.6.1. This team consisted of Supply Chain Managers in WWP, Commodity Managers in WWP, product group representatives, and regional buyers (Figure 3-2). While the larger team has upwards of 30 members, a sub-committee of four managers from WWP coordinates its activities.

The charter of the committee is threefold. The first is "Strategy Interlock." This means it own the Local Content Project, and is responsible for transforming local content at Dell from a reactive, event-driven process to a proactive, strategy-driven process. The second is "Conflict Resolution" – coordinating the commodity teams' and product teams' needs with the needs of each region, and determining the best path for the overall path. The third was "Project Coordination" – making sure that all the relevant parties are aware of the various local content efforts being undertaken. To accomplish these goals, the Steering Committee established a series of regular monthly meetings, as well as an annual summit.

The monthly meetings are one-hour conference calls held during the first week of each month. Representatives from the product groups, commodity groups, regions, and corporate tax participate. The typical agenda includes half-hour updates from the regions,

15 minutes from the commodity managers, and 15 minutes of any overall local content strategy.

Each region discusses any new regulations they are subject to, as well as the status of any efforts they may be currently undertaking. For example, the Brazilian region may be trying to negotiate with their motherboard supplier to set up a factory in Brazil to meet certain requirements. In this meetings, the Brazilian regional representative, will discuss how those negotiations are progressing, and gives them an opportunity to share with the commodity managers what are the key issues, and the likelihood of a change. This forum is useful because it allows for the sharing of best practices. For example, a different region may share their experiences dealing with that specific supplier and how they overcame any issues, or another commodity manager may identify a potential new sourcing option.

The meetings use a red-green-yellow methodology for tracking issues. Each region reports its local content status using these colors. A report of "green" means the region is currently within governmental specs; a "yellow" status means that either the region is out of spec but has a plan of action to get back into spec, or the region is in spec but in danger of falling out; a "red" classification means the region is in danger of not meeting the governmental requirement. In addition to a red-green-yellow grading for the whole region, each region also assigns the same classifications for sub-initiatives it is undertaking, such as the supplier negotiations discussed above.

In addition to the monthly teleconference meetings, the four-member sub-committee also coordinates an annual summit. This summit gives a chance for all the Steering Committee members to meet face to face. The summit is a two-day event held in September in Austin. While other locations were initially considered, Austin was chosen to minimize overall travel commitments.

The summit's agenda is shown (Figure 5-2). As opposed to the monthly meetings, which focus more tactically, the annual summit focuses more on strategy and forward-thinking. The regions discuss their status with the committee, as well as shifts in manufacturing strategy planned for the coming year. Similarly, the product groups and commodity groups share their roadmaps for the coming year. This includes a discussion of how their technology is evolving as well as the projected long-term suppliers. The summit wraps up with a discussion of any tools or processes being developed by the Local Content Project team.

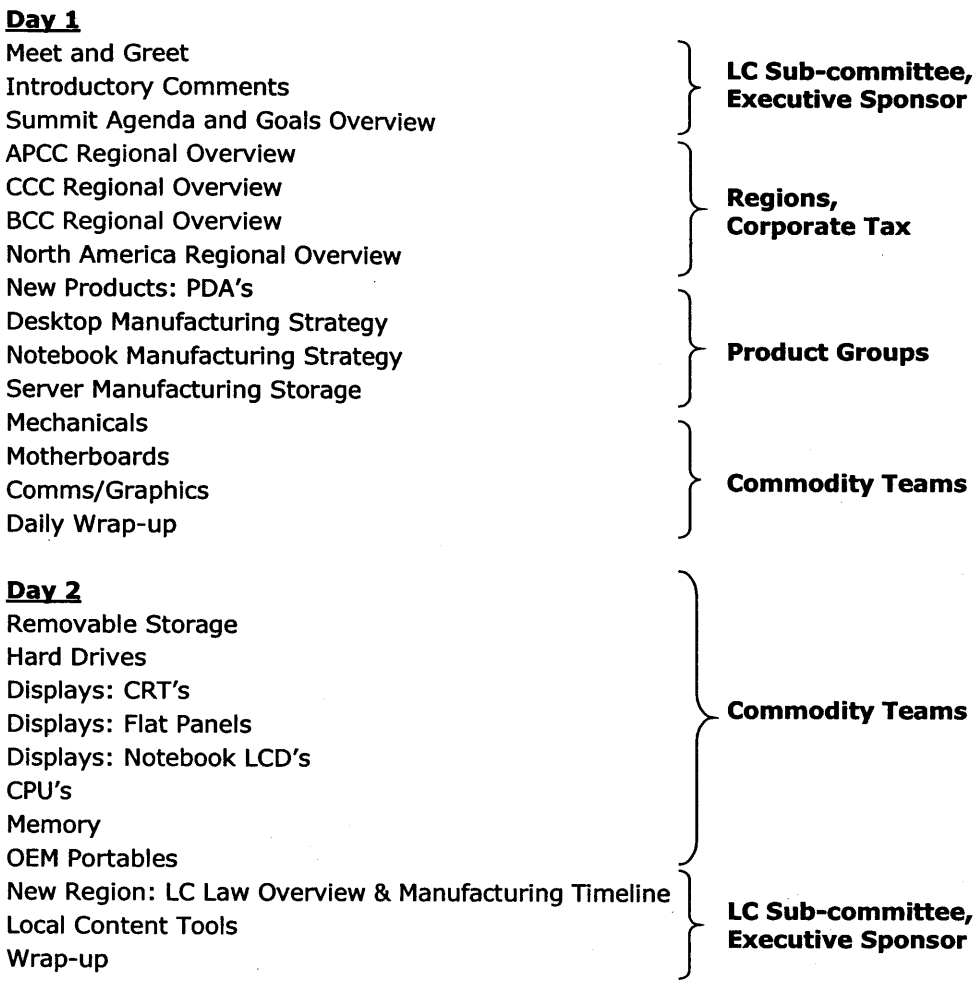


Figure 5-2: Local Content Summit Agenda

5.3.2 Database of Global Initiatives

As discussed, each region has its local content initiatives that it is undertaking, with the help of the commodity managers. Prior to the Local Content Project, there was no global visibility into the status of all these initiatives. To correct this, we developed a database of initiatives to track their status. The database gives a snapshot overview of all local content efforts across all regions. It keeps track of who is driving the effort, and what is the projected local content impact. The impact is threefold. First, it allows for easy

updating to the executives of Dell's local content status. Second, it allows the regions to see efforts in other geographic areas. This may identify new opportunities, or expose potential roadblocks other regions are facing. Third, it allows the commodity managers and product teams to see efforts in other commodities or products. A member of the local content sub-committee maintains the database.

Field	Explanation	Allowable Values
Updated	Date the information for this initiative was last updated	<date>
WWP LCSC #	Unique Identifier for this initiative assigned by WW Procurement	
Regional #	Unique Identifier for this initiative assigned by Region	
Region	Region of this initiative	APCC (Asia Pacific) BCC (Brazil) CCC (China) DAO (US) EMF (Europe)
LOB	Line of Business effected	DT (Desktops) NB (Notebooks) SV (Servers) ST (Storage)
Family	Product Family effected	examples: Umlaut, Shasta, Flash, Superman....
Mfg Strategy	Effect of intiative on LOB strategy; to be filled out from info from LOB managers	
Commodity	Component(s) that are effected by the intitiatve	examples: motherboards, CPU, memory, chasis....
Supplier	Supplier of the effected component(s)	<company name(s)>
Product Name	The name of the product in question	<product name>
Sup. Loc.	Country that the component supplier is located (which country is the component coming from)	<country>
$/Box savings	Savings we will achieve through intiative, on a per unit basis, if applicable	<$>
Law/Reg	Explanation of the law that is driving us to do this initiative;	example: law XXX says we will be taxed 0% on component duties and 3% on assembly duties if we meet 50% local content; This is compared to 4% component duty and 6% assembly duty if we do not meet 50%.
WWP Owner	Owner in WW Procurement	<Dell Employee Name>
WWPA Owner	WW Procurement Asia Owner, if applicable	<Dell Employee Name>
Region Owner	Regional owner	<Dell Employee Name>
Project Status	Status of the initiative	Open Complete Canceled On Hold
Status (RYG)	Status of open initiative (leave blank if the 'Project Status' is complete/canceled)	Green (initiative progressing smoothly) Yellow (initiative is preogressing with minor problems) Red (initiative is stalled)
FY03 $ Impact	Overall savings for FY 2003	<$>
FY04 $ Impact	Overall savings for FY 2004	<$>
Start Saving	First FY quarter in which we will achieve savings	<date>
End Saving	Last FY quarter in which we will achieve savings	<date>
LC% Impact	By what percentage will this increase the overall local content percentage?	<%>
Planning Start	Date of origination of the initiatve	<date>
Planning Complete	Date the initiative was completed/canceled (if still currently 'open', put scheduled completion date)	<date>
Note	Any other relevant information	

Figure 5-3: Database of Local Content Initiatives

The database has 26 fields to capture all relevant information about each initiative. This information can then be rolled up across all regions, providing global visibility of all the projects to management (Figure 5-3).

5.3.3 Summary of Local Content Laws

Also lacking at Dell was not only the crucial information links described in Figure 5-1, but a pervasive understanding of the underlying regulations. This means the driving impetus for local content action was not fully understood.

To rectify this issue, a concise summary of the local content regulations in each region is needed. This summary is distributed to the members of the steering committee, product teams, regional buyers, and commodity teams, and is also available on the corporate intranet. It provides a baseline understanding of the laws so that better supply chain decisions can be made and local content can be treated as a true decision factor.

This summary has to be concise for it to be used – the decision makers such as product teams and commodity teams do not have the time to pour over long legal documents. Because of this requirement, Powerpoint is used. This is the accepted communication format at Dell, and has the added benefit of allowing the users to copy the slides to presentations they may need to give.

5.4 Chapter Summary

This project reveals the need for improved information flow at Dell relative to local content. The steering committee is the key step to ensuring the right parties are

communicating with each other. These communications are on a regular tactical basis at the monthly meetings, as well as on higher strategic level at the annual summit. Additionally, the global database of local content initiatives provides the global visibility needed to understand how Dell is faring. It helps call-out issues being worked on in each region, and potentially highlights synergies in efforts across regions. Finally, the summary of local content laws provides basic information to those whom it impacts.

6 Consistency and Global Optimization

6.1 Chapter Overview

This chapter discusses the second prong in the local content strategy – consistency and global optimization. It describes the tools developed for this prong – why they are needed, what is their key output, and their impact on the supply chain function at Dell.

6.2 Assessment Tools

To get a grasp on procurement at Dell, it is useful to think of the company's "supply chain equilibrium" at any given time. This equilibrium is a snapshot of all Dell's suppliers, raw material shipping plans, and factory production plans. There are many factors that determine this equilibrium. First there is Dell's regional demand. This helps Dell decide where it will produce its goods. A second factor is the location of Dell's suppliers. This defines the shipping routes of raw materials to Dell's factories. Other key factors include labor costs, product composition, and other criteria.

A visualization of this equilibrium appears in Figure 6-1. The labeled dots represent Dell's factories (APCC, CCC, BCC, DAO, and EMF), and the other dots represent Dell's suppliers. These suppliers ship raw materials to the various factories, as represented by the dashed lines. Different quantities of raw materials are shipped on these routes as determined by the factory's output requirements, which is predicated on forecasted demand.

From this snapshot, Dell can determine its local content status in each region, for that given point in time. For example, the China region (CCC) can sum up the quantities of goods coming into its factories from China-originated routes, and the quantities from non-China-originated routes. This fraction represents the local content percentage for that given point in time. This is how the local content statuses were tracked prior to this project. Interesting to note is that this process is reactive, as opposed to proactive, to Dell's operations. Sourcing decisions are made, implemented, and then measured. Based on the reported measurements, the sourcing decisions could be adjusted to bring the region in line with its local content requirements.

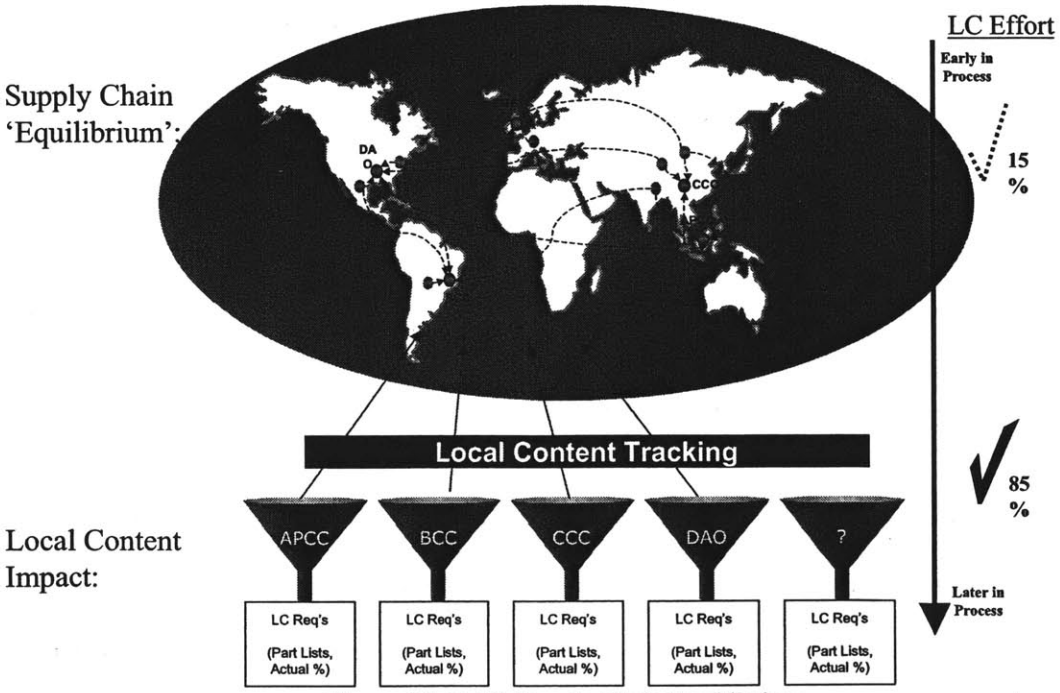


Figure 6-1: Dell's Supply Chain Equilibrium

This is a snapshot of the supply chain equilibrium. In reality, this picture is constantly changing. For example, if demand changes in a region, the quantities of raw materials shipped on a route may change. Also, if a new supplier is introduced because of cost and quality advantages, the picture will need an extra node added, with corresponding routes. Also, if new supplier locations are needed to provide new raw materials for new products, that too will need to be added to the picture.

This project changed the local content approach at Dell. Rather than take a reactive view of the world, Dell now is proactive in its sourcing decisions. It accomplished this by modeling the impacts of these changes to the supply chain equilibrium. By modeling these impacts on local content status, it is making local content a decision criteria in the ***initial*** procurement decisions, not just the modifications.

As you can see, there are many "supply chain disturbances" that causes change in the equilibrium. The two major disturbances that are controlled by WWP are:

1) **New Products** – when new products are released, WWP must find supplier locations to fulfill raw material needs. These locations may be existing supplier locations, and thus the quantities on the routes will change, or brand new supplier locations, which require a new node and routes. These all represent sourcing decisions by WWP. These sourcing decisions ultimately impact the local content statuses in each region, and thus, understanding their effects and making them a decision factor is crucial. This will be discussed in section 6.3.

2) **New Commodity Sourcing Strategies** – Dell is continually changing their supplier mix in an attempt to improve cost and quality. These decisions are often made at the commodity level, which spans many products. For example, the hard drive commodity team may source the 20GB desktop hard drive from two defined suppliers. That means every desktop with a 20GB hard drive must source this component from one of those two suppliers. The commodity team may then add a third supplier (or replace an existing supplier) as cost and quality metrics become favorable. This change in strategy affects all products carrying that 20 GB hard drive. These sourcing decisions also ultimately impact the local content statuses in each region, and thus, understanding their effects and making them a decision factor is crucial as well. This will be discussed in section 6.4.

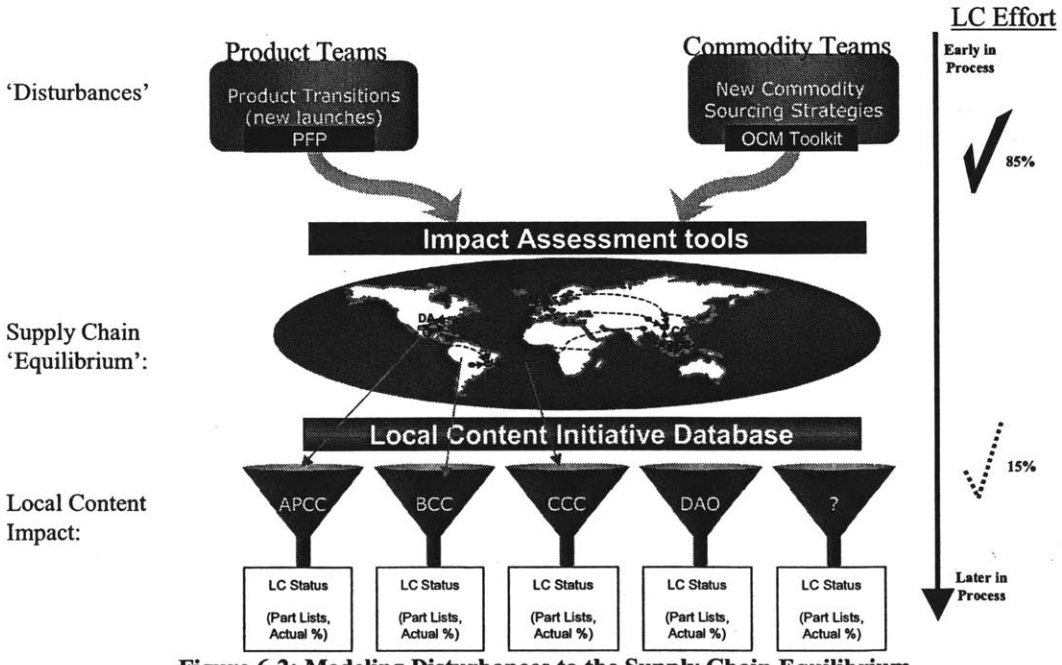


Figure 6-2: Modeling Disturbances to the Supply Chain Equilibrium

The new process for handling local content is shown in Figure 6-2. As shown in this figure, the approach to local content is proactive as opposed to reactive. The impact of sourcing decisions is modeled up-front, and thus, local content considerations can be initial decision criteria.

6.3 New Product Impact

As discussed above, the first major disturbance to Dell's supply chain equilibrium occurs when new products are introduced.

6.3.1 Need

The assessment tool to model the local content impact of new products helps Dell's procurement organization to make more informed decisions. This is especially important for Dell's high volume products. In any given year, Dell may sell 10-20 desktop lines into a given region. Obviously, the volume distribution is not uniform across these products. This implies that a single product could account for 20 –30% of overall desktop sales for a region in a year. These key products have a significant effect on the annual local content composition for that region. Being able to forecast this potentially large impact is crucial for the planning of that product as well as others in the product line. If this key product is made largely from imported parts, there is a burden on all the other products to be more local. These decisions ultimately effect how well each Dell region compares against its local content regulations, which effect tens to a hundred million dollars of cost to the company.

6.3.2 Key Audience and Output

The New Product Impact assessment tool is managed and owned by the Supply Chain Manager (SChM) on each product team. They manage the inputs and interpret the outputs for the team. The output influences the sourcing decisions for the product.

The output of the assessment tool is broken down by region (Figure 6-3). The output is broken down into two sections - "Summary" and "Notes". The "Summary" section provides the highest-level information for the SChM, while the "Notes" section provides more details.

In the Summary section for China (CCC) and Malaysia (APCC), the tool reports the initial local content status (LC_0), the impact of the new product line to this status (Δ LC), and the final status outcome (LC_1), all for the current calendar year. Essentially:

$$(LC_0) + \Delta (LC) = LC_1$$

The Notes section for CCC and APCC provides this same information for the next calendar year. It also provides an overview of the "locality" of the product. This reports the percent of local/non-local parts for the unique parts, the percent of local/non-local parts for the non-unique parts, and the overall percentages. This helps focus the SChM's corrective actions, if needed.

For Brazil, the output reports the cost avoidance achieved this year and next by the product by meeting local content regulations. This cost avoidance comes in two forms – direct and indirect. Direct cost avoidance refers to taxes levied directly on the specific

product. Indirect cost avoidance refers to the value of the "exceptions" earned. As discussed earlier, by meeting certain regulatory requirements with desktops, Dell can earn "exceptions" which it can use to import components for notebooks and servers. Since these exceptions are very important to the viability of those lines of businesses, their value is reported here.

The Notes section provides more detail for BCC. First, it provides volume information for BCC shipments. As discussed in Chapter 3, the basic local content requirement for Brazil is called the PPB law. A product meets this requirement by having a Brazilian motherboard, memory, video card, modem, and NIC. The volume of products that does this is reported here as "meets Basic PPB". In addition to this requirement, the server and notebook exceptions can be earned by having a local chassis and power supply. This volume is reported here as "meets extended PPB".

The next two items reported in the Notes section for BCC is the cost avoidance achieved ("Cost Avoidance Achieved"), and the potential cost avoidance not achieved by not meeting some of the regulations ("Cost Avoidance Left on the Table"). For the cost avoidance achieved, the tool reports the value of the "direct" cost savings both this year and next, as well as the "indirect" cost savings – broken down by server and notebook.

For the U.S. the tool reports whether or not Dell can sell the product to U.S. Federal Government agencies.

Summary

	NET IMPACT (CY 03)	LC % Before Platform	LC % w/ Platform (CY 03)
APCC - percentage impact	0.0%	X%	Y%
	NET IMPACT (CY 03)	LC % Before Platform	LC % w/ Platform (CY 03)
CCC - percentage impact	0.0%	W%	Z%
BCC - Direct Cost Avoidance	$ -	Direct Local Content Cost Avoidance Achieved in BCC (CY03 and CY04)	
- Indirect Cost Avoidance	$ -	Indirect Local Content Cost Avoidance Achieved in BCC (CY03 and CY04)	
DAO		Please answer question in 2.5.5	

Notes

APCC

CY '04 Projected LC w/ Platform	X%		
CY '04 LC Net Impact	0.0%		
Materials Summary:	Local Content ($)	Non-Local Content($)	Local Content (%)
Unique Materials	$0.00	$0.00	0.0%
Non - Unique Materials	$0.00	$0.00	0.0%
Total	$0.00	$0.00	0.0%

CCC

CY '04 Projected LC w/ Platform	W%		
CY '04 LC Net Impact	0.0%		
Materials Summary:	Local Content ($)	Non-Local Content($)	Local Content (%)
Unique Materials	$0.00	$0.00	0.0%
Non - Unique Materials	$0.00	$0.00	0.0%
Total	$0.00	$0.00	0.0%

BCC

Volume Information			
Total Volume (CY 03)		-	
Volume that meets basic PPB requirements (CY 03)		-	*basic req: Motherboard, Memory, Modem, Video, NIC all local*
Volume that meets extended PPB requirements (CY 03)		-	*extended req: all of the above AND PSU and Chassis local*
Total Volume (CY 04)		-	
Volume that meets basic PPB requirements (CY 04)		-	
Volume that meets extended PPB requirements (CY 04)		-	
Cost Avoidance Achieved			
Direct Cost Avoidance achieved - (CY 03)	$	-	*savings from lowered IPI tax from 15% to 1.5%*
Direct Cost Avoidance achieved - (CY 04)	$	-	
Indirect Approximate Value of 'Exceptions' earned - (CY 03)	$	-	
Indirect - Number of Server Exceptions earned (CY 03)		-	
Indirect - Number of Notebook Exceptions earned (CY 03)		-	
Indirect Approximate Value of 'Exceptions' earned - (CY 04)	$	-	
Indirect - Number of Server Exceptions earned (CY 04)		-	
Indirect - Number of Notebook Exceptions earned (CY 04)		-	
Cost Avoidance Left on the Table (b/c not all requirements met)			
Direct Cost Avoidance missed - (CY 03)	$	-	*missed savings from systems that don't meet basic requirement*
Direct Cost Avoidance missed - (CY 04)	$	-	
Indirect Approximate Value of 'Exceptions' missed - (CY 03)	$	-	
Indirect - Number of Server Exceptions missed (CY 03)		-	
Indirect - Number of Notebook Exceptions missed (CY 03)		-	
Indirect Approximate Value of 'Exceptions' missed - (CY 04)	$	-	
Indirect - Number of Server Exceptions missed (CY 04)		-	
Indirect - Number of Notebook Exceptions missed (CY 04)		-	

Figure 6-3: New Product Assessment Tool -Output

6.3.3 Required Input – APCC and CCC

To achieve the output described in section 6.3.2, the tool needs to gather information as inputs. The inputs come from two sources – the SChM, and "behind the scenes" purchasing data from each region. This "behind the scenes" information is data from actual purchasing practices from the previous 12 months in APCC and CCC. The information is built into the tool, and updated every quarter by the tool owner.

The first key piece of data needed is a measure of the current local content percentage (LC_0) reported by APCC and CCC. We use the last twelve months' purchase data – which includes volumes and dollar amounts, as a baseline. We then need to calculate the net impact of the product. For this, we need to take the volume (in dollars) of the new product times the percentage of local/non-local parts (in dollars). This gives us the delta to add to the baseline.

To get percentage local/non-local of this product, the tool needs to know what the product looks like. The tool asks the supply chain manager on the product team to list the components, with costs. For each component the tool then asks: "is the component local or not for CCC? For APCC?"

This is a time consuming process for the supply chain manager, so we use approximations to simplify the usage. First, the tool only asks for important components - 95% of the value of the product is likely represented by chassis, motherboard, CPU, Hard

drive, optical drives. Because of this fact, we can focus our questions on just these key components.

The second approximation is to only ask for unique parts. Many of the desktops have unique and non-unique parts. Unique parts are used only in that product line, while non-unique parts are used in many product lines. Unfortunately, the supply chain managers do not know specifics (supplier/location) of non-unique parts. To account for this, we take a look at that specific commodity family in that region. For example, the tool may know that 80% of hard drives in APCC are sourced locally. The tool uses that 80% as a proxy for the product assessment.

6.3.4 Required Inputs – DAO

The main local content requirement in the U.S. revolves around whether or not the product can or cannot be sold to the Federal Government. As discussed in chapter 3, this boils down to whether or not "significant transformation" of the product occurs in the U.S. "Significant transformation" is defined as the location of the integration of the CPU onto the motherboard – which the tool asks the supply chain manager.

6.3.5 Required Inputs - BCC

For Brazil, the tool needs to ask for specific information (an example is shown in Figure 6-4). The first thing it asks the SChM is whether or not the product will even be produced in Brazil, and if so, what will be its base selling price. This selling price is used as the tax basis in the tool's calculations.

The tool then asks about specific PPB components. While it would be logical from a local content point-of-view to first ask about the motherboard, memory, video card, NIC, and modem (basic PPB requirements), and THEN ask about the power supply and chassis, this does not make as much sense for the SChM. Because we want to simplify the use of the tool, the questions come in a different order.

First, the tool asks if the motherboard, power supply, and memory are sourced locally. These three components are grouped together because they are present on every desktop.

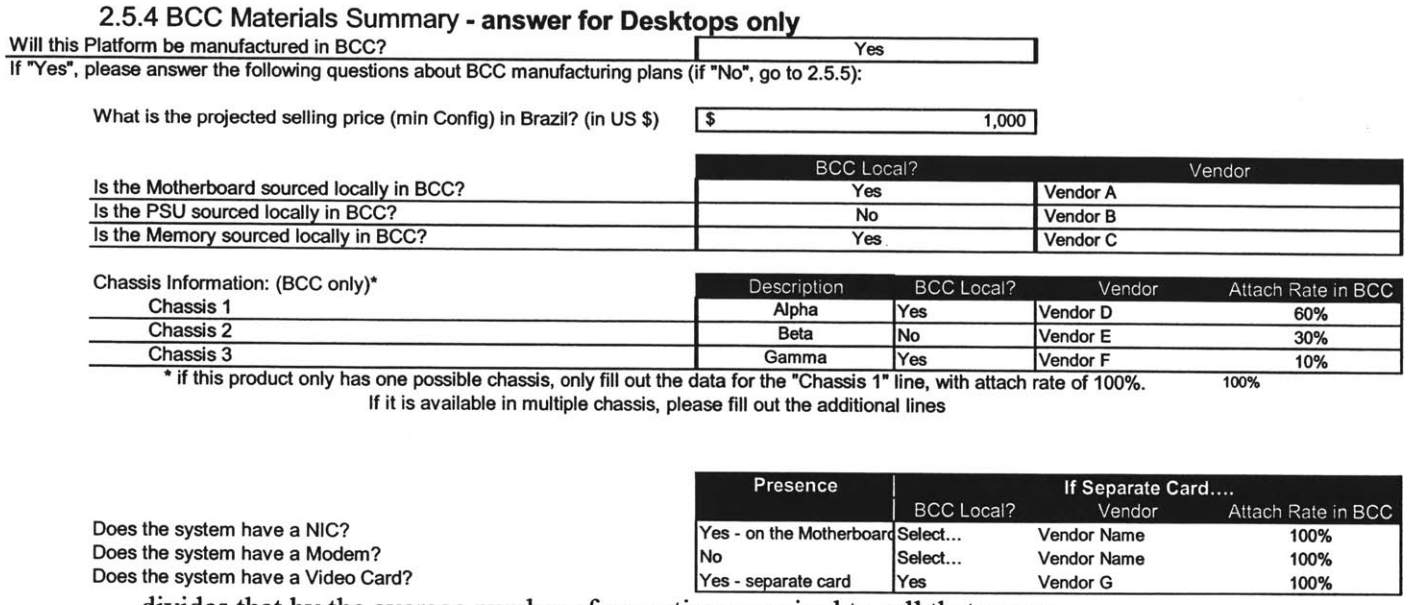
Next, it asks about the chassis. The complication with chassis is that a single product line may use more than one type of chassis. For example, for the "Batman" product line, 40% of units may use Chassis A, 40% Chassis B, and 20% Chassis C. We shape the questions to reflect this potential behavior, and for each chassis type, ask whether it will be local or not.

Finally, we ask about the video card, NIC, and modem. These components are grouped together because they do not always appear in every computer. Many times, a computer can be sold without one or all of these parts. Additionally, these components are now often integrated onto the motherboard. This means they no longer are a stand-alone component, rather, just part of the motherboard's functionality. We shape the questions to reflect these potential configurations.

From these inputs the tool has the data needed to assess the product's impact in Brazil. It first calculates the volume of units that meets the basic PPB requirement, and the associated tax avoidance with meeting that requirement (IPI tax decreases from 15% to

1.5%). It then calculates the volume of units that meet the extended PPB requirements, and the associated number of "exceptions" earned for servers and notebooks.

For the value of these "exceptions", the tool uses an approximation. For the server example, it takes the average server margin per unit (selling price * margin %), and



2.5.4 BCC Materials Summary - **answer for Desktops only**

Will this Platform be manufactured in BCC?	Yes

If "Yes", please answer the following questions about BCC manufacturing plans (if "No", go to 2.5.5):

What is the projected selling price (min Config) in Brazil? (in US $)	$ 1,000

	BCC Local?	Vendor
Is the Motherboard sourced locally in BCC?	Yes	Vendor A
Is the PSU sourced locally in BCC?	No	Vendor B
Is the Memory sourced locally in BCC?	Yes	Vendor C

Chassis Information: (BCC only)*	Description	BCC Local?	Vendor	Attach Rate in BCC
Chassis 1	Alpha	Yes	Vendor D	60%
Chassis 2	Beta	No	Vendor E	30%
Chassis 3	Gamma	Yes	Vendor F	10%

* if this product only has one possible chassis, only fill out the data for the "Chassis 1" line, with attach rate of 100%. 100%
If it is available in multiple chassis, please fill out the additional lines

	Presence	If Separate Card....		
		BCC Local?	Vendor	Attach Rate in BCC
Does the system have a NIC?	Yes - on the Motherboard	Select...	Vendor Name	100%
Does the system have a Modem?	No	Select...	Vendor Name	100%
Does the system have a Video Card?	Yes - separate card	Yes	Vendor G	100%

divides that by the average number of exceptions required to sell that server.

Figure 6-4: New Product Assessment Tool Example - BCC Inputs

6.3.6 BCC Planning Tool

In addition to the product assessment tools, we supply the SChM with a tool to help plan Brazilian production, called the "BCC Planning Tool." Early in the pre-production phases, the product teams must make a decision on whether or not to even offer the product in Brazil. This requires an in-depth margin analysis for different scenarios for which the product can be introduced there. The possible scenarios are:

- Sell in Brazil, but produce in the U.S. (or another location), with an imported monitor
- Sell in Brazil, but produce in the U.S. (or another location), with an Brazilian monitor
- Sell in Brazil, produce in the Brazil, NOT meeting their local content requirements (higher taxes)
- Sell in Brazil, produce in the Brazil, meeting their basic local content requirements
- Sell in Brazil, produce in the Brazil, meeting their extended local content requirements
- Don't Sell in Brazil

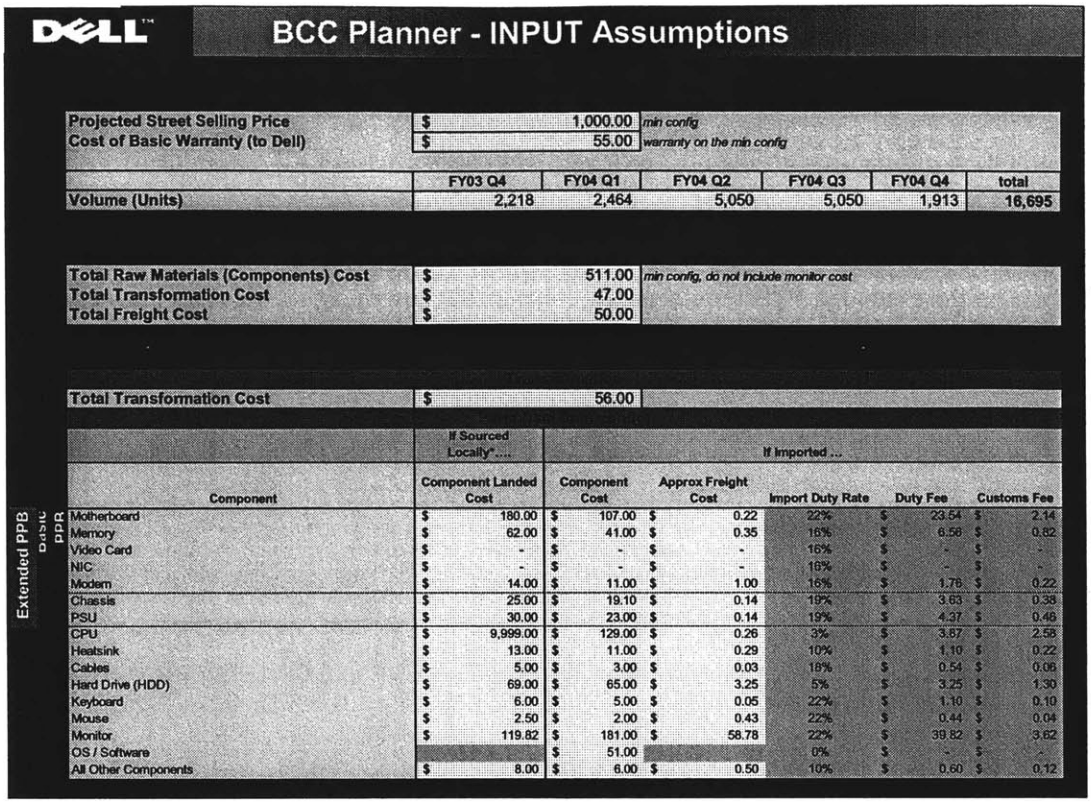
The BCC Planning Tool allows the SChM and the product team to choose which of these scenarios is best for their project. The tool asks the SChM to answer questions about components, similar to the Product Assessment Tool. The key difference is that the BCC Planning Tool is much earlier in the product introduction process, so many of the estimates have to be rough estimates. From these component characteristics, the BCC

planning tool will tell the SChM which method is most cost effective when taxes are considered.

Dell SChM's currently use the BCC Planning Tool, and a pilot (with disguised numbers) from the fall of 2002 is shown (Figure 6-5). In this example, the user inputted information about the projected selling price and volumes in Brazil in Section A. In Section B, the SChM answered questions about the system assuming it is built completely abroad, and then imported into Brazil. The relevant pieces of information include the cost of the parts, the cost of the labor abroad (ie transformation costs), and the shipping costs. In Section C, the SChM answered questions about the system assuming it is built in Brazil. If it were built in Brazil, there is a choice to be made about each commodity part that goes into the final product - each part can be bought locally or imported. Section C asks the SChM the costs associated with each of these choices for all of the key components.

The example output highlights the importance of making correct decisions. The net margins for the scenarios listed above run from 8% all the way down to –29%. The difference between meeting and not meeting the basic local content requirements (columns III and IV) is 5% of net margin (3% versus 8%). Additionally, the value of the server and notebook exceptions earned by meeting the extended requirements (column V) is an extra $108 per box, which is very significant. This highlights the fact that the Brazilian factory for Dell needs to push as many desktops through its factory that meet these more stringent requirements in order to be able to sell notebooks and servers, which have higher margins per box. The tool helps attach a dollar figure to an idea that local

Brazilian managers have been trying to explain to their U.S. counterparts. By attaching a number, it grants their argument much greater credibility in Dell's numbers-focused culture. Based on this analysis, the team decided to manufacture the product in Brazil, meeting the extended PPB requirements. This meant convincing a supplier partner of chassis to invest in tooling equipment needed for the Brazilian factory.



DELL

BCC Planner - INPUT Assumptions

Projected Street Selling Price	$ 1,000.00	min config
Cost of Basic Warranty (to Dell)	$ 55.00	warranty on the min config

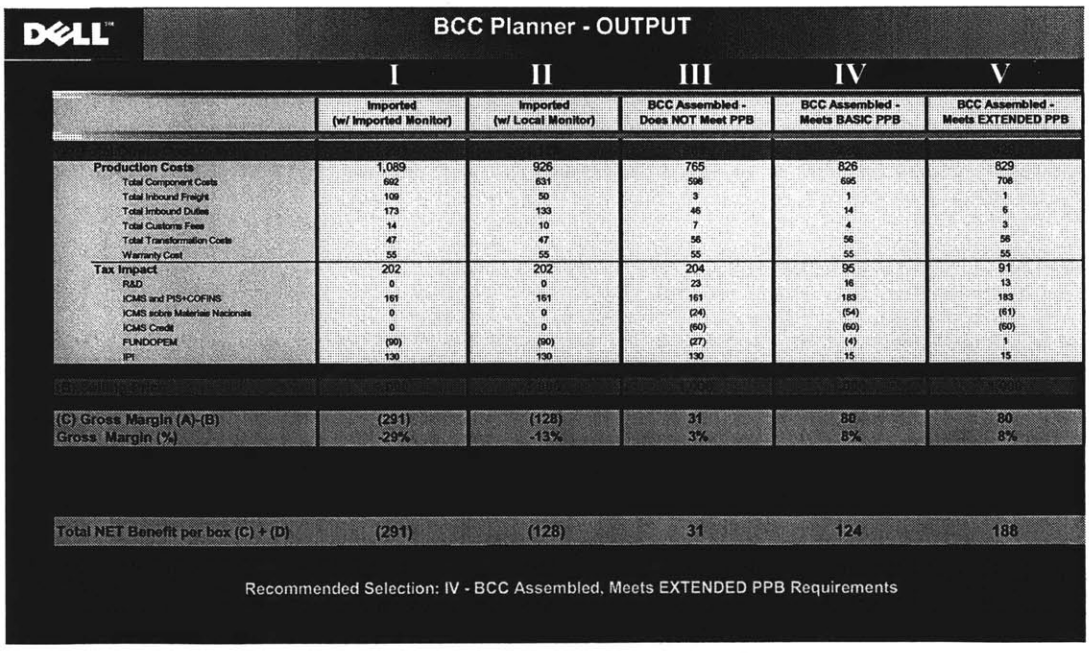
	FY03 Q4	FY04 Q1	FY04 Q2	FY04 Q3	FY04 Q4	total
Volume (Units)	2,218	2,464	5,050	5,050	1,913	16,695

Total Raw Materials (Components) Cost	$ 511.00	min config, do not include monitor cost
Total Transformation Cost	$ 47.00	
Total Freight Cost	$ 50.00	

Total Transformation Cost	$ 56.00	

Extended PPB

Component	If Sourced Locally*.... Component Landed Cost	If Imported ... Component Cost	Approx Freight Cost	Import Duty Rate	Duty Fee	Customs Fee
Motherboard	$ 180.00	$ 107.00	$ 0.22	22%	$ 23.54	$ 2.14
Memory	$ 62.00	$ 41.00	$ 0.35	16%	$ 6.56	$ 0.82
Video Card	$ -	$ -	$ -	16%	$ -	$ -
NIC	$ -	$ -	$ -	16%	$ -	$ -
Modem	$ 14.00	$ 11.00	$ 1.00	16%	$ 1.76	$ 0.22
Chassis	$ 25.00	$ 19.10	$ 0.14	19%	$ 3.63	$ 0.38
PSU	$ 30.00	$ 23.00	$ 0.14	19%	$ 4.37	$ 0.48
CPU	$ 9,999.00	$ 129.00	$ 0.26	3%	$ 3.87	$ 2.58
Heatsink	$ 13.00	$ 11.00	$ 0.29	10%	$ 1.10	$ 0.22
Cables	$ 5.00	$ 3.00	$ 0.03	18%	$ 0.54	$ 0.06
Hard Drive (HDD)	$ 69.00	$ 65.00	$ 3.25	5%	$ 3.25	$ 1.30
Keyboard	$ 6.00	$ 5.00	$ 0.05	22%	$ 1.10	$ 0.10
Mouse	$ 2.50	$ 2.00	$ 0.43	22%	$ 0.44	$ 0.04
Monitor	$ 119.82	$ 181.00	$ 58.78	22%	$ 39.82	$ 3.62
OS / Software		$ 51.00		0%	$ -	$ -
All Other Components	$ 8.00	$ 6.00	$ 0.50	10%	$ 0.60	$ 0.12



DELL

BCC Planner - OUTPUT

	I	II	III	IV	V
	Imported (w/ Imported Monitor)	Imported (w/ Local Monitor)	BCC Assembled - Does NOT Meet PPB	BCC Assembled - Meets BASIC PPB	BCC Assembled - Meets EXTENDED PPB
Production Costs	1,089	926	765	826	829
Total Component Costs	692	631	598	695	708
Total Inbound Freight	109	50	3	1	1
Total Inbound Duties	173	133	46	14	6
Total Customs Fees	14	10	7	4	3
Total Transformation Costs	47	47	56	56	56
Warranty Cost	55	55	55	55	55
Tax Impact	202	202	204	95	91
R&D	0	0	23	16	13
ICMS and PIS+COFINS	161	161	161	183	183
ICMS sobre Materiais Nacionais	0	0	(24)	(54)	(61)
ICMS Credit	0	0	(60)	(60)	(60)
FUNDOPEM	(90)	(90)	(27)	(4)	1
IPI	130	130	130	15	15
(C) Gross Margin (A)-(B)	(291)	(128)	31	80	80
Gross Margin (%)	-29%	-13%	3%	8%	8%
Total NET Benefit per box (C) + (D)	(291)	(128)	31	124	188

Recommended Selection: IV - BCC Assembled, Meets EXTENDED PPB Requirements

Figure 6-5: BCC Planning Tool - Inputs and Outputs

6.3.7 Integration into Procurement Functional Plan

One of the key realizations through the course of this project was the fact that the tools developed had to match the culture in which they would be used. Dell's culture, as previously discussed, is one that prides itself on quick analysis and decisive action. This had direct implications on how to implement the Product Assessment Tool. The initial incarnation of the tool was as a stand-alone product. The reaction to this was lukewarm. This required the SChM's to keep track of another tool that was not already integrated into their defined processes.

The solution to this problem is to integrate the Product Assessment Tool into the SChM's existing toolkit. Their toolkit has already been well defined, as well as the process steps required to use that toolkit. By integrating the Products Assessment Tool into the toolkit, the tool received a much warmer reception. The reasons were twofold – first, it gave a sense of credibility to the importance of local content and brought this issue to their attentions. Second, it reduced the number of times the SChM had to enter in product information such as volumes and component costs. Since this information was already being captured, the Product Assessment Tool did not have to re-ask for it. This reduced the workload on the SChM as well insured greater accuracy by reducing possible errors in multiple information stores.

6.3.8 Analysis of Expected Benefits – Project Pilot

As we have discussed, the key driver of the New Product Assessment Tool is to have SChM's and product teams make more informed decisions, and to consider local content

as a key decision factor. Local content should be considered as it effects in the tens or even hundred of millions of dollars in tax costs for Dell.

To test the tool's effectiveness, it was piloted on three desktop products in development at Dell in the fall of 2002. The pilots focused on the Malaysia (APCC), Brazilian (BCC), and U.S. (DAO) regions. For confidentiality reasons, we will call the products Product A, B, and C. Product A is a relatively low volume product, with less than a million units forecast to be shipped in 2002 and 2003. It is a follow-up to a current product Dell is selling, but with various replacement components that lower its overall costs. It will be produced in all of Dell's manufacturing regions, including Brazil. Product B is a midrange volume product, with just over two million units forecast for 2002 and 2003. While it has larger volumes, it will not be produced in Brazil. Product C is a small form-factor desktop with projected volumes of approximately two million units and no Brazilian production. The key questions for each of these three products is what is their impact on the local content status in each region. If they have a large impact, what are the key sourcing decisions that drive that impact. This will allow the product teams and supply chain managers to evaluate their sourcing decisions with local content as a decision factor. The results from the pilots are shown here.

- **Product A**
  - **APCC** – The product ends up being 40% local to the APCC region (1% of unique components, and 57% of non-unique components). Given the relatively low volumes for the product, this has negligible impact on the local content status in the region (.06% in 2002, .15% in 2003).

- **BCC** – This product has production planned for Brazil. The components meet the basic PPB requirements, but only some of the units meet the extended PPB requirements. This extends from the fact that only 1 of the 3 chassis planned for this product is manufacturable in Brazil. The meeting of the Brazilian PPB requirements leads to a $5.2M direct cost avoidance in 2002 and 2003, and $3.8M in indirect savings via server and notebook exceptions.
- **DAO** – The tool informs the team that this product can indeed by sold to U.S. Federal Government agencies.
- **SOURCING DECISION IMPACT** – This tool helped shape sourcing decisions for BCC. Based on the analysis, the product team, with help from the chassis component team, is pushing for a higher attach rate on the local Brazilian chassis (up from 45%). That is, the analysis has pushed them to negotiate with the supplier of the chassis for greater capacity in Brazil. This will help Dell achieve some of the $1.8M cost avoidance "left on the table."

- **Product B**
  - **APCC** – The product ends up being 44% local to the APCC region (47% of unique components, and 33% of non-unique components). Like Product A the product has relatively low impact on the local content status in the region (.1% in 2002 and 2003).
  - **BCC** – This product has no Brazilian production volume
  - **DAO** - The tool informs the team that this product can indeed by sold to U.S. Federal Government agencies.
  - **SOURCING DECISION IMPACT** – Given the low impact, no sourcing decisions are effected.

- **Product C**
  - **APCC** – The product ends up being only 16% local to the APCC region (3% of unique components, and 75% of non-unique components). The tool's

analysis shows the main driver of this is the high usage of unique parts, very little of which are locally sourced. Unlike Products A and B, the Product C has a relatively high impact on the local content status in the region (.2% in 2002 and 2.2% in 2003 when higher volumes come on).

- **BCC** – This product has no Brazilian production volume
- **DAO** - The tool informs the team that this product can indeed by sold to U.S. Federal Government agencies.
- **SOURCING DECISION IMPACT** – The tool's output has influenced the product team to look at other available sourcing options in Malaysia. Specifically, the team and component managers are exploring alternatives for Hard Drives and the chassis. For hard drives, this means finding a new supplier of small form factor drives. For chassis, this involves negotiations with the existing chassis supplier to move some of the production to Malaysia.

6.4 Commodity Sourcing Impact

The second major disturbance to Dell's supply chain equilibrium occurs when there are shifts in commodity sourcing across multiple products. The example from above discusses a hard drive that is used in multiple product lines. The Commodity Sourcing Impact Tool assesses the impact of these decisions on the local content status in Dell's regions.

6.4.1 Need

Just like some high volume products have a large impact on the local content statuses in the regions, some highly levered commodities have large impacts on those statuses as well. These commodities are the same commodities used in the approximations for APCC and CCC portions of the product planning tool – CPU's, motherboards, memory,

chassis, hard drives, and optical drives. The Impact Tool focuses on these key components.

6.4.2 Key Audience and Output

The key output for this tool is to the Operational Commodity Manager (OCM). The tool reports the local content percentages for the given commodity, and then using inputs from the OCM about the shifts in these percentages, reports the net impact to the region.

6.4.3 Required Input

There are two families of required input for this tool. The first is the existing local content percentages for the given commodity. This data is generated in a similar fashion to the LC_0 data in the New Product Assessment Tool. Remember in the New Product Assessment tool, actual purchase behavior from the previous 12 months is used to determine the initial level of "locality" for a given region. For example, we look at the purchase orders for Malaysia for the previous 12 months and determine that Dell achieves 40% locality in APCC (40% is a disguised figure). Similarly for the Commodity Sourcing Impact tool, actual purchase behavior from the previous 12 months is used to give a picture of how "local" a given commodity is. This percentage is reported to the OCM initially. It is given in both absolute dollar amounts and in percentage terms.

Once the OCM has this "current state" data, he/she is asked to input the new shifts to this percentage. This is the second family of inputs. For example, if his/her commodity is currently 40% local for APCC and 60% imported, the OCM would need to enter how this

changes. The OCM could then enter 45%/55% to represent a shift in sourcing from the original 40%/60%.

6.4.4 Implementation and Integration into Existing toolkit

Similar to New Product Assessment Tool, this Commodity Assessment Tool needs to be integrated into an existing toolkit to promote use. The existing toolkit for this assessment is different though, since the key audience is OCM's rather than SChM's. The Commodity Manager Toolkit (OCM toolkit) is the targeted toolkit for this tool.

As of the writing of this thesis, this implementation of this assessment tool was not yet completed. The initial pilot will focus on 2-3 highly leveraged commodities, and focus on APCC region, and is waiting for approval from the commodity teams.

6.5 Chapter Summary

Dell's supply chain, like any vibrant company's, is dynamic. This implies that the current state or equilibrium is only a snapshot of the supply chain, and changes through time. There are some key supply chain disturbances that provoke these changes. The two most common disturbances at Dell are either new product launches or changes in commodity sourcing strategies. Dell changed the way they make the decisions that are at the genesis of these disturbances. Previously, local content was not a decision criterion and was dealt with reactively. Now, local content is recognized as a key factor and is accounted for in the up-front decision-making.

Figure 6-6 summarizes the two assessment tools that we developed at Dell to model the impacts of supply chain disturbances on local content. Each of these tools is unique – each has different users, inputs, and outputs. But despite their uniqueness, they serve a common goal. They allow Dell to make better sourcing decisions by having all required information when the procurement decision is made. They also allow Dell to consider these criteria in a consistent manner across all desktop products and commodities.

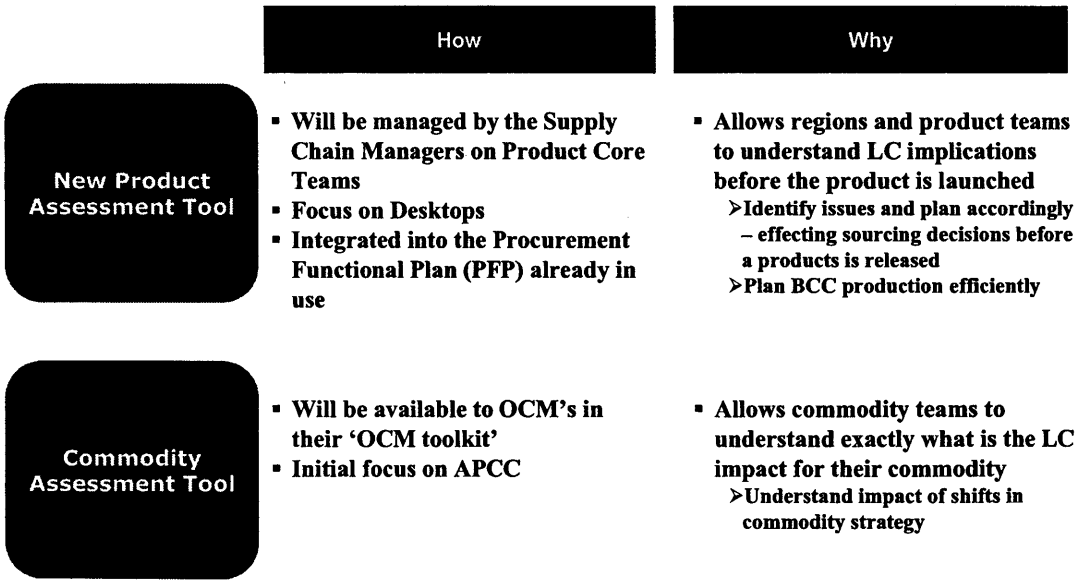


Figure 6-6: Local Content Assessment Tool Summary

7 Conclusion

7.1 Chapter Overview

This chapter discusses the implementation status of the local content project, as well as its organizational implications. It concludes with a summary of the key findings.

7.2 Implementation Status

This research project represents a major thrust of Dell's local content efforts, but not the only one. This project successfully defined communication links and processes – which would be useless if not carried out in the future. The steering committee meetings and summits will continue on long after this research project is over.

Similarly, the tools designed to measure impacts of supply chain disturbances have been developed and are now is use by supply chain managers in Dell's Worldwide Procurement organization. A member of the local content steering committee manages the updating of these. The tools must be refreshed as local content regulations evolve and even as new manufacturing regions are brought into the Dell family.

7.3 Organizational Aspects

This research project required Dell to understand the implications of its globalization efforts. Obviously, this effort is not just about doing the same things in new places – it

requires a mental shift in the organization – including an understanding of new cultures and new local regulations. The local content project highlights that shift in thinking.

The first-order result of the project was to make sure local content implications are considered as decision factors within the procurement organization. There was also an interesting second order effect – the increased global awareness spawned by the project.

7.4 Summary

Along with globalization of Dell's products and services comes the ability to provide products in a competitive manner to all regions. Many emerging nations have local content requirements that must be realized in order to sell products in that country. Often times these requirements conflict with Dell's current fulfillment strategy. The objective of this research project was to develop for Dell a local content strategy and implementation plan that effectively balanced country-specific requirements with Dell's fulfillment model.

A two-layered approach is taken to this problem. The first layer focuses on improving information flow between the relevant parties involved – including product teams, commodity teams, regional buyers, sales and marketing, and corporate tax and law officers. The second layer focuses on the set of tools developed to achieve consistency across Dell's manufacturing regions. These tools assess the impact of supply chain disturbances – namely, new products or commodity shifts that change the current supply chain equilibrium. These events are analyzed from the perspective of local content, and

the output fed into the decision making process as a decision criteria of those managers in charge of the action.

This thesis highlights the team's and Dell's learnings. First, it highlights local content as an increasingly important issue for Dell as it looks to expand globally. Before this project, there was little understanding of the total dollar impact of local content regulations. Now, this number is quantified for Dell. The next key learning is that it is important to address local content requirements and tax regulations during supply chain design, as opposed to supply-chain execution. Key procurement decisions are made during this design stage, and these decisions need to be as informed as possible. Incorporating local content into the procurement managers' processes leads to more informed decisions and ultimately saves the company money. The final key learning is the importance of incorporating local content considerations into existing tools of the procurement managers, as opposed to separate stand-alone tools. This integration promotes use by the procurement managers.

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