

STRATEGIC OUTSOURCING MODEL: DECISION SUPPORT FOR
DETERMINING SUPPLY CHAIN STRUCTURE

By

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Submitted to the Sloan School of Management and the Department of
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degrees of

Master of Business Administration and
Master of Science in Mechanical Engineering

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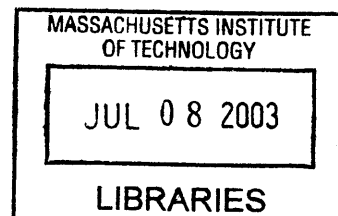
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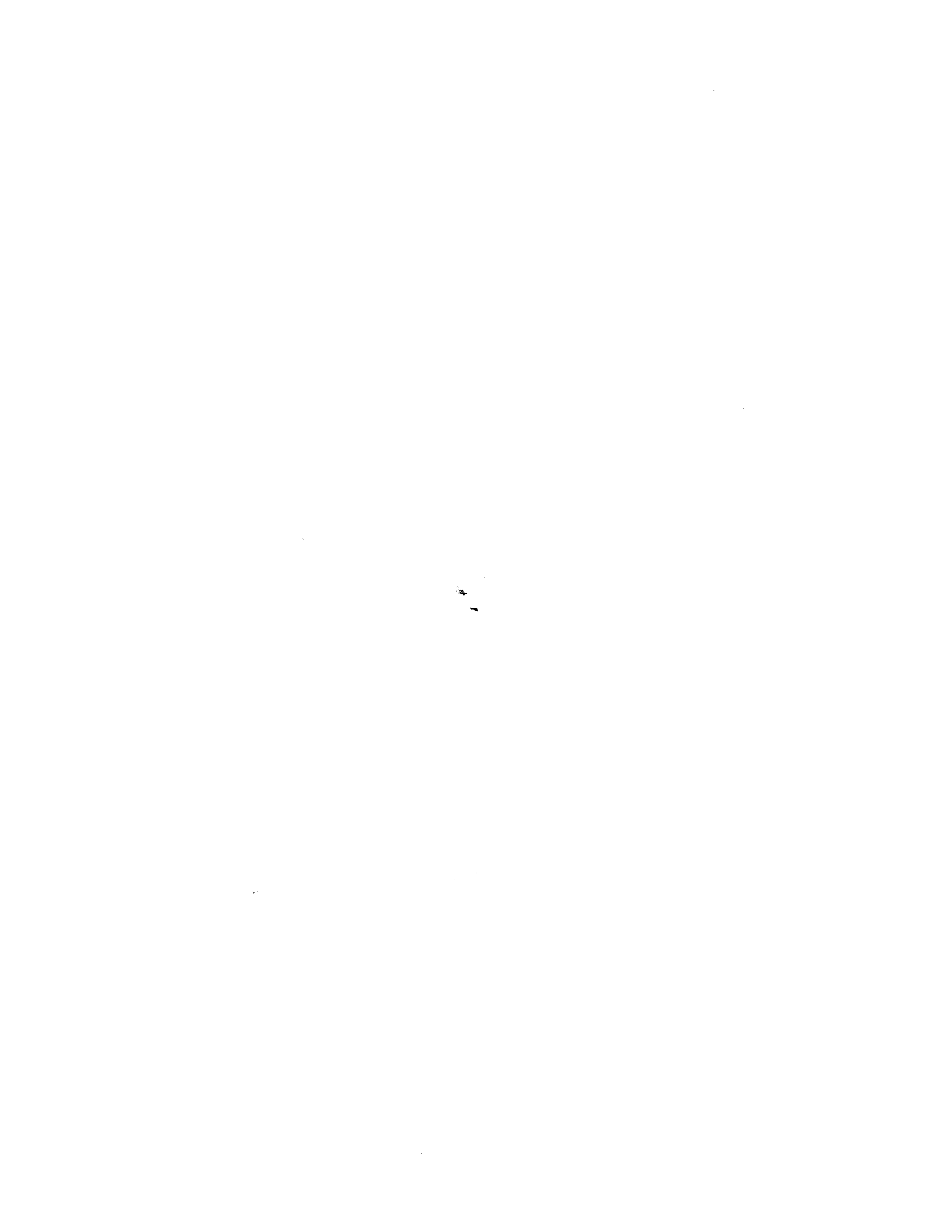
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ABSTRACT

Outsourcing is becoming the norm in business today. This is a natural insight from the management philosophy of the 80's and early 90's of doing only what is "Core" to the business. A company, if their main focus is to keep their margins as high as possible, will focus on what gives their company a competitive advantage and differentiates them from the competition. To The Firm, all other tasks outside of these advantages are superfluous and unnecessary. It is only rational, in this management paradigm, to get rid of, or outsource, all of these activities that take scarce resources away from what the company considers core.

The next logical question is: "How to conduct an analysis for outsourcing decision making." Current methodologies coalesce cost alternative analysis with a strategic "gut feel" from management to make decisions that will last multiple cycles into the future. *Cost analysis* is basic. However, *strategic analysis* is far-reaching, impacts the company's future capabilities, and is difficult to evaluate.

This thesis proposes a *Decision Support System* (DSS) for evaluating the strategies of outsourcing and determining the impacts on The Firm. A thorough review of industry and academic literature on outsourcing, analysis of historic outsourcing results, and discussion of current capability concerns has led to the development of six strategic factors: *Customer Experience*, *Technical Clockspeed*, *Industry Climate*, *Supply Chain Excellence*, *Product Architecture*, and *Competitive Position*. Included is an exhaustive discussion of these strategic factors, strategic matrices for evaluating the business climate, development of excel spreadsheets with questions for evaluation of these factors and matrices, development of a database for knowledge transfer, and implementation of the DSS in the organization.

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I would be remiss if I did not also mention the assistance of my supervisor and coworkers at Dell who made my research challenging and enjoyable - as well as Dell Computer's financial support of the LFM program.

“Where there is no guidance the people fall, But in abundance of counselors there is victory.”

~ Proverbs 11:14

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Part I Overview and Background

“Whether to outsource is one of the most significant decisions any executive team ever makes. Outsourcing involves massive changes to a business’s delivery system – changes involving trade-off and organizational trauma, It is difficult to reverse, It [affects] the livelihood of thousand of employees. And it opens critical aspects of a company’s core business to the scrutiny of supply partners and other external forces, and to their disruptive interventions.”

~Stephen J. Doig, “Has Outsourcing Gone Too Far?,” McKinsey Quarterly, 2001 Number 4

1.0 Introduction and Overview

1.1 Dell Computer Corporation Background

Dell Computer Corporation is a well-known brand of personal computers. They have achieved unprecedented success with their ability to remain vital and profitable in both an “up market” of the 90’s and a recessionary, “down market” of the new millennium. They have been the poster-child of “mass customization” with their Direct Model, the consummate example of management with the naming of Michael Dell as the Chief Executive Magazine’s “2001 CEO of the Year,” and – probably the most enviable – their 500lb gorilla status in the supply chain with the least inventory costs in the industry and their highly negative cash-to-cash cycle.

The company is leveraging their success to venture into other lines of business and partnerships. A look at the Dell.com web page today will show sales of PC’s was well as peripherals (printers, camera...), servers, projectors, handheld personal data assistants and more. Partnerships abound for collaborative development of product with Intel, EMC, Quantum, and Microsoft as well as for channel services with Lexmark, IBM software, and countless other OEM companies. Everyone, it seems, wants access to Dell’s customers and operating systems. Dell’s dilemma is determining with whom to partner and what their role will be in product development and fulfillment.

1.2 LFM/Dell Partnership

The Leaders for Manufacturing Program at MIT and Dell Computer have had a long and successful partnership. The program design is based on three tenants: Industry, academic excellence, and engineering. The first of these is developed via partnerships with companies like Dell. The Dell partnership provides the opportunity and insight to take academic pursuits and apply them to tangible problems in the industry.

1.3 Chapter Contents

This paper is divided into Four Parts: *Part I, Overview and Background*, provides a brief introduction of the parties involved in the development of this project. The first chapter covers the overview and problem formulation with the second chapter identifying outsourcing concerns that will be addressed in Part III.

Part II, Infusing Strategy into Decision-Making, discusses the development of a Strategic Outsourcing Decision System (SODS). The third chapter focuses specifically on development of a decision support system to quantify the “unquantifiable” or the intangibles in the business world typically labeled as intuition. This is done through the identification of six strategic outsourcing factors. Chapter Four applies this framework to strategic outsourcing. Specifically it details the development of the process and how strategy is infused into the surveys and matrices.

Part III, Drivers of Outsourcing Strategy, focuses on the six strategic outsourcing factors. Each, in turn, is developed with the intent of provide a discussion on the importance and potential dangers to outsourcing. Additionally, they are assessed with the surveys to location its position (both graphically and strategically) on a matrix. There are strategic matrices for all of the factors except Competitive Position, which has a strategic flow chart. This Part contains Chapters Five through Ten, one for each strategic factor.

In *Part IV, Deployment and Final Remarks*, Chapter Eleven outlines how the model is currently being used at Dell and the direction is it headed. This includes synthesizing the

cost and strategic models and provides examples of the results. Chapter Twelve presents conclusion for the project and areas for further study.

2.0 Problem Formulation

The purpose of this thesis is twofold. First, it proposes that outsourcing must be based on a combination of strategy *and* cost considerations. The latter is obvious and a business case accompanies any potential outsourcing alternative, however, it has been found that the “cost only” approach can lead to local optimization, and long-term difficulties.

Considering the long-term strategies of *The Firm* is necessary to ensure that the company has the requisite capabilities to be a long-term competitor in the marketplace. Once, this point has been presented it is time to move on to development and application of the strategy.

Second, a framework of strategic analysis of outsource decisions is developed. Literature has been abundant on proposing strategies for outsourcing, however it has been quiet on how to assess a strategy or implement a Strategic Outsourcing Decision System in the organization. The bulk of this thesis is spent developing six strategic criteria and furnishing a structure for their assessment.

2.1 Introduction of Make Versus Buy (a.k.a Outsourcing)

“No man is an island, entire unto himself.” – John Donne

Outsourcing is becoming the norm in business today¹. This is a natural insight from the management philosophy of the 80’s and early 90’s of doing only what is “Core” to the business. A certain company, if their main focus is to keep their margins as high as possible, will focus on what they feel gives their company a competitive advantage and differentiates them from the competition. To *The Firm*, all other tasks outside of these advantages are superfluous and unnecessary². It is only rational, in this management paradigm, to get rid of, or outsource, all of these activities that take scarce resources away from what the company considers core.

¹ This became apparent after a presentation of the Strategic Outsourcing Model at MIT. The interest from company managers from HPQ, Genzyme, and Sun shows the decisions these firms are facing.

² Michael Hammer, In the preface to “Reengineering the Corporation,” Harper-Collins, 2001

If a company believes that their main competence is assembly, as such can be said about GM (barring GM power train), then individual manufacture of components is not necessarily core to their business. Therefore, GM becomes chiefly a systems integration, assembly, and test company and is comfortable contracting to thousands of suppliers to fulfill their manufacturing needs knowing their value is added elsewhere.

Likewise, Dell is predominantly a systems integration, assembly, and test firm and is considering outsourcing activities on a more frequent basis. My discussions with managers within The Firm however, lead me to believe that outsourcing is not a result of getting rid of what is *not* Core to their business model, but which firm can produce the feature the cheapest given the quality standards necessary for the product. In the last year alone there have been multiple product lines that have been outsourced as well as processing activities such as the boxing lines and maintenance functions with the main driver of the decision being cost.

2.2 Outsourcing Strategy

Strategy (in the business sense) is the use of plans and goals to determine *what* you want to accomplish in industry. A good strategy will balance *risks* and *rewards* to achieve a desired position in industry (Figure 2-1). For long-term viability, this balance should favor protecting and favoring capabilities that will fuel The Firm into the future. That last thing you would want to do is outsource capabilities you will need in the next business cycle!

Tactics are the actions taken that determine *how* you achieve those goals. Tactics drive you towards the strategy balancing *resources* and *actions* to achieve the biggest impact. Granted, understanding where in the industry you want to be and how to get there is the crux of the problem. However, this decision model for outsourcing provides a framework that can be molded to meet the needs of The Firm and help to balance these tradeoffs.

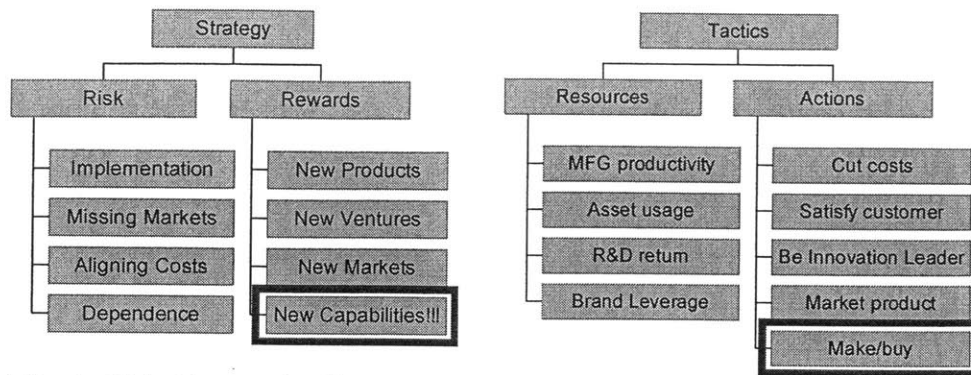


Figure 2-1 Tradeoffs in Outsourcing Strategy

Obtaining Outsourcing Balance. When a firm decides to enter the market with a new product, there are a several considerations it must determine. The Firm can choose a fully individualist, “*One Firm,*” approach where they design the product from scratch, build it in their own manufacturing plant, and distribute it using their own distribution resources. Or, they can pursue a “*No Touch*” alternative and have a product development firm perform the design of the product, a contract manufacturer produce, assemble, and test the product, and maybe even a third company conduct distribution of the product to the customer. In this latter case, The Firm manages the overall process³.

These are extreme cases but most companies - certainly Dell is included - are more of a mix between the “*One Firm*” and the “*No Touch*” approaches just discussed. Should the company decide the *One Firm* alternative is the proper avenue then they are sure to take a lions share of the rewards, maintain plant utilization, defray costs over product volume, and invest in their own product development and process knowledge. There is one major caveat however, and that is the risks of business are theirs alone. The risks of a product missing the market sending costs through the roof or of failing to be able to compete on innovation are not shared with other supply chain partners – they lie squarely on the *One Firm*’s shoulders alone.

³ In the extreme case, this has happened in the clothing industry. Explore the role of Li & Fung, a virtual clothing “*Supply Chain Orchestrater*” in Hong Kong, in their supply chain. Reference John Seely Brown, “*Loosening up: How Process Networks Unlock the Power of Specialization,*” *McKinsey Quarterly Special Edition*, 2002.

Where clearly defined values are lacking and product objectives are muddled with many complications of risk, reward, competencies, plant utilization, and paranoia these tradeoffs are not so clear. It is in assessing this gray area that makes the make/buy decision so difficult and mandates an overall approach to the problem solution.

The Strategic Make/Buy Model proposed in this thesis desires to analyze many of the these factors and provide a way for managers to make decisions based on a standardized assessment of these strategic and cost factors.

The current Dell approach to the make/buy decision. Historically, the division responsible for the decision solicits a bid for contract manufacture for the feature by a third party and compares it with the cost of manufacture by Dell plants. These numbers would then go through a series of financial management meetings where the final numbers were debated on how to allocate indirect costs for the cost comparison. After some discussion the numbers are finalized and presented to senior management who would then make the final decision based on the cost numbers and their feelings for the strategic implications of the decision.

Because of the complexity of Dell's financial accounting system, there is always some speculation on the cost numbers and how indirect costs are to be used. In Section 3.0 review is given of the methods that Dell has used for make/buy decisions. In addition, each division makes the decision in their own interests and puts together the decision analysis with these in mind. Figure 2-2 shows a break down of some of the local outsourcing interests for some "islands" within Dell.

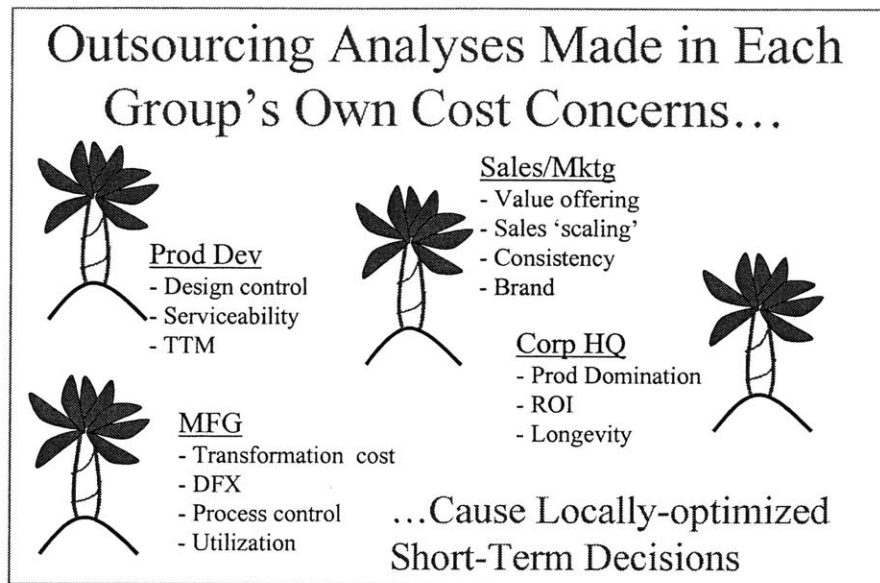


Figure 2-2 Localized Outsourcing Decision Making

The strategic make/buy model enables global decision-making. One source of motivation for developing this model is to standardize the process. When each group conducts a make/buy decision it can be difficult to ensure that other interests of Dell are considered as well as ensuring that all of the strategic and cost factors have been assessed. Because of this, the model uses a step-by-step framework to simplify the process and convey the concerns of the each division to Dell management who, in turn, uses these enterprise-wide interests to develop a corporate strategy that is communicated to the divisions. A second motivator for this model is to ensure that it is useful. For this to occur the model must be followed, monitored, and documented. This entails appointing a process “owner” who can be a referee for the process in case there is a question or concern. The owner will also monitor the process to make sure it is being used consistently and has quality inputs. Lastly, the owner who will have conducted multiple assessments will provide a useful recommendation using the metrics furnished by the model. This recommendation can then be stored in a database for posterity. Figure 2-3 shows the benefits of the model for global decision-making.

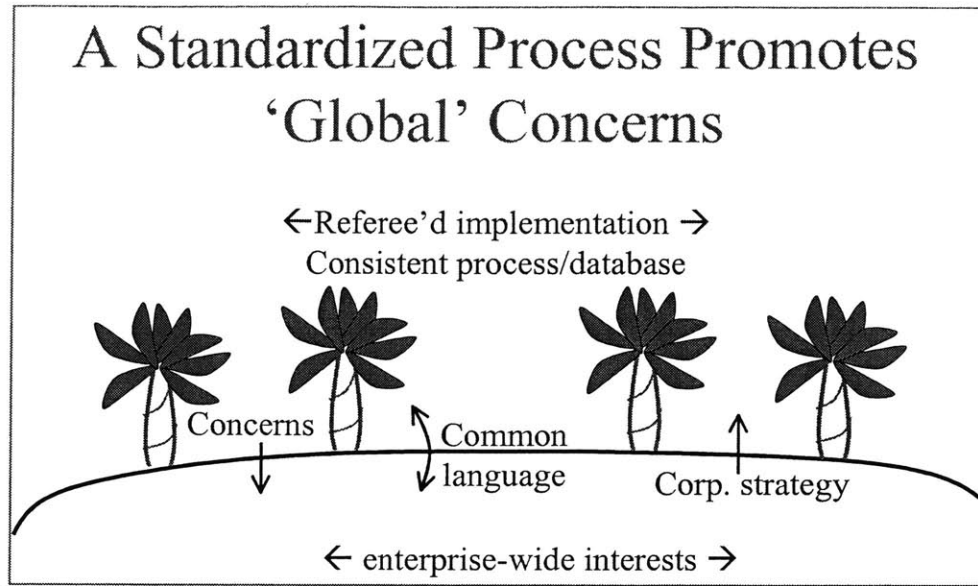


Figure 2-3 Improved Boundary Management Using Model

2.3 Project Focus

Focus on strategy over costs. The brunt of the work of this thesis is spent on determining what is important to Dell for a given make/buy decision. Cost is obviously a very important part of business decision-making, however there is a team⁴ already in place at Dell corporate that is focusing on standardizing this approach. In addition, the strategic implications are not considered widely⁵ by many parts of the organization. Therefore, this thesis portends that making decisions based solely on cost without consideration of strategy can lead to long-term struggles for The Firm. The project is also concentrating on combining the cost and strategy models into a Balanced Scorecard useful for presenting the analyses to management.

2.4 Project Scope

The project is generally focused within Dell's manufacturing environment. Initiatives and drivers for the project are based on personal interviews with the stakeholders of past

⁴ This team has been charted as New Business Development in Product Group Finance and is headed by Greg Gilman at this time of this writing.

⁵ Many managers have mentioned that they do indeed consider strategy in addition to cost considerations. I am thankful and have added their strategic concerns to the model to aid those who are not aware of their concerns when making outsourcing decisions.

outsourcing decisions across all pertinent departments. Additionally, the model contains strategic concerns of current outsourcing literature as well as current industry interests.

The scope is limited to the development of a computer model to survey focus groups and conduct a roll-up of these questions to publish a balanced Scorecard. The original objective included the use of the model as a “Black box” that would be able to process given strategic inputs into a singular answer for the make/buy question. Furthermore, this model was to be usable for parts, process, and components. This wide application has been considered in the development of the model. The applicability/specificity problem was deliberated at the onset with the “go-ahead” decision to make the model widely applicable. Therefore, it may cause specificity problems when used in unique cases – however, even at these times it can be used successfully as a screening tool to predict problems.

3.0 Outsourcing Concerns

In order to provide the most comprehensive model possible to apply to Dell’s outsourcing decisions, it was necessary to completely understand the current state of their processes. This process, once it has been identified and studied, is built upon to furnish a comprehensive model that is both acceptable and usable to Dell.

Outsourcing decisions involves assessing WHO assembles and WHERE. Whenever one makes the determination to outsource, he or she must consider what the results they are seeking. For most cases, outsourcing involved determining if one should make or buy a particular component or product oneself. Additionally, outsourcing involves the assessment of the supplier base to determine who should be the supplier for the part should they choose to outsource.

For Dell, Outsourcing answers: “Who Integrates the product.” Dell has been fortunate to be a modular company (one that has a culture of segmentation as discussed in Section 11.2.4) in a modular industry (one that has the product broken up amongst many players in the supply chain). Theoretically, a fully integrated company would be one that does not have any intermediaries at all and are the only players in the supply chain besides the

customer. Furthermore, they are not performing standard manufacturer processes that would require outsourcing such as casting, molding, machining, or other transforming of a material. Therefore, an outsourcing decision at Dell is not necessarily should they make a component of a computer or buy it from a supplier– but rather, who should assemble or procure it⁶ and where would the best place in the supply chain to conduct these activities.

Contrast this with a medical device manufacturer performing highly involved machining of ceramics for a product in that is in the development stage and wants to consider entering the product into market. The level of involvement of transforming a ceramic requires a mastery of materials knowledge and experience in a machine shop that is intricately more involved than assembly. Therefore, the decision to outsource would be accompanied by a myriad of skills and competencies that must be considered. Should they decide to send the component outside their organization for manufacture a great deal of skills and control of the supply chain *may* be outsourced with it.

It is important to make this distinction because the operation of the model depends on its final use.⁷ For the systems integration, assembly, and test firms, their competencies may lay outside of the product scope, being found in the *process* control of the products. The line of reasoning that is the model provided is designed to be global to discover competencies, whether they are product or process related.

3.1 Outsourcing Evolution at Dell

It has been remarked, by Michael Dell, that Dell Computer is a “large start up.” As such, the decisions are made quickly with the knowledge that “he who hesitates is lost” and loses market share. Getting products to market quickly is one of the competencies that Dell values and excels. In the 90’s heyday of growth these decisions were pushed down layers of management to facilitate speed and to ensure the success of the product.

⁶ While discussing this with a Dell employee, he had a contrary opinion remarking that Dell was a true manufacture in that they do transform raw materials into a complete product. He went further to say that they consider their components to be their raw material. The difference here is one of scope.

⁷ The model has been developed to be useful for level of integration as well as conventional outsourcing considerations.

Because margins were high and volume was very large, there was *not* a major decision analysis conducted to determine how effective the results of these decisions would be in the long-run.

After the 90's, the market slowdown and recession has caused an inward focus for most companies – including the PC cost leader: Dell Computer Corporation. The decisions that were typically made at low levels were now becoming a growing concern catching the eyes of senior management. This coupled with the frequency of outsourcing decisions that were ongoing caused a detailed look at the processes that were used to make these decisions.

3.1.1 Outsourcing Before a Formal Model

The process of answering the outsourcing question was done informally as with the case with Product Albatross⁸ (See Albatross min-case Sidebar) and had an ad hoc group of membership making individual contributions. In this case, the analysis for the decision was based primarily on cost and was spurred on by the need to provide a value offering in the market. The cost analysis was performed on a fully burdened cost accounting method (described in Section 3.2). This stimulated the need to develop a standardized process to analyze the complex financials involved with each outsourcing decision. The process was dubbed the “Alternate Fulfillment Model” and is described in Section 3.1.2

Sidebar 3-1 Prior to the Alternative Fulfillment Model, Albatross Mini-Case⁹

Motivation

Dell currently had value-priced desktops out on the market that did not generate a great deal of profit. The marketing department predicted there was future market potential in this value niche and initiated a project to determine if a value desktop product could be made that would provide higher margins. This market niche was described as value customers who buy individual units for personal use.

⁸ The actual name of the product was changed. Throughout this report, all code names for Dell products have been changed.

⁹ This case was based on conversations with Dell employees Jan McCarthy and Ben Hunter and their teams.

Drivers

- *Product Offering:* Dell desires to have a full product offering across all markets knowing that value offerings bring in future performance buyers.
- *Costs:* Decreasing the cost of the unit (mfg, service, support, distribution)
- *Risk:* Pass on the management of materials and capital expenses to the supplier.
- *Time to Market:* Changes to Dell infrastructure would have been costly and time-consuming potentially causing loss of sales. Also, redesigns of the cheaper chassis that was not designed for Dell's high velocity manufacturing would have been resource consuming.

Approach

Dell's Client Product Group Marketing Department determined the product price and entry timing that would be likely to capture market share and met with procurement and the new product introduction team¹⁰ to develop a plan of attack. The project sought outside sourcing almost immediately due to the cost structure that was required and the short time to market needed. Additionally, Dell's current manufacturing processes did not favor the outsourced chassis. The value chassis under consideration was not designed for manufacturability nor was there time to conduct redesign.

In order to keep costs to a minimum and as a source of accountability for the OEM, Dell decided to go with a "No Touch" solution on the Albatross product. This would entail the OEM to build, test, support, distribute, and service the product. Dell would handle product returns because they were the revenue receiving party for the product. This provided an added level of accountability for the OEM to check their quality, as they would be responsible for servicing any problems with the units they built. This solution matched the competencies of the OEM who was familiar with the chassis and excelled in distribution management.

When picking the OEM supplier, Dell considered a variety of implications to the supply chain. Dell maintains three types of relationships with their suppliers: Dependence Partners¹¹, Alliance Partners, and Point Use. The original intent was to use a "Point Use" supplier relationship for the Albatross product. The point use solution relationship is much cheaper to Dell as they do not have to develop supplier relationship by integrating them into Dell's supply chain, training them in testing and quality programs, ensuring

¹⁰ Dell organizations that met were: CPG procurement and Opti/PWS NPO & DT DFX.

¹¹ The author's term, there was not a formal name for relationships like Intel or Microsoft who were strong supply chain players, yet were not "Alliance."

they meet noise requirements, and involving them with product development. The point use relationship matched the value goals of the project. Further OEM-selection considerations included making sure they could meet volume requirements for various demand scenarios.

The implications of the loss of control of “Customer Experience” (See Chapter 6.0) were also a concern of Dell since the OEM was ultimately responsible for product delivery. Therefore, Albatross was marketed to “one-of” customers who only buy one unit for personal use. Interaction of users with quality problems would therefore be less likely and have less affect on the Dell Brand should quality problems arise.

Albatross had an intentionally limited life of approximately six months due a known compatibility deficiency with an increase in functionality of Microsoft Windows.

Metrics

Albatross was an outsourced product from the onset. Therefore, most of the metrics involved were not make/buy comparison metrics, but were those used to ensure a positive Customer Experience and a respectable margin. Concerns such as quality, unit cost, service response, and cost of repair were included as metrics in the contract and tracked along the life of the product.

Results

Ultimately, the outsourcing of Albatross allowed Dell to reach their goals of a value desktop with a speedy time to market. The product development time of approximately nine months shows that an outsourced approach to product development can be mutually beneficial to all parties in the supply chain. There was some concern over service costs. The OEM chosen for the project was apt at manufacture and distribution but was new to servicing computers. Because of this, their cost structure was not suited to the low volumes of the value desktop demanded by the market and service center costs were not “spread out” enough and ate into their margin.

Results

Albatross worked very well as a “call generator.” It generated interest among consumers who were looking for quality, value PCs. Sales personnel were often able sell customers on a higher performance, higher margin units. However, this led to a decrease in the number of Albatross units sold. Sales personnel are incentivized to “up sell” or encourage the customer to add more expensive features (i.e. adding a bigger hard drive or more memory). Since Albatross was a fixed configuration model “up selling” was not possible so a product change to a different model would result. This turned out to be a problem for the supplier who was trying to allocate service call costs over machine sales volume.

The supplier also underbid their costs that turned into a profitability problem. However, this led to increased business with Dell on other product lines allowing them to move from the Chinese motherboard and chassis market to a worldwide market.

Albatross Lead to Future Scenarios

After Albatross, the need for a value PC still existed. To meet this, a Dell Designed, Dell-Built PC was released named Product Bluebird. Bluebird was a fixed configuration PC using a third party chassis. Dell manufacturing was not able to meet the required cost point for this model so it was used as a “loss leader” or a unit that would generate calls from the customer in hopes of up selling or capturing new customers. It was then determined by Sales that fixed configuration would not sell in the U.S. and future attempts were discouraged.

After Bluebird, another value model was made using the same outsourcing model as Albatross however, it would only be sold to consumers in China.

Strategic Implications

This case provides a rich backdrop of strategic and tactical analysis. The project ‘s success was difficult to ascertain. But the impact on the supplier was probably negative. The following considerations were found to drive the development of an outsourcing strategy:

- Is the OEM competent in all areas of the outsourcing?
- Does the supplier have sufficient margin to continue as a “going concern”?
- Does depreciation of OEM capital over contract give them an advantage?
- What would happen if the OEM masters other parts of the value chain? Holdup from the supplier increases with supplier responsibility. Would they be able to enter the market on their own? Did Dell help develop another competitor?
- Would decisions change as volume increases (decreases)?

- Would this provide an opportunity for the Chinese manufacturer to gain an edge in the worlds biggest growth market? If Dell is to continue 20 YOY growth than they will need the Chinese market. Does it make sense to aid their development?
- Would the game “be up” if there was a nationalistic “Made in China” sentiment?

Lessons Learned

There was an understanding of how does supplier would have cheaper costs with manufacturing and distribution, but not on the other areas of the project that was asked of them (namely service and repair).

Giving responsibility to the most impacted party paid off; Dell’s quality concerns were lessened by holding the OEM responsible for fixing quality problems.

Incentives are powerful, how would the Albatross story change if sales were incentivized to sell it on volume as opposed to margin?

3.1.2 Standardizing Cost Analysis: Alternate Fulfillment Model (AFM)

A task force approach was used for a couple of studies to answer the outsourcing question for both the kitting of parts prior to the building of units and the boxing of finished products for shipment (See mini-case study in Boxing Sidebar). These multifunctional teams consisted of members from Strategic Engineering, Manufacturing, Finance, Logistics, Operations, and Information Technology services. The purpose of the model was to address the following issues¹²:

- Decisions are analyzed using ad hoc, situation specific assumptions,
- No global process exists to evaluate sourcing decisions,
- Inconsistent business-case analysis due to varying data and sources,
- No formal review process prior to Office of the Chair submissions,
- Projects viewed independently and lack cross LOB impact consideration,
- Traditional fully burdened costing may not represent true Dell costs for short-term opportunities, and
- Program Managers are measured based on Fully Burdened P&L.

This team recommended defining a new organization entitled “The New Business Development” (located within Product Group - Finance), creating the role of a New

¹² Taken (with modification and addition) from a presentation passed on to be by Michael E. Green titled: AFM updated gatekeeper 1-281.ppt

Business Analyst, and development of a Financial Analyses Tool to standardize cost accounting.

At the time of this writing the final model is still in progress, however inroads have been made on with the hiring of the New Business Analyst and developing the Financial Analysis Tool. The latter is an excel spreadsheet designed to collect financial inputs and manipulating this data into a set of standardized metrics useful for decision making.

The New Business Development Group acts as a liaison to the Program Manger (the individual in a Line of Business (LOB) responsible for the outsourcing decision), ensures that the financial model is consistently used, works on further development of the AFM and tracks success of key metrics useful for the implementation of the AFM project.

Sidebar 3-2 Application of The Alternative Fulfillment Model

Outsourcing at Dell's European Manufacturing Facility¹³

Motivation

Dell's European Manufacturing Facility (Dell - Europe) was attempting to reduce costs and maximize floor space usage as part of an improvement initiative. Dell - Europe wanted to look for more cost effective ways of boxing units. This was an added concern due to the large number of products and variability of demand involved with the boxing operation. For example, if Dell - Europe decides to place a flyer in the box along with document manuals, they must have it available in multiple languages for the European market they serve. This greatly increases the number of part numbers placed in the document box.

The decision was made to determine if a third party could manage the materials for Dell - Europe and then ship them from the boxing facility (see Figure 3-1 Process Flow Diagram for Boxing). A make/buy analysis was conducted for Dell - Europe and it was decided to outsource the preparation of the document box (containing manuals, flyers, etc... in the language of the customer) based largely on cost considerations. The engineers worked with the contractor to develop the boxing process lines and ensure they

¹³ Thanks to Dellites Luciano Luz, Trevor Coughlan, Michael Green, Bill Hendon, and Kevin Percy at Dell for their input.

would be able to integrate seamlessly into the plant. This exchange of knowledge allowed the contractor to benefit from the knowledge of Dell engineers and ensured that the suppliers provided an optimal solution.

A similar analysis was conducted by Dell America's Operations (DAO) to determine if it would be reasonable to outsource boxing at one of their domestic manufacturing facilities. It was thought that if Dell - Europe would find it cost feasible to outsource boxing then it would be here. Additionally, Dell would benefit from optimization of existing floor space. It was also felt that the boxing process had little effect on quality or customer experience.

The analysis was conducted in similar manner as Dell - Europe; namely to solicit a bid from contractors and then compare that bid to the costs for Dell to conduct the work.

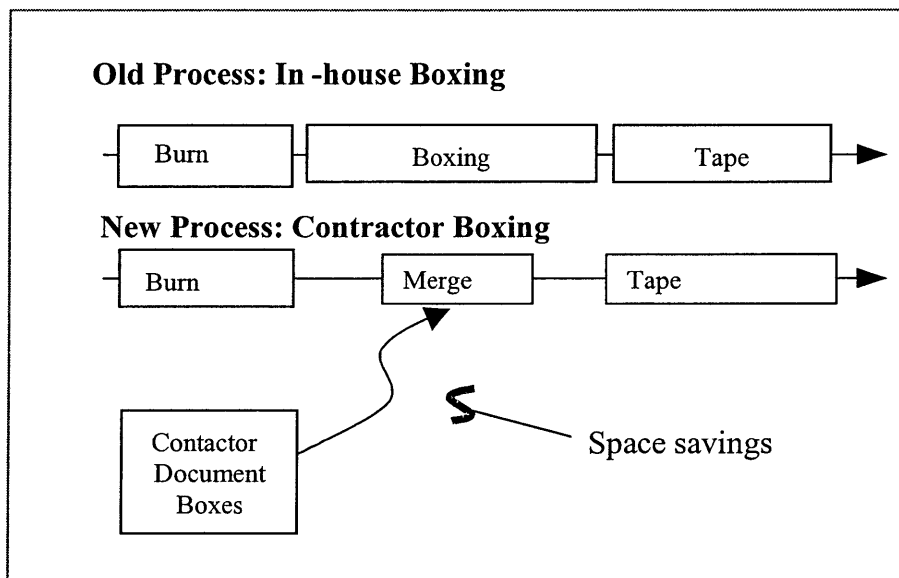


Figure 3-1 Process Flow Diagram for Boxing

Drivers

- *Costs:* Material handling and E&O (Excess and obsolete - repackaging fees, inventory costs) could be reduced
- *Space Savings:* Would maximize space for building machines.
- *Risk:* Suppliers *AND* Dell would be co-responsible for management of materials.

Approach

The process for soliciting bids progressed as follows for the Dell - Europe analysis: 1) grant prospective contactors access to necessary Dell information (metrics, cycle times,

infrastructure), 2) receive bids, 3) refine viable bids with engineering input to improve processes, 4) accept bid from most competitive supplier. These bids, plus the shipping costs of Dell - Europe to the boxing facility, were compared with the fully burdened cost¹⁴ for Dell to box each unit. The most cost-impacting alternative was chosen resulting in a “buy” decision for Dell - Europe to outsource the boxing.

DAO used a similar method to determine the make/buy, however they had the benefit of Dell - Europe’s experience. In addition to Dell - Europe, DAO conducted benchmarks of other companies to understand how they did their boxing. These companies did outsource their boxing to third parties, however they also had fixed configuration product platforms that favor a “build to stock” model whereas Dell “builds to order.”

These benchmarks were used to “scope out” exactly what would be required of the suppliers for boxing. This was followed by soliciting bids from their suppliers to perform the boxing of manuals, flyers, keyboards, and external peripherals.

Metrics

The main metric for the decision was the transformation¹⁵ cost of each unit cost per unit plus the shipping charges incurred for each scenario. These metrics for a specific process were not readily available and were difficult to ascertain. Reasons for this are typical of manufacturing plants and include: personnel switching jobs during the process, volume based approach to allocating costs, and inclusion of capital and maintenance costs in the analysis.

Results

There was a substantial unit cost savings for Dell - Europe largely attributed to: 1) their not having to pay management fees to their suppliers, 2) the “soft cost” impacts from having the contractor aggregate demand¹⁶ over all of the lines, 3) a better line design was achieved by using the outsourcing initiative as a line upgrade improvement¹⁷, 4) an increase in floor space that could be used more productively by Dell - Europe, and 5) a

¹⁴ FPC or Fully burdened cost is used in the standard cost-accounting sense as the cost per unit plus fixed cost allocations.

¹⁵ Transformation cost is used in the standard cost-accounting sense. It is the amount of value added work from receiving to shipping of the product. Corporate allocations are typically included.

¹⁶ The EMF contractor boxes one stream of document boxes in their plant. These boxes were then “routed” to the proper line for merging with the systems’ box.

¹⁷ A verification scan was included in the IT infrastructure of the contractor to ensure that the correct items were boxed – a direct result of engineering input in the bid process.

decrease in Excess and Obsolete parts due to a change in the financial structure (that provided financial incentives to manage inventory responsibly) resulting from the contracting. Individual contributions of these initiatives were not determined as these savings were calculated jointly.

DAO did not conduct the outsourcing because the procedure did not prove financially feasible. This difference in the two scenarios is due to the dissimilarity in the cost structures of the regions and the lack of part number proliferation in DAO who only have to consider the English language. Also, the location of Dell - Europe's SLC readily favored a "just in time" implementation. Dell also did the analysis as an individual boxing initiative and did not consider plant consolidation or other cost savings initiatives.

Strategic Implications

- Does supplier have sufficient margin to continue as a "going concern"?
- Is there an understanding of how does supplier would have cheaper costs?
- Does depreciation of OEM capital over contract give them an advantage?
- Is there potential Holdup from increases in supplier responsibility?
- Would the decision change as volume increases (decreases)?

3.2 Cost Accounting Methods

Accounting for capital is the crux of the matter. Tackling capital accounting in the business world can be something of an art. Indeed, while talking to finance folks about outsourcing decisions the "hot button" seemed to be "what to do about capital outlays?" The standard approach would be for the program manager to solicit bids on how much suppliers could produce the parts; typically reported in a cost per unit basis. While this bid was in process, the manufacturing fulfillment centers at Dell went through a similar (but internal) bid process where they scrambled to determine what their unit cost.

Once the unit cost was obtained for each party, the one with the cheapest bid typically was awarded the deal. There were, of course, some strategic considerations, however interviews with managers demonstrate that the lowest cost producer normally wins. The bids from the suppliers were straightforward, however it appeared that the Dell costs

were usually much higher than the supplier costs. This begged the question, “How can suppliers be beating Dell production costs so badly on something that Dell was clearly world class?”

Another dilemma was which cost account method to use. If Dell used a “fully burdened cost” (FPC) that includes the cost of capital expenses, indirect costs, and overhead, then they are likely to have a much higher unit cost than their suppliers. However, if Dell decides to use a cash-flow analysis that only assesses the change in incremental cash then the responsibility of existing capital expenses would rest only with preexisting products.

Fully Burdened or Cash Flow Analysis. It is not always clear which one of the methods should be used for outsourcing. They both have their pros and cons and these are hashed out in meetings while finance folks determine which is the most representative of the situation. Here, and the two examples to follow, the intent is to provide cursory remarks on the subject and do not intend to probe the matter at depth. The aim is only to bring awareness of the problem.

The FPC method takes into consideration the costs of capital that Dell wishes to have a good return. Using this method has its advantages when there is an appreciable amount of capital at stake, which needs product volume to justify its expense. However, in this case the unit cost is likely to be inflated biasing the results toward choosing the supplier. Arguably, a major drawback to this method is that managers are incentivized on a Profit and Loss basis. Therefore, if the decision to outsource makes the metrics look better and helps to bring in some more ‘revenue’ and spread out the costs of capital, then managers would be more inclined to make the product in-house. Conversely, if the in sourcing requires the expenditure of capital, thereby depreciating the P&L statements, it is likely that managers would be inclined to outsourcing the product.

Another problem with the FPC method arises because of the extra allocation burden that is transferred to other products within the company once the decision has been made to

outsource. If the Nashville plant is making 1000 units¹⁸ of a dimension desktop with a corporate allocation of, say \$2 per unit and they decide to outsource, then that \$2000 cost is spread out amongst other product lines in other plants making their profit margin look worse. It does not take a business systems dynamics model to infer that this process – based on the P&L incentives along – would lead to outsourcing all the products under your purview.

The CF method considers only the “out of pocket” expenses that would arise from the outsourcing. This appears to be a more accurate method, a closer comparison with supplier bids, and has a less ‘political’ impact than the FPC method. From interviews with finance, it appears that this is the best way to make the outsourcing decision because it accounts for the situation where extra capital expense is not required to produce the units “in house.” This would be the case if the plant had “extra” capacity that it was not using. Therefore, the out of pocket costs for the product of these units would only be labor and materials.

Consider the following examples of a simple outsourcing calculation. The bid from Supplier X is \$10 per unit, the corporate allocations are included in the Table 3-1, and the volume required is 1,500 units. For simplicity, the cost of the units sold (COGS) or material costs are not included in the comparison since they would be the same for both analyses.

3.2.1 Example: Fully Burdened Cost Accounting

For the FPC analysis, all of the costs associated with transforming the product (direct labor) are included with corporate costs and allocations (indirect costs, facilities...). Here we can see that these costs are totaled and then divided by the total volume to obtain the cost per unit of \$13.33. This figure is higher than the bid presented by the supplier of \$10 so it is likely that Dell *would outsource* this product. The numbers used to produce this number are presented in Table 3-1.

¹⁸ This, and all other numbers and data in this thesis, are fictional to protect *Dell Confidential* Information.

Nashville Fulfillment Center - Dimension		FPC	CF
\$\$\$	Direct Labor- Mfg Spending	\$10,000	\$10,000
	Direct Labor Benefits	\$2,000	\$2,000
	Direct Labor Training	\$400	\$400
	Manufacturing Indirect Labor	\$1,500	-
	Bonus- Mfg Spending	\$1,100	-
	Facilities	\$3,000	-
	Depreciation- Mfg Spending	\$2,000	-
	Total	\$20,000	\$12,400
	Volume	1500	1500
	Cost per unit	\$13.33	\$8.27

Table 3-1 Comparison of Fully Burdened Cost (FPC) vs. Cash Flow (CF) Analysis¹⁹

3.2.2 Example: Incremental Cash Flow Analysis

For the CF analysis, only the *direct costs* associated with transforming the product (direct labor) are included and corporate costs and allocations are excluded since they would exist regardless of the decision. Here we can see that these costs are totaled and then divided by the total volume to obtain the cost per unit of \$8.27. This figure is lower than the bid presented by the supplier of \$10 so it is likely that Dell *would* produce this product in-house. The numbers used to produce this number are presented in Table 3-1.

3.2.3 Example: Activity Based Cost (ABC) Accounting methods

A third method, and one that is gaining favor but not currently used for outsourcing, is *Activity Based Cost Accounting*. This method engenders the idea that if a product is using some assets, then that product gets charged. This manages to take volume into account (similar to the FPC) and the amount of resources the product is using. Of course, the trouble here is determining how to measure the amount of the resource each product is using. For example, if Product “A” used .25 hours on an a machine costing The Firm \$100 per day then the ABC charge would be \$1.56 (.25 hours * \$100/16 hours) assuming

¹⁹ Hypothetical data presented for comparison only. I am indebted to Kevin Percy of Dell for explaining the two processes and providing the framework for comparison.

they run two eight hour shifts. Assumptions can have a dramatic impact on the analysis. The interested reader can find a number of resources on ABC accounting²⁰.

3.3 Why Outsourcing Analysis Is not Easy

3.3.1 Political Implications of Outsourcing.

Outsourcing is often an emotional issue. Workers, concerned with their jobs, take umbrage with managers that decide to send work outside the organization – even more so when it is outside the country! Managers, intent on maintaining control over assets, may desire to have more products produced inside the plant. That is until they offset control with the potential increase to the P&L through continued outsourcing thereby increasing their performance metrics. Senior managers, interested in providing value to the shareholders, may outsource to decrease capital liability and debt increasing the market-to-book ratio possibly making the stock look more attractive²¹

Outsourcing as a marketing tool. Not only can outsourcing be used to increase short-term metrics, but it can also be an important alliance tool when venturing into other countries. Charlie Fine, in his book, *Clockspeed*²², reports that Boeing, in an attempt to win sales from Japan to buy Boeing planes over their major competitor -Airbus, had to outsource part of other the production of the plane to the Japanese. Thereby transferring the technology required to produce that portion of the plane. A similar strategy, although with a different impetus, was Teledesic's intent to open up the development of their "Internet in the sky" program. The rationale was not so much as to win sales, but to give different countries a stake in the matter to discourage integrated competition for the massive project. Of special interest was bringing Motorola, who was already developing a competing program, in on the deal. In these cases, we see that outsourcing (and insourcing) is a way to gain support of customers and a method to keep competitors at bay.

²⁰ A good resource is Michael Bromwich (from the London School of Economics), "Activity-based Costing Systems and Incremental Costs," Academic Press, 1999.

²¹ Steve Schwarzwaelder, "Make or Buy", McKinsey Quarterly 2001

²² Fine, "ClockSpeed Winning Industry Control in the Age of Temporary Advantage", Perseus Books, 1998

Outsourcing to increase capabilities. One of the most harrowing stories of outsourcing is the intent of IBM in the late 1980's to give control of the operating system to Microsoft and the production and development of processors to Intel. In hindsight, IBM did exactly the wrong thing by outsourcing without maintaining an equity relationships with the “winners.” However, their cost focus and product strategy led them in this direction. While IBM's capabilities diminished from this decision, it is clear that both Microsoft and Intel greatly benefited and were able to obtain abnormally high margins in their fields.

What is to be said of insourcing to increase one's own capabilities? It stands to reason that Dell could learn a great deal from their competitors should they take on their “outsourced” products. This is one potential development from a relationship with a major storage device company where Dell is selling their machines (see Sidebar: Learning from Insourcing). If Dell were to decide to enter in the highly competitive storage market, there is no better way than to learn from the market leader. By using relationships to learn about the products and business of a new market Dell can increase their chance of survival.

Sidebar 3-3 Learning from Insourcing²³

When A Major Data Storage Company (let's call them “MDSC”) asked Dell to sell MDSC storages devices they jumped at the opportunity – not only would this be a revenue opportunity for Dell, but it would be a great way to take a look a the storage market (at the time of this writing Dell does not offer a Dell branded storage device) and see if it fits the “Dell Direct Model”. A contract was hashed together to encompass the selling plan and work out the transfer pricing.

The relationship has been a successful one with Dell learning about the market and providing value to MDSC through their direct sales channel. Dell is also learning what it is like to be on the weaker side of a relationship. Interviews with operations personnel have revealed that they have had difficulty getting process data from MDSC because it was not specified in the contract. Since MDSC does not have the “Direct Values” of

²³ Thanks to Dellites Ed Juba, Monica Carson, Laurie Boecker and their teams for their insight.

having real time process information at all parts of the production process, they have not been concerned with passing this data on to Dell.

Another pitfall has been the integration of their IT systems. MDSC's system has not been able to handle the explosion of the bill of material that is generated when a customer orders via the web. This lack of a seamless integration with Dell's automated system has caused some pains on Dell's end as they develop a manual process of parts order entry. Further lessons learned include need of: a central "data farm" for data access for both seller (Dell) and manufacturer (MDSC) to monitor progress and customer orders, a process improvement clause to ensure the relationship (and transfer prices) are changed to reflect cost and process improvements, and a more defined service relationship to distinguish who and how devices will be repaired.

MDSC's decision to outsource the "Buying Experience" (something Amazon.com provides for Target and Toy's R Us) has been a learning process for Dell. Being on the receiving end of an outsourcing decision has enabled a transfer of resources to Dell. The MDSC-made, Dell-sold machines have met the needs of the customers with very little corruption and good access to data. Additionally the contract has been upheld, to the mutual benefit, of both parties.

3.3.2 Concerns with *Cost-Only* Approach

Third Party Bids may not always be credible. The quantitative-only (or cost-only) approach is only as good as the numbers that are used to rank the alternatives. IF there is some reason to believe that the data may not truly reflect reality – due to potential political or strategic concerns on the part of the supplier – than it is unlikely that a good decision will result. Because Dell has a great deal of market share and subsequently, does high volume, many suppliers may desire to do business with Dell – even if it means taking a loss to "get their foot in the door."

One may remark that this is not a concern for Dell, however the costs of developing and integrating a supplier into the Dell network is considerable. Considering uncertainty when costing a bid is difficult enough when there is sufficient profit in the deal; it is even more difficult when there is little "rent" for the supplier to obtain. Making a bid when it is a "loss leader" adds a great deal of complexity for which missing the numbers may put the supplier out of business necessitating that Dell expend additional resources to find

another supplier. This is further exacerbated if Dell develops dependencies on the supplier, as the urgency to replace the supplier will be increased.

3.3.2.1 Cost-Only Approach Does Not Consider “Follow-On” Value

Research on “Real Options” as a method of decision making to invest in core competencies has shown that a large portion of the value in competence capabilities development value is derived from follow-on value. Follow-on values are capabilities that are cultivated for the current decision that can be used for subsequent decisions²⁴. For example, Boeing’s develop of their 777 program required a computer aided design platform that would expedite their product development for subsequent designs. Outsourcing 777 development would not have enabled them to develop this important computer infrastructure²⁵.

The project may have a lower cost for the short term but will drastically increase prices for the next product introduction. This begs the questions: How do we account for capital that can be used for multiple products or to support long-term strategy? How do we internalize intuition for successful decision-making? And, is there a process to ensure we cover all the bases? In Part II we attempt to derive a process for including long-term strategic considerations into a quantitative model.

²⁴ Dilemmas n Exercise Decisions for Real Options on Core Competencies,” Russell Coff & Kevin Laverty, SSRN Jan 2002

²⁵ As reported in Coff and Laverty (2002).

Part II Infusing Strategy into Decision-Making

*“You’ve got to listen to your gut...
If you don’t have a good gut, you’ve got to develop one”*

- Don Davis, Former CEO, Stanley Works

4.0 Developing the Qualitative Model

Strategy is more of an art than a science. As such, it is difficult to optimize and typically assessed qualitatively based on “gut instinct.” Unfortunately, its far-reaching impacts are essential for The Firm’s health and not simply left for others to admire subjectively. In Part II, we develop a process for understanding what is behind “gut feel” and put a framework in place to aid in strategic assessment. For companies that do not have a “good gut” this tool will enable development of strategic intuition necessary to make impacting, long-term, strategic outsourcing decisions.

4.1 Model Objective ~ A decision process for outsourcing decisions

The overall objective of the model is to determine what the best way to produce a product – either to make it in-house or to buy it outside the organization. From a strategy standpoint, this can prove a daunting task if one considers all of the variables and inputs at once. Therefore, the approach used for this application at Dell Computer Corporation was so segment the decision into “edible” parts and then reunify them after they have been analyzed using scoring, weighting, and a balanced scorecard. See Chapter 12.0 for a detailed treatment of the implementation and treatment of the qualitative model.

4.1.1 Considerations

Hauser²⁶ provides additional insight to the metrics development quandary stating that there are seven metrics development “pitfalls” to avoid. These were helpful in directing the following assessment. Before one can accurately determine which decision tool to use, it is important to consider:

- How the process will be implemented.
- How the model will add value
- The need to provide a quantifiable solution
- How the model will be used for decision making

4.1.1.1 How the process will be implemented.

Each factor is assessed by a focus group that fills out the survey for that factor. As an example, The “Supply Chain Excellence” survey would be filled out the Supply Chain management Focus group and the “Customer Experience” survey would be filled out the by the sales and marketing department. Figure 4-1 has a breakout of the Core Team positions and which survey they would be responsible. The answers to the survey determine the position of the feature on a strategy matrix, which provided the potential danger to outsourcing. It is unlikely that the focus groups will be the same for each decision or that they will be familiar with the model prior to taking the survey.

²⁶ John R. Hauser, “Metrics: you are what you measure!,” *European Management Journal*, October 1998.

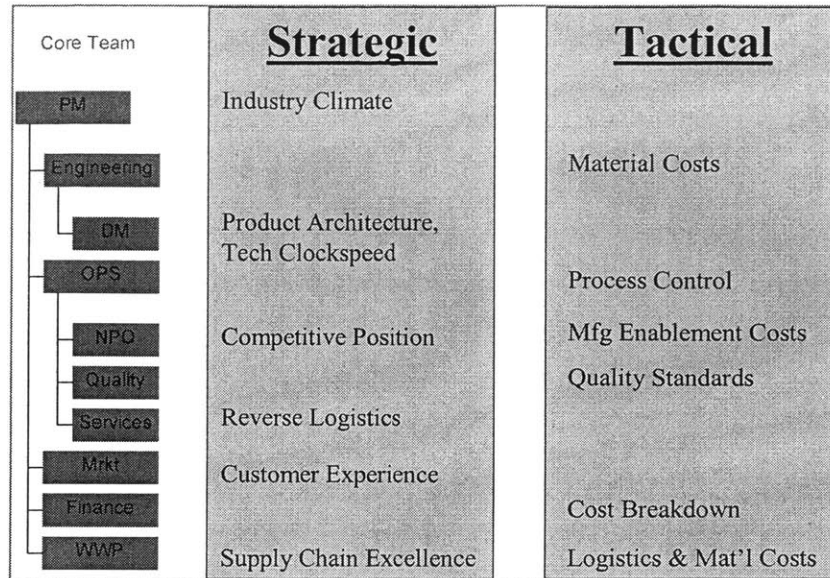


Figure 4-1 Integration of Surveys into Core Team

The data that is typically used for a strategic analysis is usually “squishy.” Outside of consumer buying trends, manufacturing indices, and other such economic analyses, much of the analysis is based on instinct. Consider the decision to enter the market with a new, innovative product. A product development team may look at consumer spending numbers and marketing surveys to determine potential revenue as well as internal cost and production projections to determine potential costs. The truth of the matter is that these numbers go to an executive meeting where they talk about risks and rewards and make a decision based on instinct.

4.1.1.2 How the model will add value

This model will be similar to product development “concept models”, except it takes the strategy that occurs in the “corner office” and infuses it down to the worker level. This adds value in two ways. First, it enables the folks working on the project to convey concerns to management that they feel may be a problem for the product. Secondly, it takes some of the pressure off managers and gives some of the responsibility for the

decision to “individual contributors”²⁷ enabling senior managers to focus on external boundary management.

4.1.1.3 The need to provide a quantifiable solution

“Dell is a metrics driven company. If you do not have metric’s, you do not get to drive”

This quote from an interview with a Dell employee clearly states the political climate at Dell - typical of most large, aggressive companies. Simply put, if you cannot find ways to contribute to the bottom line, than it is going to be difficult to determine how your project is adding value.

On more than one occasion, I was explaining the model to managers and was asked, “What are the ‘Soft Costs’ of the decision.” They wanted to know how much, in dollars, the outsourcing would save (cost) Dell should they choose to outsource (or vice versa). The question is much more simpler than the answer. In 1980’s when IBM was outsourcing their operating system (OS) to Microsoft, they must have asked the question of how much they stood to lose should the OS be where the money was. There is no way they could have known this answer accurately enough to make a management decision. Table 4-1 shows the soft costs and relevant studies for each of the six outsourcing factors.

²⁷ This is a Dell term for non-plant, non-management personnel.

Factors	Soft Costs	Studies	Owner
Customer Experience	Warranty, whole unit exchanges, Rev loss avoidance	Costs per service call/repair, TMI-Underage/overage models	Sales, PG/Mktg, "Voice of Customer", Demand/Supply,
Tech Clockspeed	Muscling through mkt power,		PG
Industry Climate	Loss in market share		COO
Supply Chain Excellence	IT costs, supplier relationship costs		WWP - OEM/SCM
Product Architecture	Costs of standardization		
Competitive Position	EOS, Velocity reduction, loss of customer access, loss of CTO	Velocity Studies, XDS	Impacted Stakeholders

Table 4-1 Soft Costs of Outsourcing Decisions

“Soft costs” are the opportunity costs of a given decision. They are difficult to quantify and suspect of their managerial impact. If they can quantify long-term costs/benefits, it is important to make the distinction between subjective and objective metrics. The former are prone to selection bias of the team who is rating them – product development personnel may have a completely different score than manufacturing. This is captured on the horizontal axis of Figure 4-2 that captures the ability to rank a metric against a standard. Presented on the vertical axis is the usefulness of the metric for decision-making, once it has been determined.

The worst cases, shown in the bottom right quadrant, are situations where the inputs are subjective and the metrics are not useful for decision-making. An example of this is ranking of looks. One may find someone attractive and think Marge Simpson is a “7,” however the next person may think she is a “4.” Regardless of the number, it is doubtful the metric will be used for any real decision-making. An example of the best case is measurement of Noise, Vibration, and Harshness from the automotive industry. An engineer can place an accelerometer on the car and determine NVH statistics that can be ranked, objectively, against a standard. Over time, these metrics have proven useful to determine ride-quality and comfort and are useful for decision-making.

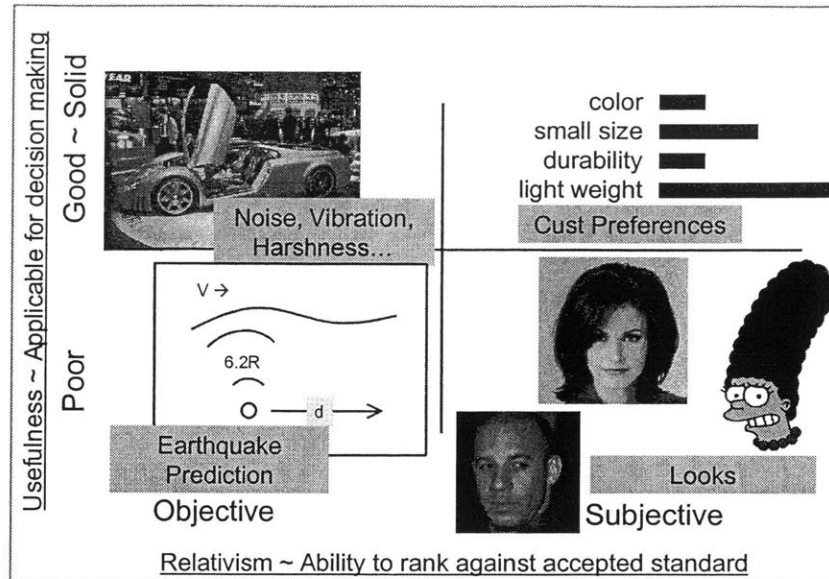


Figure 4-2 Examples of Quantifying the "Squishy"

Choosing an impact assessment approach. Additionally, because of the small numbers of employees taking the survey, statistical approaches are unlikely to yield any value. A typical rule of thumb for a good marketing sample size is ten²⁸. However, it is unlikely to get more than one focus group per survey. Therefore, a statistical approach is not likely to yield improved results in testing.

4.1.1.4 How the model will be used for decision making

The implications on this with regard to decision support tools means that the process must be very simple to follow with little training necessitating that the questions be clear and unambiguous. An interview with one manager revealed that seven to ten minutes²⁹ to be the optimal time for the survey - severely limiting the assessment. Because the tool is designed with the end use in mind the follow criteria has been determined as valuable to Dell for this model:

- Quick ~ No more than 30 minutes
- Consistent ~ Results that can be compared across multiple decisions

²⁸ Shiba & Walden, "Four Practical Revolutions in Management," Productivity Press, 2001

²⁹ This was not an isolated response, however other managers have mentioned that 30 – 60 minutes would be acceptable. The tradeoff between assessment and attention span favors the former to aid discussion and usability.

- Oversight ~ A team of individuals who own the process and ensure it is conducted properly
- Meaningful ~ Co-Developed by Dell personnel and validated with their “mental model”
- Easy ~ Easy process that can be started instantly with little training

5.0 The Strategic Outsourcing Model

5.1 Decision-making Framework

While interviewing with a company for a position the question was posed, “How do you make a decision?” This behavioral question was designed to look at one’s analytical thinking process instead focusing on the result. Little did they know the seed they had planted would result in the methodology presented in Figure 5-1 outlining the steps involved in decision-making (if only I had this figure during the interview). Developing a decision support system to aid in outsourcing is a daunting task. However, the steps and analysis tools presented in this framework help to quantify the unquantifiable.

Data Collection:	<div style="border: 1px solid black; padding: 2px;"> Questionnaires Historical Data Literature </div>
Objective Prioritization:	<div style="border: 1px solid black; padding: 2px;"> Analytical Hierarchy Protocol Conjoint Analysis Gut Instinct </div>
Option Evaluation:	<div style="border: 1px solid black; padding: 2px;"> Segmentation (matrices) Balanced Scorecards Real Options^α Decision tree Analysis^{αβ} </div>
Outcome Simulation:	<div style="border: 1px solid black; padding: 2px;"> Iterative Experience Monte Carlo^{αβ} Artificial Intelligence^χ </div>

α Requires detailed financial data

β Requires objective data

χ Need McKinsey to develop©

Figure 5-1 Steps of Decision Making

The decision-making steps outlined above trace the analysis of a decision. Also included are some tools for completion of each of the four steps. Not all of the tools are used in the analysis due to depth of data needed to make the tool useful. Those that are boxed were used in the model and are discussed below:

- *Data collection* – obtaining the information necessary to analyze the decision. This is done via questionnaires, drawing conclusions from historical data from outsourcing decisions, and noting concerns from literature searches.
- *Objective prioritization* – focusing the data to prioritize information that is most important. This is done using Analytical Hierarchy Protocol³⁰ and conjoint analysis³¹ to evaluate “gut instinct.”
- *Option evaluation* – assessing alternatives based on prioritization. Segmenting the decision allows positioning on strategic matrices, which are divided into quadrants with pre-assigned strategies. Balanced Scorecards are a visual management tool to present priority data for decision making. The scorecard includes the strategic assessment as well as the costs analysis conducted by the New Business Development team.
- *Outcome simulation* – determining if the answer makes sense and if it meets the proper risk/reward balance. Use of the model provides valuable experience that will make the next iteration even more effective.

There are a number of decision support system tools available. Those tools that are listed on the right hand column of Figure 5-1 that are not used are provided for future consideration. The current situation did not allow for their use due to the subjectivity of the data that they would require and the lack of usefulness the outcome would be for decision-making (placing them in the bottom left quadrant of Figure 4-2).

5.2 Segmenting the Decision: Six Factors to Assess Outsourcing Decisions

In order to make the decision-making more feasible the decision was segmented into six assessment factors. A similar approach was used by *Fine* while working on a project for GM³². In his paper five attributes (or factors used for consistency for this paper) of an outsourcing decision are identified. The sixth factor was added to incorporate additional research on disruptive technologies and industry forces. These six outsourcing factors are outlined in Figure 5-2.

³⁰ Thomas L. Saaty, “Multicriteria Decision Making: The Analytic Hierarchy Process,” Rws Publications, 1990

³¹ Conjoint analysis is a common marketing tool used to prioritize a basket of criteria by making pairwise comparisons.

³² Fine and Whitney, “Rapid Response Capability in Value Chain Design,” Sloan Management Review, 2002

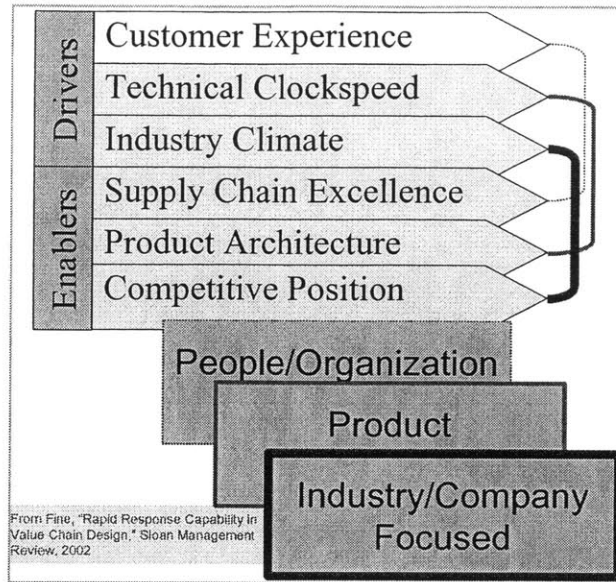


Figure 5-2 Six Strategic Outsourcing Factors

Each of these are discussed and developed in Part III. Here we can see that Customer Experience and Supply Chain Excellence focus on the *People/Organizations* that are involved with the decision (the customer and the supply chain). Technology Clockspeed and Product Architecture are related to the *Product* and its efficacy to be outsourced. Lastly, Industry Climate and Competitive Position focus on the *Industry* and how outsourcing the product may affect The Firm’s competitiveness. It is also important to note that the first three are *Drivers* for outsourcing. They are exogenous to the decision and not necessarily in the immediate control of the company considering the outsourcing. That last three are *Enablers* for outsourcing. They are endogenous and are controlled by the company as they are able to alter their partners, their products, or their position to favor their outsourcing strategy.

These factors are then further segmented into sub factors that are even further segmented into categories. It is these final categories that are assessed using a strategic survey. In total, the model has 6 factors, 20 sub factors, 60 categories and over 400 questions used to assess the decision. An example of the multiple layering used for *Supply Chain Excellence* is provided in Figure 5-3.

	M/B Factors	SubFactors	Categories	
Drivers	Customer Experience	Feature Importance/Innovation Effect on Out of Box Experience Effect on Recovery		Questions
	Technology ClockSpeed	Assessment of Product Clockspeed Dependency for Knowledge Dependency for Capacity		
	Industry Climate	Available Economic Surplus Ability to Win Economic Surplus Alignment with Industry Forces Alignment with Costs and Culture		
Enablers	Competitive Position	Understanding of supplier's advantage Assessment of Dell's Competencies Transfer of capabilities		
	Supply Chain Excellence	Assessment of Supplier Capabilities Supply Chain Dynamics Supply Chain Control	Information Feedback Production Flexibility	
	Product Architecture	Maturity (modular, standardized)	Financial Control	
		Potential for dependence on Supplier		
		Feature Complexity Involvement w/ Development		⋮

Use Weights when going from one level to another

Figure 5-3 Example of Layering for Decision Analysis

5.3 Key Model Development Tasks

Understanding the Important Factors. A great deal of time was spent understanding what is important to Dell for an outsourcing decision. Personal interviews and email correspondence with well over 50 Dell employees helped to identify what is important to Dell in the long term as well as their short terms goals and how outsourcing affects both.

Segmenting the decision. In order to assess this broad universe of criteria, a framework was necessary to segment the decision. A typical value stream analysis of the PC market reveals the players involved and how they are involved with the value change of the product until it is ultimately delivered to the customer. Appendix 1 contains a map of the six strategic factors and their assessment criteria.

Assessing the Factors. Determining how to assess these six factors is the meat of the thesis and is discussed in Part III. From the interviews, a number of questions were formulated for the surveys based on the incentives and concerns for each organization.

These factors are then given a numerical score that will help determine the overall impact of the outsourcing decision for Dell.

Reassembling the factors into an overall decision. Once an impact assessment of the survey has been determined and the overall score for each of the factors, these are published into the Balanced Scorecard.

5.4 Using the Framework at Dell

The use of the model was designed to allow the flexible use of the considerations in Section 4.1.1 and to maintain continued model integrity by having a permanent team to oversee the process. Because of this mix of temporary and permanent users it was essential to involve stakeholders where they were most useful. This is shown in Figure 5-4, Model Implementation.

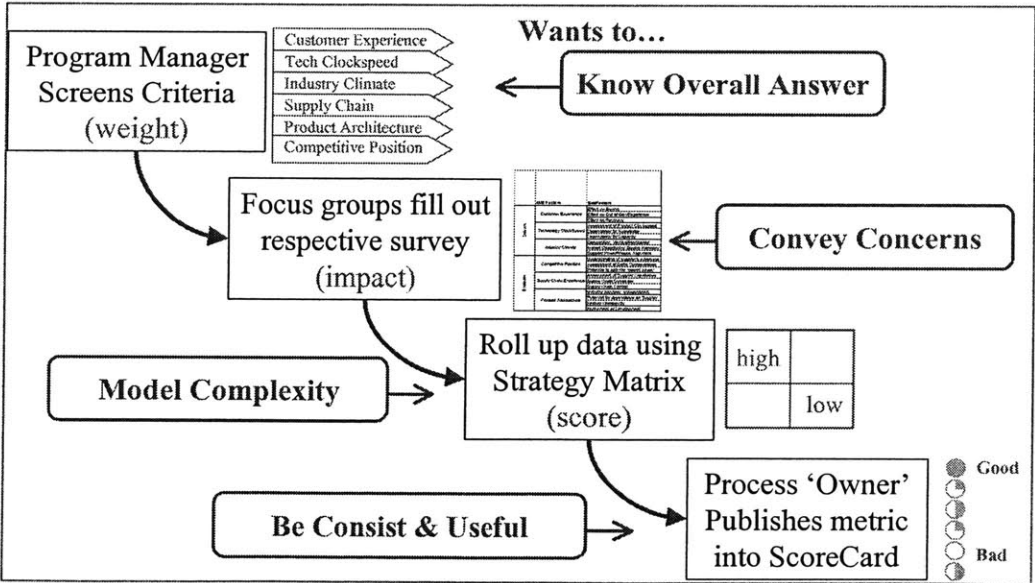


Figure 5-4 Model Implementation

5.4.1 Program Manager Guides Process

The program manager (PM) has the ultimate responsibility for the use and delivery of the model's results. The PM provides a weighting of the six strategic outsourcing factor to determine the most impacting factors for each outsourcing decision. Additionally, the PM

has responsibility for guiding the cost analysis with the alternate fulfillment model. This individual is the gatekeeper for the information that is specific to the project and manages the focus groups (additional responsibilities for are shown in Appendix 2).

5.4.2 Focus Groups Furnish Data

The focus groups are teams with specific knowledge of a program area and how it affects the product. The FG's involvement begins with education on the decision system and of their roles. Then, each FG fills out their respective survey (i.e. the Supply Chain Excellence Survey is filled out by the OEM and supply chain group, the Customer Experience Survey is filled out by the Sales/marketing department for the product...). Finally, the FG is involved with the wrap-up and feedback portion of the decision when their services may again be called upon to provide clarification of concerns.

5.4.3 The Model "Roll-up" is Computer Assisted

Once the data has been collected via the surveys, the computer model (currently on Excel) rolls up the data with the weighting and "places" the decision into the proper position on the strategic matrix for each of the six factors. Each quadrant has already been assigned a score for its "potential danger for outsourcing." For example, if the decision turns out to drastically impact the customer's experience for the product, then Customer Experience would receive a High Potential Danger for Outsourcing on the Balanced Scorecard. Managers would then be aware of the problem and could make their decision or mitigate risk accordingly.

5.4.4 Process Owner Oversees Model

The Process Owner is the backbone of the decision system model and thusly has the greatest responsibility. The incentives are matched with their concerns as they have the management over the use of the model, the solicitation of feedback, and the updating of the model between successive uses. Additionally, this essential team publishes the Balanced Scorecard from the “rolled-up” data and consults with management during the decision-making process.

5.5 Building Strategic Concerns into the Survey

5.5.1 Biasing the Model

Early on in the project it became clear that building some of the strategy into the model up front would greatly simplify the model. This was accomplished in two ways. The first was to make the answers to the consistent by assigning all “Strongly Agree” answers a numerical value of “1” and making them *favorable* to outsourcing and conversely assigning all “Strongly Disagree” answers a value of “5” and noting them as *unfavorable* to outsourcing. This was done to avoid having multiple answers that would have a differing impact on outsourcing and thusly lose their meaning. Secondly, it was necessary to bias the model toward outsourcing. By this it is meant that the model assumes that the user desires to outsource and must justify it. This way a position can be ascribed to the surveys and the model “knows” how to ask questions. The same issues arrive in our judicial system today when someone is assumed “innocent until proven guilty.” This provides both the defending and the plaintiff counselors a starting point.

There is one other major result of formulating the questions in this way and that is the survey can have continued learning. If the process owners (discussed in section 5.4.4) determine that there is an issue they would like to assess then they could add the questions to the appropriate survey worded so a “Strongly Disagree” would mark that factor as a concern. This “learning” greatly promotes the robustness of the model.

5.5.2 Standardization Model Development

Because the model was getting large and complex and other folks were getting involved with developing different pieces, it was needed to leave a legacy file to document the development. “Consistency rules” were instituted and used to standardize the development and use of the model. These rules covered the above strategy questioning and interactions as well as the scoring, weighting, nomenclature, levels (Factors, sub factors, categories...), presentation of results, formatting, and roll-up of metrics. These rules added rigidity to the model - decreasing specificity for assessing each factor independently. However, the standardization of the survey and results more than made up for these hindrances. For sake of brevity these model consistency rules are deferred to Appendix 3.

5.5.3 Building Strategic Interactions into the Strategic Matrices

It is clear that there are certain interactions that can be synergistic, antagonistic, or neutral. For example, Dell desires to enter into product spaces that have higher margins. But higher margins typically have a higher complexity. Dell, as a systems integrator, may not have the wherewithal internally to produce a highly complex feature. Therefore, having a very complex component in the design of a PC may mean that Dell is dependent on the supplier of that technology³³. However if they are involved with the development of the feature with the third party, then they are more likely to understand the technology and “hold up” will be less of a problem. In this case the feature complexity and Dell’s involvement with the development have a moderately antagonistic effect.

As an example, Figure 5-5 (we will discuss Product Architecture more in Section 10.0) contains these interactions. The worse case, the upper left quadrant, is a highly complex

³³ An example of this would be video cards. Customers that demanding faster, higher quality graphics, may desire a certain brand that has consistently outperformed the market, say Quantum. If Dell is not involved with the development and Quantum decides they want to offer their cards to the highest bidder Dell must bid competitively. However, if Dell IS involved with the development we will have another bargaining chip on the table as we have some intellectual capital and engineering expertise with which to determine pricing.

feature³⁴ where Dell has had little involvement. Here Dell is dependant on the supplier of the feature for development. The best case, the lower right quadrant, is a situation where the feature is not complex and Dell *has* been involved with the development. Here the technology of the feature is not an issue. There is a line of questioning in the survey designed to determine which is the relevant quadrant of the matrix for the feature.

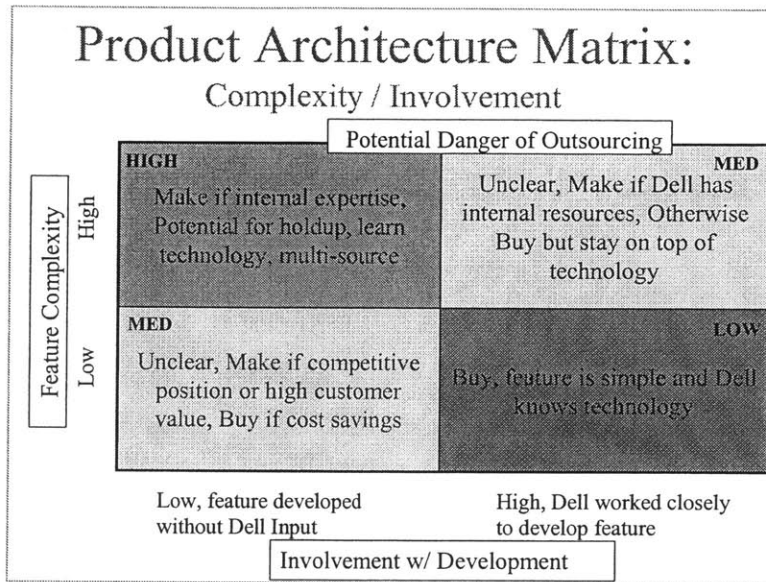


Figure 5-5 Strategic Matrix of Complexity and Involvement of a Feature

³⁴ Dell specifies “complexity” as being central do the core. Ergo, anything on the motherboard is complex while printers are ‘peripheral’ and not complex.

Part III Drivers of Outsourcing Strategy

This Part identifies and develops six strategic factors to consider when making a make/buy decision³⁵ depicted by Figure 5-2. It is insightful to note that these factors interplay with one another and are balanced “lenses” to look at the decision from three different vantage points. Customer Experience and Supply Chain Excellence focus on how the Decision impacts the people and organization, Technology Clockspeed and Product Architecture focus on the product to see if it readily lends itself to outsourcing, and Industry Climate and Competitive position are concerned with how the decision will affect the Industry and The Firm.

This development of the strategy for these factors is an amalgamation of Dell’s current concerns, the latest academic thinking on outsourcing, and the strategy necessary to avoid historical “miss-steps” at Dell. These six strategic factors are developed and discussed in the following six chapters.

³⁵ Five of these factors were developed in Fine, “Rapid Response Capability in Value Chain Design,” Sloan Management Review, 2002. Industry Climate was added to identify the external forces on The Firm.

6.0 Customer Experience ~ Controlling what is important to the customer

When considering Customer Experience for outsourcing decisions the first step is to determine how important the feature or attribute is to the customer. This is divided into three segments namely: Essential, Indifferent, and Discriminatory. Next, the strategy of the company for that feature is presented as: Innovative, parity, and economical. Each of these is discussed in turn.

The matrix presented in Figure 6-1 contains the strategy Matrix for each situation by combining the Importance of the feature to the customer with the Innovativeness of the feature. Generally, the closer the product puts you to the customer and the more innovative the feature, the more margin is available. In these cases, it would be unwise to outsource control of those features since we would lose our control of the margin as well, hence the high Potential Outsourcing Danger for the upper right quadrant. In this case The Firm should produce it themselves to maximize control.

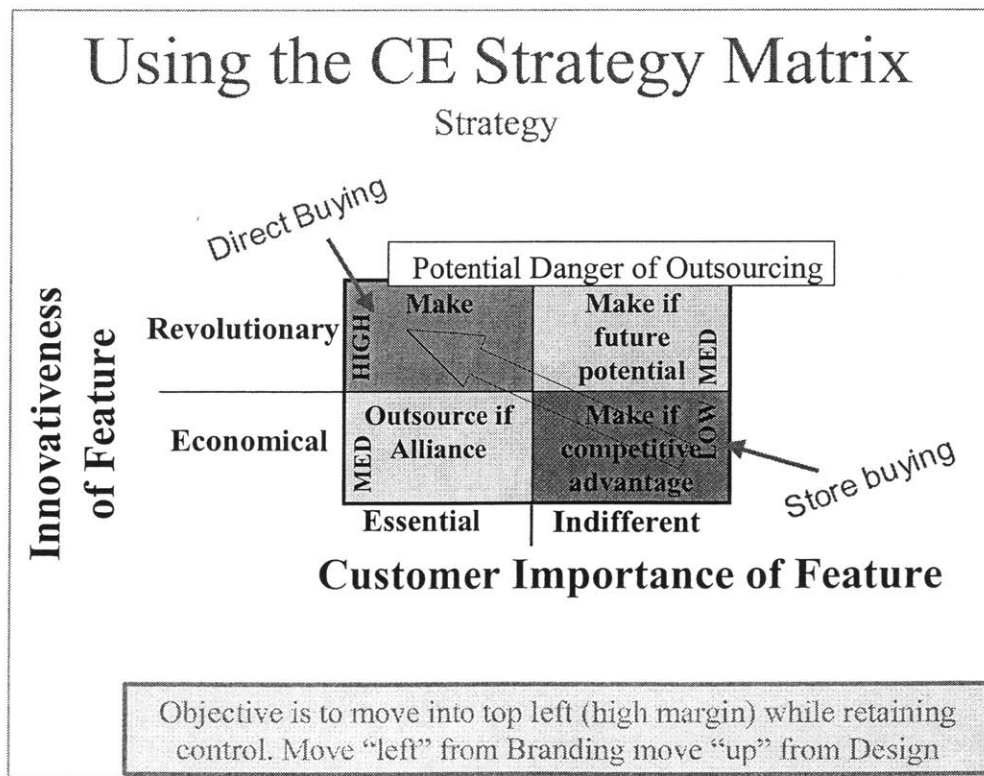


Figure 6-1 Innovation vs. Importance Strategy Matrix

6.1 The “Getting Closer to the Customer” Management Paradigm

Management paradigms abound for the understanding customer relationships and thought processes when they decide to select a product, continue its use, or return it to the manufacturer. The main point of these processes is to understand how customers make decisions so marketing and sales organizations may direct their efforts on customer preferences. By “owning” these attributes (price, quality, color...) companies may become the premium choice of the customer and obtain a higher margin. All of this requires knowing customers and what satisfies them.

A number of consultancies exist to provide help with Customer Satisfaction Measurement (CSM) or Customer Relationship Management (CRM) to aid in the analysis and implementation of processes to understand customers.

Developing a CSM system “in house” can be difficult and often results in “little or no return on a significant investment of time and finances. Why does this happen so often? Most organizations fail to answer three critical questions before developing a CSM process³⁶.”

- Who are the internal customers for the CSM process?
- What results do internal customers need and want from the process?
- How do internal customers want to receive the data?

An additional factor to resistance to implementation of CRM is size. Because of organization issues, the larger the project the more likely it will be dropped³⁷. These issues have been addressed throughout the development of this model by asking the organization making the analysis to aid in development and keeping the “end users” apprised of the model’s development. The best method for delivery of the data to management for decision making is using the Balanced Scorecard approach discussed in

³⁶ Barry Frey , “Customer Satisfaction Measurement: What Makes It Successful?,” LMA Consulting Group. <http://www.lmasystems.com/Articles/CustomerSatMeas.htm>

³⁷ The December 2002 issue of the McKinsey Quarterly, “How to Rescue CRM,” discusses these roadblocks and how to overcome them.

Section 12.1. The major takeaway for getting over the project size issue is proper goal selection and co-development with stakeholders.

While this model does not seek to have the full capability of a CSM or CRM it does take the major issues from each into consideration in the survey. Additional functionality of this model is developed from Dell's world-class customer facing systems. These web/customer interfaces are unparalleled in their ability to provide what the customer wants, when they needed, for the price they desire. Feedback is noted via customer keystrokes and "clicks" and used to modify Dell's thinking on customer preferences.

A particular revolutionary use of Dell's Direct Model is the ability to determine customer price sensitivity. By making small changes to the order on the web Dell is able to determine what customers would be willing to pay for certain bundles. This is further insightful because it is the customers themselves and not a predetermined Dell bundles that are selected due to Dell's customization options.

6.2 Understanding Customer Importance

The customer is always right. Giving the customer exactly what they want is becoming mainstream. With Dell and other retailers (i.e. Amazon.com and Wal-Mart.com), direct selling is continuing to segment the market into populations of one. Customers are able to configure their orders and products and have them ship it directly to them. As this segmentation continues, knowing what is important to each customer (and thusly the correct options for their order) becomes paramount. Dells business is built around this concept enabling them to have the elicitation (determining customer needs), process flexibility, and logistical support necessary to invoke Mass Customization³⁸.

This model seeks to divide this group into three categories of customer importance: Essential items, Indifferent, and Discriminatory. Each will be discussed in turn for use in the Customer Experience Strategy Matrix used to identify the best strategy for the Make/Buy decision.

³⁸ Paul Zipkin, "The Limits of Mass Customization," MIT Sloan Management Review, Spring 2001

6.2.1 Customers Choose Essentials

Every customer has an idea of what they desire for a product. Some of these desires are attributes that they hold as essential or characteristics that they must have for the product. Customers view essentials as items the product must have in order for them to select it. From a marketing standpoint, they are differentiators such as brand or image. A view from the engineering floor would have the customer select the product based on a certain functionality or performance. For the sake of this model these are decision points and are used in the survey to determine how important the outsourced feature is to the customer. A sampling of these preferences from interviews across Dells organization include:

- Customer have different values on feature depending on their industry.
- Corporate users want Platform Stability, (referred to as “lattitudeness”). IT folks want to have something that matches rest of machines (don’t want a bunch of machines with different configurations, setups, and maintenance procedures) that lowers total cost of ownership (TCO).
- Small Business users are more price-sensitive and seek lowest TCO solution and want a value.
- Performance users want the latest and greatest and want it quickly. Dell’s time to market (TTM) is excellent allowing them to capture roughly 60% of high performance Mkt.
- Tactile feedback – must have a quality feel, can’t be “chinsky” or flimsy.
- Want a system that looks classy.

6.2.2 No Decisions on Indifferent Attributes

Customers who do not have a preference on the feature presented to them as said to be “indifferent.” They could care less if the feature or process were added to them or not and do not base their buying preferences on these features. Some examples of indifferent features for Dell customers are:

- Customers do not typically care where the product is built.
- Customers do not particularly sensitive about Dell’s customer experience metrics. These are Dell-tracked items such as delivery times, quality metrics, and order correctness. Customers just expect these things without fail. These metrics are more for internal “push” for manufacturing and service than for the customer.
- Customers are not especially brand loyal.

- Customers expect quality but will not use it as a selection criterion. They have the expectation that Dell will meet their idea of quality (these seem to be relative to the rest of the market).

6.2.3 Keeping a watch on Discriminatory Attributes

The last segment of customer preferences is those that the customer would rather not be included in the product. These are classified as “discriminatory.” It is unlikely that a customer would pay extra for one of these features, however they may be inclined to pay or exert effort for their removal. Typically, these are discriminatory because the technology has not reached the point where it is readily useful to the customer but which will become essential as the technology develops or the customer learns to use it. In product development parlance there are specified as “latent needs.” Examples of these would be:

- Early point stick “mice” on a laptop,
- Briefcase folder on desktop from MS Windows
- Palm OS graffiti (necessary evil?), it is arguable that PDA data entry has not quite “arrived,”
- AOL icon on desktop.

It may be desirable for the manufacturer to cave into early customer derision and discontinue the feature, however, research on disruptive technologies have shown that “staying on top” of these features is a better strategy. It is not always clear which discriminatory features will turn out to be disruptive technologies (those which change the manner of competition for complimentary products). A good strategy is to keep a close eye on these technologies to ensure the ability to enter the market if they later prove to be essential³⁹.

³⁹ An in-depth treatment of Disruptive Technologies is presented in Christensen’s “The Innovator’s Dilemma”

6.3 Leading by Innovation: The Key to Higher Margins

Business strategies abound for different niches of the market. Compare the high margin low volume products such as Agilent Technologies Inc. to the high volume, lower margin products of Dell Computer. Agilent builds high dollar (some in the hundreds of thousands), highly complex, ion implantation devices in manufacturing cells at very low volumes (less than 100 per month). When semiconductor companies choose an ion implantation device it is crucial that they buy an innovative one that will not limit their ability to make microchips efficiently. When these buying cycles are on the order of years, Agilent must have the technology ready or else risk the loss of a multi-million dollar sale.

Dell, on the other hand, builds computers in continuous flow lines of products streaming down conveyor belts. Here velocity is king so that they may sell a high number of products at a lower margin to make revenue. Innovation is less of a factor because of the high volume and price competition, however the rule still applies as higher margins are obtained on Dell's "higher end" performance computers (switches, servers...). Clearly, the more innovative a product (and hence the more apt is it to have value to the customer) the more the consumer will be willing to pay to obtain that performance.

So that this has greater import to companies that run on a high volume, low margin strategy, innovation is defined here as: "the ability to create value for the customer in a unique way." This would include innovative products, processes (such as the Dell Direct Model), or branding (do we pay \$4 for Starbucks' coffee or their image?). Three main business strategies of product innovation, parity (just as good as everybody else's [or the "follow the leader" mentality]), and economy are discussed below.

6.3.1 Winning with Innovation

Pouring money into innovative products has been the business strategy of many kingpins of industry. Sun Microsystems, 3M, Intel and the like all have massive research budgets focused on bringing the highest performance products to market for their customers. These companies use their research findings to sway customer opinions and buying

preferences to favor their business models. The rewards of this strategy can be large on new products that win the performance demands of their customers.

Sinking cash into R&D is not a sure way of competing on innovation however. As Sharon Oster points out the environment must be favorable. This would assert that the diffusion of the technology is slow to allow the first innovator to achieve large returns for their investment. Additionally, there must be a value of a head start to drive companies to strive to “come to market” with their products. A summary of Oster’s comments are presented in Table 6-1.

Diffusion Rate is slow
- Technological complexity of innovation
- Substantial specific assets required to implement
- Strict patent / ownership rules
Value of head start is high
- Large, lucrative early market
- Large, first-mover advantages in production, marketing, or R&D
- Product standardization important
Resources available to innovator for growth

Table 6-1 Factors that Create a Favorable Environment for Innovation⁴⁰

6.3.2 Parity Strategy ~ Keeping up with the Jones’s

One way of differentiation oneself in the market is to not do so at all and have a “Parity” offering in the market. Sounds counterintuitive, however by aligning oneself with an industry leader you can ride the success of their marketing, reap the advantage of their product technology, and gain advantage of their tested markets. These companies seek to carve a niche of their market by stepping up or down the Buying Hierarchy and offering a value to their niche that the leader does not. Dell initially competed on parity (as far as product offering) by building computers as just as good as the next guys. Arguably, Dell maintained this follower status – closely watching Compaq and IBM’s product offerings – for much of the 1990’s. One crucial aspect of parity is to ensure that your product offers

⁴⁰ From Sharon Oster, “Modern Competitive Analysis,” Oxford University Press, 1999, Table 16.1

everything that customers expect of the market. A failure to have a product attribute the niche expects would cause a flight to someone else's products.

6.3.3 Economical ~ it works but can we get better?

Traditionally, companies that compete on Economical Product offerings seek to reap "economies of scale" (the more we make the cheaper our average cost will be) or "economies of scope" (synergies of producing two different products). The first relates well to manufacturing since the capital equipment used to produce one product could be used to produce 1000 products making the average costs decrease. This is also heavily reflected in buying power and has a large role in the electronics component supply business. Suppliers of circuit boards centralized distribution in China and buy large volumes of components at a discount for resale to computer manufacturers.

Economies of Scope are focused on using existing assets to leverage into an additional product type. An example from Dell that has worked out very well is their venture into servers. Dell used their well-received brand name in the personal computer market to leverage their server offerings. Additionally, much of the systems integration, assembly, and test knowledge and expertise used to make personal computers translates well into server production.

6.4 Example: Tying Importance and Innovation together

If the feature is essential to the Customer and Dell is a driver for the feature than Dell is "In the Money!" Supposing the advantage is defensible (i.e. hard to duplicate) then Dell has a competitive strategy that will enable high margins. Consider Figure 6-2 which is the Customer Experience Matrix. This matrix manages the interface between how the customer feels about the product or feature and the company's perception or strategy for the product.

The general idea – for companies seeking high margin differentiation - proposed by the Matrix is to develop strategies and products that will place them in the upper left hand

corner where products are essential to the customer and companies are seeking an innovation strategy supported. An example follows⁴¹.

Dell Computer Corporation had a bear of a problem when they first entered the personal computer market. When Michael Dell moved from “face-to-face” orders to phone sales the market balked. Many of their competitors thought Dell would not be able to sell computers to complete strangers who had never seen the product over the phone. Additionally, their opponents felt most customers were not computer savvy enough to pick and choose their own configuration. On the matrix below, this position of having a selling process was discriminatory with customers (they did not desire it) and economical with Dell (cheapest way to get the product out) puts them in the lower right corner – a difficult position for differentiation (and thus margin) but ok for outsourcing. A further note is warranted, because customer view this as “discriminatory” Dell should watch to see if the technology or process will improve the attribute and elevate it in the eyes of the customers.

Dell did two things to improve their position. First, in order to move from discriminatory to indifferent in the eyes in the customers, they offered a “30 day money back guarantee.” The risks were mitigated by Dell who offered to take back any problem units. This put their “factory ship” model on par with the industry’s channel making customers indifferent. Secondly, Dell bulked up their sales organization to offer advice to their customers and help them customize their computers. This was a move from an economical position to parity to place it on the same footing as the larger, channel-selling PC makers.

The last move was to make custom configuration a major part of the buying experience. Dell marketed the “Dell Direct Model” moving from a niche of folks who knew computers well enough to order their own, to mainstream buyers who were looking for the latest options and personalization. Customers knew that they could get what they wanted from Dell exactly how they wanted it and began to think of doing business this

⁴¹ Taken from Michael Dell, “Direct from Dell,” Harper Collins, 1999

way as “Essential.” Dell was able to maintain this innovation because of their hard to imitate culture and the heavy barriers for the big computer makers to abandon their channels. Today, Dell continues to reap higher margins of their Dell Direct Model that is innovative and essential.

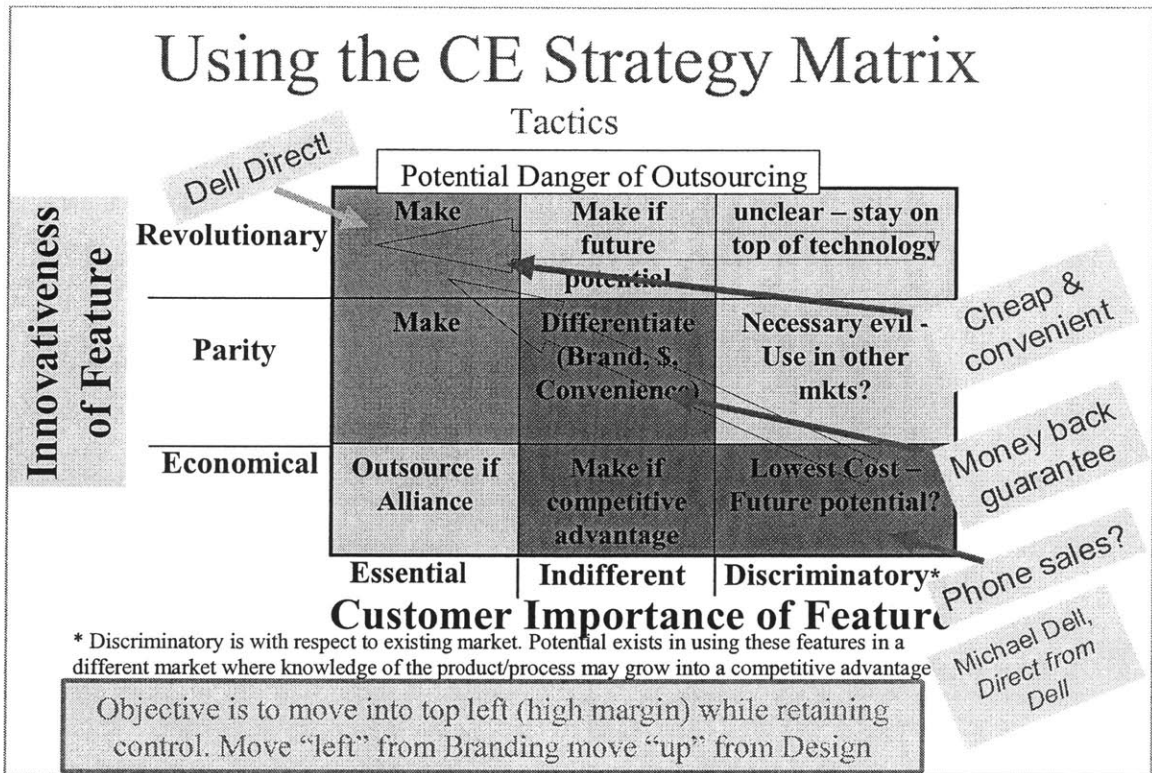


Figure 6-2 Dell Direct Model Applied to the Customer Experience Matrix

7.0 Tech Clockspeed ~ How new product introductions and process changes affect decisions

7.1 Clockspeed

Understanding the Clockspeed of your organization is one of the most crucial aspects for deliberating a Make/Buy or outsourcing decision. By making an analysis of how fast your products, processes, and organizations move you can determine what is important to your firm, how capabilities are transferred, and how likely you are to become dependant on another company. Clockspeed is divided into three areas of assessment Organizational, Product, and Process Clockspeed⁴².

The nature and study of Clockspeed is helpful to determine which part of the business is changing the quickest and if the organizational Clockspeed is sufficient to capitalize on changes in products and processes.

7.1.1 Organizational Clockspeed

This relates how frequently a firm reorganizes itself to take advantage of opportunities. Dell has an extremely fast organization Clockspeed. So fast in fact, that an organizational chart is hard to come by and actually safeguarded if one is produced. Restructuring the organization around product lines and new initiatives is a way of life. Compare Dell with the US Army who, until the latest Force XXI initiative had not seen a major restructuring since Vietnam; when the change was made from large scale ground combat in division-sized elements to air mobile, self sustaining platoon and company sized elements. It would be safe to say that the Military, steeped in tradition and a hierarchical structure, has a very slow organizational Clockspeed.

7.1.2 Product Clockspeed

Product Clockspeed relates to how quickly a product is changing in the marketplace. This can be the result of companies pushing technological improvements or from customer

⁴² See Fine, "Clockspeed"

demanding more and pulling successive innovation. Additionally, products can improve on any of the criteria of the Buying Hierarchy.

Allow a presentation of product clockspeed graphically. In Figure 7-1, there is a comparison of processor and chassis clockspeeds. The clockspeed of a Dell chassis is relatively slow; there have been few releases of these products with little innovative improvements between releases. Conversely, the processor clockspeed, following Moore’s Law, is very fast with multiple releases having a great deal of incremental improvement in a short span of time.

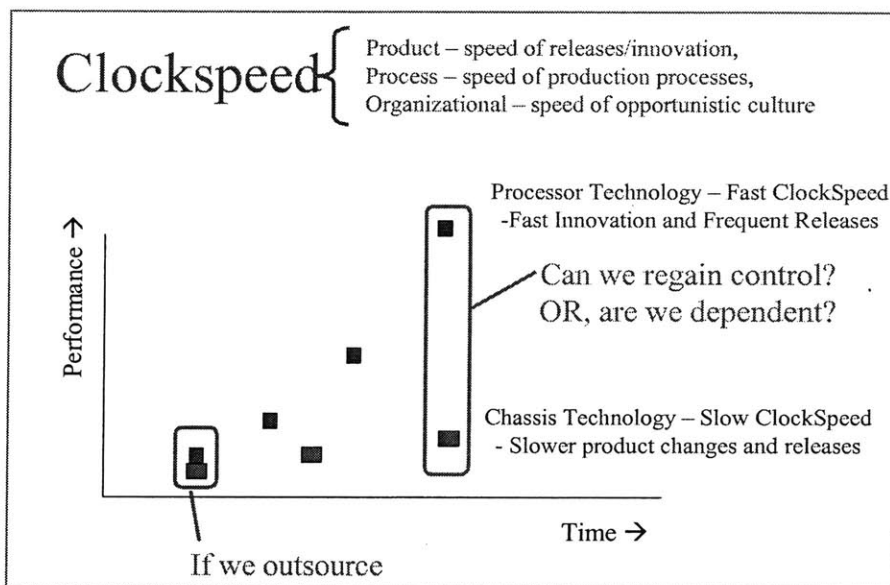


Figure 7-1 Comparison of Product Clockspeed

7.1.3 Process Clockspeed

The Process Clockspeed necessary to produce a part can is necessary to consider separately. It is possible to have a process change very frequently with a product that does not change frequently. Here, the argument is that the Product Clockspeed is independent of the Process Clockspeed. If the competitive advantage is in the production of the product more so than the actual product itself (which is the case in most “low cost commodity” scenarios) then the process used to manufacture the part may be change quickly to take advantage of innovate manufacturing techniques.

This is not to say that Product and Process Clockspeeds are completely unrelated – only that their independence is a possibility. For some capital-intensive products, such as semiconductor processor fabrication, it makes sense that the Process and Product Clockspeeds would be more aligned since the production of a new chip typically means a new process is needed.

7.2 Dependency for Knowledge.

If outsourcing products means an outsourcing of capabilities, then it stands to reason that a consideration of dependency on those outsourced capabilities should enter the analysis. This dependency can be broken into Dependency for Knowledge and Dependency for Capacity.

The first, Dependency for knowledge, is undoubtedly worse. If a firm decides to outsource a product to a supplier, the knowledge required to make the product (categorized as *Manufacturing Dependency* in this model), and the knowledge required to upgrade or improve the product (*Innovation Dependency*), as well as the knowledge required to distribute the product (*Supply Chain Fulfillment Dependency*), is lost. Control over the products production processes is also lost. In industries such as automotive, where the process required to produce the product is as important as the product itself, loss of control of the product and process could have serious impacts. Consider a product that is outsourced and then sold by the parent company. Because the parent is the main revenue recipient, it is liable for the end product. This is as true with the FDA regulating drug manufacture as it is for the EPA regulating waste emission guidelines and mandatory returns (in Europe) for environmental concerns. These control issues are worsened for products with very fast Product and Process Clockspeeds.

First hand knowledge of the product is essential to maintaining high quality and knowing how to improve the product with customer preferences. A strategy based on producing exactly what the customer desires, such as Dell's Direct Model, is based on knowing what can be efficiently and effectively produced in the factory. The greater the distance (e.g. geographically, culturally...) between the manufacture and the customer, the more difficult it is to control the features that impact the customer most.

Additionally, in a market that progresses towards low cost manufacture, knowledge of low cost manufacturing processes is crucial to survivability. Dell is undisputedly the low cost producer of PCs largely because of the focus and control of their manufacturing⁴³. The incremental improvement in their processes over time is a direct result of their knowledge of the process. Outsourcing manufacturing activities to third parties can diminish learning and capabilities to produce products competitively.

7.3 Dependency for Capacity

Dependency for Capacity is a somewhat better situation than Dependency for Knowledge. It assumes that the knowledge required to design and produce the product is known, however the capacity or the plant space, machinery, or labor is not on hand to produce it. This could even potentially be a favorable situation for a cyclical industry, such as aerospace, where a company builds their plants sized for a certain amount of capacity and plans on contract manufacture carrying the burden of the oscillation of demand. In this scenario, The Firm is dependant on the supplier for *production fulfillment*. There are two additional factors to consider when assessing Dependency for Capacity namely *asset specificity* and *capacity advantage*.

Assess specific relates to the use of the production or transportation capital. All other things being equal, the more specific the assets to the product (such as semiconductor manufacture processing to a particular processor) the more likely the company will defend their capital with pricing and promotions. How does this relate to outsourcing? Well the more expensive and the more specific the assets are to the feature being considered for outsourcing the less likely Dell would be to purchasing those assets once it has been outsourced.

Consider a heavy tooling charge for a new part for a laptop. Supposed the die needed to produce the part is very expensive and a firm is deliberating whether to make the part themselves or to buy it from a vendor. Should they decide to outsource it, their supplier would purchase the expensive capital and would not be able to use it for anything else. It

⁴³ Michael Dell, During a Presentation to the MIT Sloan School, September 26, 2002

would be unlikely that The Firm would buy their own expensive equipment and bring manufacture back inside should they have problems with the supplier. The capital is just too expensive and the supplier would have an incentive to drop their prices to avoid low utilization of their equipment.

Capacity advantage arrives from having control over the assets used to make the products, this could arise from location, from the learning required from using the equipment, and the close proximity of customers (distribution advantage).

Once these three factors, Production Fulfillment, Asset Specificity, and Capacity Advantage have been taken into consideration, it would be possible to make an accurate analysis of The Firm's potential for Dependence on Capacity.

7.4 Example ~ How Clockspeed and dependency work together

Why is Clockspeed so important to outsourcing? The decision “to buy” means outsourcing capabilities as well as products. If the process necessary to make or develop the part is developing very quickly then it may be difficult to bring those activities back inside the plant and make them “in-house” should it be necessary to regain control. Consider our example in Figure 7-1, if Dell decides to outsource the slow Clockspeed chassis, they could go years with producing them and still bring them back inside with too much interruption. However if Intel decides to outsource part of their processor fabrication, which have a very fast Clockspeed, it will be very difficult for them to stay on top of the increases in technology should they decide to regain control of manufacture later.

This is further exacerbated if The Firm develops dependency for knowledge (and to a lesser extent capacity) on the supplier. The faster the Clockspeed and the greater the knowledge needed to produce (Process Clockspeed) or develop (Product Clockspeed) the higher the potential Danger of Outsource of the feature.

The Strategic Matrix for Clockspeed and Dependency, Figure 7-2, ties these together. Processor fabrication would be located in the top, far right cell showing a high potential danger of outsourcing while chassis are shown in the bottom, far left cell with a low

potential danger of outsourcing. Given this analysis Dell's decision to outsource chassis would be more favorably than Intel's decision to outsource a segment of their processor production.

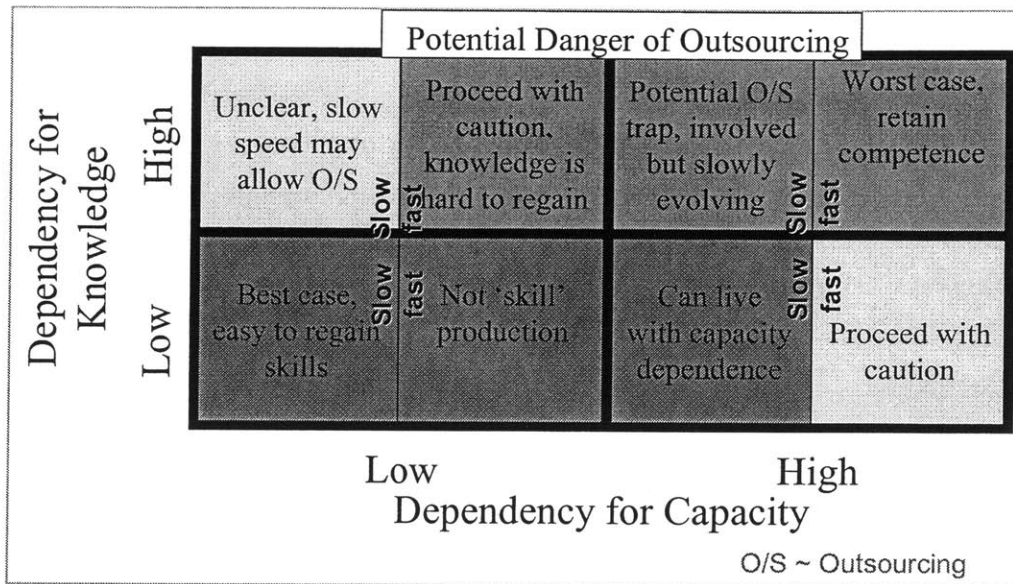


Figure 7-2 Clockspeed and Dependency Strategic Matrix

8.0 Competitive Position ~ Know ourselves - and try not to give it to the suppliers

“Before companies put their assets into play, they must put them in order.”

~ Steve Schwarzwaelder, “Make or Buy”, McKinsey Quarterly 2001

The purpose of Competitive Position Analysis is to determine if The Firm is giving away the “secret sauce⁴⁴” along with their outsourcing. This approach here is to determine if the feature intersects anything that is a competitive advantage for Dell, if there is a transfer of capabilities to the supplier, and if the supplier has the ability to form a competitive advantage of their own.

This is implied to be a defensive move: to keep the supplier from developing capabilities that The Firm desires to remain exclusive. This analysis would help enable them to determine if the supplier would have anything to gain from the relationship. If so, then the program managers making the decision could decide to make it in house or seek a less formidable supplier.

Of course, this could also work offensively: the supplier has capabilities that The Firm is interested. Therefore, a relationship is sought that will transfer those capabilities from the supplier.

8.1 Assessment of Dell’s Competencies

In determining the core competencies of Dell it was necessary to talk to many managers using the VRIO framework⁴⁵. This becomes especially difficult when the core competency is with respect to the feature being considered for outsourcing. An easier way of thinking about this however arrives from discovering the end result of the

⁴⁴ Here, “secret sauce” is a term borrowed from the fast food industry. The sauce embodies the competitive advantage (the sauce) of The Firm that we would like to keep secret from our competitors.

⁴⁵ The VRIO framework was promoted by Jay Barne and uses a line of questioning to determine core capabilities: is each Valuable, Inimitable, Rare, and does the Organization ripe to take advantage of their core competency. See Barney Jay, “Gaining and Sustaining Competitive Advantage,” Prentice Hall, 2002.

competences and speculating how the feature impacts it. The five areas of competency are evaluated in this model are:

- Economical Advantage
- Production Advantage
- Brand Management Advantage
- Information Technology Advantage
- Distribution Advantage

8.1.1 Economical Advantage

Here, an *Economical Advantage* is described on a macro level as being one that generates:

- Volume to enable economies of scale (costs decrease when buying in bulk),
- Access to a large number of customers (enabling cheaper market access),
- Continually decreasing costs as one progresses along the learning curve (making products gets cheaper as we learn how to make them better), or
- Product diversity generating economies of scope (access to many different products that benefit learning or parts sharing).

This type of advantage is crucial when developing and distributing products in a commodity business as it tends to dominate the other types of advantages. Additionally, Economical Advantage reinforces itself: volume leads to economical advantage, which wins more volume and so on.

8.1.2 Production Advantage

A *Production Advantage* can arise from having the cheapest cost structure, from having a low inventory position, from flexible manufacturing, from the right balance of labor and automation, or from having a motivated workforce. Also included here are some perks of a production advantage such as Time to Market and providing a high quality product.

8.1.3 Brand Management Advantage

Brand Management describes our ability to market Dell products to the consumer in a favorable manner. Having large access to consumers makes Dell desirable for suppliers while conveying positive information of the quality and performance of our products helps to create a desire for Dell products.

8.1.4 Information Technology Advantage

Having a sound information technology (IT) presence is the backbone that enables Dell to respond quickly and control costs giving them an *Information Technology Advantage*. Providing customer information to all parts of the organization and select suppliers allow the virtual company to act as a whole. Also, using the web to segment information and deliver it to the correct parties when they need it is a major (and expensive) part of IT.

8.1.5 Distribution Advantage

Delivering the product to the end user in a timely and cost effective manner could be a *Distribution Advantage*. Wal-Mart does a very good job with channels while Dell does a good job without any formal channel at all. If the feature caters toward a channel's distribution system then it could reinforce Dell while, if it does not (i.e. immediate fulfillment) then it would be in line with Wal-Mart's distribution model.

8.2 Transfer of Capabilities

Once it has been determined what Dell's competencies are for the feature, it is necessary to determine if they are transferring this ability to their suppliers. This transfer could take place via a *Capital Transfer* or a *Knowledge Transfer*.

8.2.1 Capital Transfer

Capital transfer is the conveyance of assets to the supplier in order to increase their production ability or systems integration ability. This can take place via machinery or finances. It is important to note that the actual delivery of machinery (or the like) from

the Firm is not necessary for a capital transfer. As there could be a transfer if they mandated the capital used to produce the product.

8.2.2 Knowledge Transfer

Knowledge Transfer of information transfer is the conveyance of information to the supplier in order to increase the production ability or systems integration ability. This can take place via training, design help, process help, or "loan" of onsite Dell employees.

In the assessment, the distinguishing factor between Knowledge and Capital transfer is how the transfer itself is taking place. If The Firm is transferring capabilities to the supplier directly then there is a *knowledge transfer* taking place. If the Firm is providing assets for the supplier to learn how to use it themselves (and potentially reverse engineer) then there is a *capital transfer*. In most situations there would be a combination of the two to develop the supplier and bring their capabilities up the level needed by the Firm. This combined transfer has been a common process for Toyota when developing their supplier base in the United States⁴⁶.

8.3 Supplier's Competencies

The assessment for the supplier is similar to the assessment used for The Firm. The intent is to determine if they currently have the capability or if it is necessary to develop their abilities. Taking this one step further is the need to determine if the supplier has the organizational abilities, market access, and drive to use the invested skills and opportunity to turn the invested abilities into their own competitive advantage. Every outsourcing decision should begin with a thorough evaluation of the supplier's competencies.

⁴⁶ For an example of transferring culture and learning amongst firms, I would direct the interested reader to Robert W. Hall, "The Americanization of the Toyota Production System," Association for Manufacturing Excellence, 1999.

8.4 Example ~ Potential for Supplier to Form Their Own Competitive Advantage

This example ties together the entire assessment for Competitive Position. Consider the hypothetical example of Dell deciding to outsource the integration of their internal peripherals to a third party, MITtech. MITtech already manufactures the chassis for distribution to China – where MITtech is located.

Following the Competitive Position flow chart of Figure 8-1, the first step would be to determine if this is a core competency for Dell. At first take you may think not and would be inclined to “Let them have it.” However, for the sake of this example let us assume that Dell’s control over the integration of this chassis and components allows them to have a production and information technology advantage – allowing Dell to build Configure to Order (CTO) better than their competition.

Next, we ask if Dell is investing resources to develop the supplier. Here let us assume that they are. If they were not we could outsource it and “Proceed with Caution.” But since MITtech does not have the IT infrastructure necessary to take online orders, convert them into parts orders from the Bill of Material, and get the correct parts to the build cells efficiently. Therefore Dell must invest IT and production resources in MITtech and we proceed to the third step.

An analysis of the supplier to determine their capabilities allows us to determine if they have the ability to turn this opportunity into their own competitive advantage and become a rival. Couple this with their ease of market access in their country (the one for which the Dell product was developed) and their low cost material status and there is potential for Dell to develop them into a competent competitor.

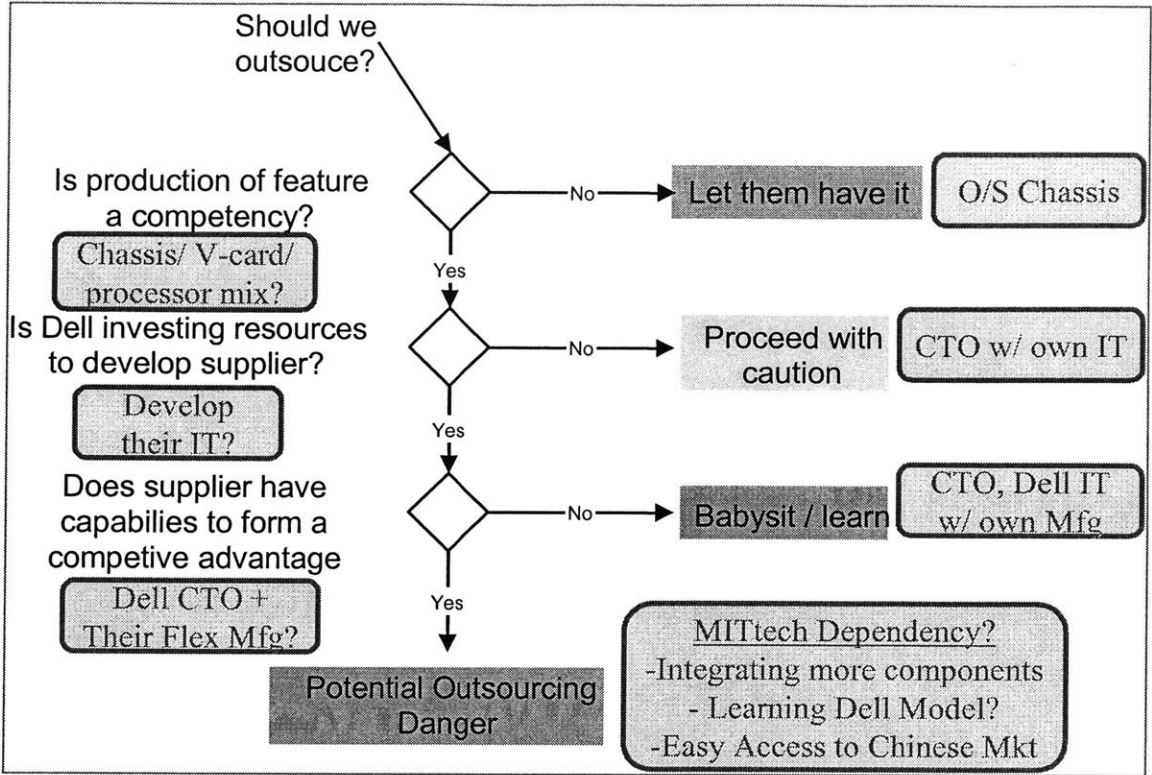


Figure 8-1 Competitive Position Strategic Flow Chart

9.0 Supply Chain Excellence ~ Becoming and staying the 500lb gorilla

An astute assessment of an outsourcing decision should always begin with the motivation behind the decision. Questions should be asked such as: “Why would another company be able to make this cheaper or better,” “What is the major reason we are considering outsourcing?,” “What long term purpose does outsourcing our decision serve,” “Is it cheaper and easier for our firm to manage a supplier-partner relationship than to improve our own internal processes?,” “Is the supplier able to seamlessly integrate into our supply chain?”

The inability to fully answer these questions could mean disaster in the long term. This section serves to answer these questions revolving around the supply chain circumstances to ensure outsourcing the product does not turn into outsourcing market power.

9.1 Assessing the Supplier

Assuming that the decision is determined to outsource the feature, the next consideration should turn to the proper supplier for the outsourcing. Dell has a methodology in place to do assessments for their suppliers called the Supplier Online Scoring Automation tool (SOSA). This is the process where the suppliers are rated on a set of criteria to provide feedback on their performance. This section of the strategic outsourcing model uses a similar approach, however it is a level more abstract than the SOSA.

The supplier must be ranked on their ability to provide quality products, their cost leadership, their technological developments, their ability to maintain continuity of supply, and their supplier infrastructure.

9.1.1 Supplier Quality

The supplier must be able, or at the very least, be willing to improve their quality. High quality is a basic tenant for most manufacturers, and is even more important for companies considering outsourcing. This means they must be able to provide quality data

when asked, have continued performance improvement, and react quickly and responsibly to problems. A key component for quality control with outsourcing is to give the supplier responsibility for their quality. One method that was used at Dell was to give the supplier the responsibility for servicing the product. This ensures that they have an incentive to maintain high quality standards or they will encounter high service costs.

9.1.2 Cost Leadership

As products progress along the Buying Hierarchy (discussed in Chapter 11.1.1) they trend toward cost competitiveness. Because this is where Dell and other high volume, discount companies reap a large portion of their profits, it is necessary to have supply chain partners who have their costs under control. These suppliers should be continually working on lowering their costs, seeking economies of scale, and obtaining buying power to lower material costs. In addition, they should be striving to get their production processes under control to lower their transformation costs. It should not go unmentioned that the supplier should be making intelligent capital and spending decisions. The model takes these and other cost questions into consideration.

9.1.3 Technology

Dell strategy is as a technology integrator as opposed to a pure leader on technology, however the technology of their supply chain partners is a big part of their business plan. Their Direct model and quick Clockspeed allows them to be first to market on performance and high technology products. This makes Dell a very favorable company to work with for companies that make their bread and butter on innovation and who are accustomed to winning a great deal of their products revenue during the introduction.

Suppliers of companies who invest in their knowledge base and have a good track record of innovative, high quality products are favorable for Dell to outsource. These companies give Dell a great deal of market power, bring high performance product seekers to their web page, and bring in a great deal of revenue.

9.1.4 Continuity of Supply

This tenant is simple in theory but difficult in practice. Choosing suppliers that have a well defined supply base and quick reaction times to market disturbances is crucial for a lean company that does not carry large inventory buffers. When the longshoremen of the International Longshore and Warehouse Union (ILWU) had a 10-day in October of 2002 the repercussions on the factory were far reaching and damaging. Goods sat on the dock and on ships waiting to be unloaded causing a hiccup in the supply chain⁴⁷. Dell's supplier relationships and quick thinking enabled them to offer supplemental goods on the web and create incentives for customers to switch to products that were not disrupted. Picking the right suppliers made an impact also. Those with negotiation power were able to persuade the Pacific Maritime Association to unload their goods immediately to bring their products to market and maintain continuous supply with Dell.

Other factors to consider are the supplier's inbound and outbound logistics, their manufacturing response time (ability to meet fluctuations in demand), their production capacity, their cash flow, and their profitability. Many of these deal with a supplier's

⁴⁷ CNN.com, "Tentative deal in shipping dispute," November 24th, 2002

ability to be responsive from a manufacturing standpoint. The last two are financial and reflect their ability to remain in business, secure monies needed for upgrades, and react to disruptions. Any one of these factors could put the supply chain at risk should a market disruption occur.

9.1.5 Supplier Infrastructure

For a company that relies a great deal on their technology infrastructure, their information technology and communication, and their physical infrastructure, supply chains and logistics, it is imperative that the supplier integrates seamlessly. Consider a Dell joint relationship with a major data storage company (let's call them MDSC) who operates with a large channel stuffing logistical model (see Sidebar 3-3 Learning from Insourcing for background). Typically, Dell – who has a very automated information tracking process - has a very good idea of demand via their website and call centers, of process metrics via their internal IT tracking, and of quality metrics via their disciplined use of reporting. However, MDSC – who has a manual information tracking process - did not have the impetus of fulfilling orders in “Dell time” and were not tracking (at least not passing on) this information to Dell leaving the company “in the dark.” Dell customers typically would be able to keep abreast of their orders via the Dell tracking process but were unable to get this information with the “partnered” products. This was especially problematic for understanding failure modes and quality metrics for Dell who was responsible for carrying service parts per the contract.

9.2 The Right Relationship for the Right Outsourcing Role

Supplier relationships can be very resource consuming in both time and money. As such, it is only fitting that the proper supplier relationship matches the feature being outsourced. It would not do to have a very superficial relationship for a product that requires a lot of interaction and fiscal involvement, nor would establishing an involved relationship for a part or feature that does not require much more information than volume and price. These relationships have been segmented into three main types and are listed and discussed below: Each of these is discussed in turn and are assessed using Figure 9-1, The Supply Chain Excellence Matrix.

Additional work has been done at General Motors on balanced sourcing. Timothy M. Laseter has pioneered this work in his book “Balanced Sourcing: Cooperation and Competition in Supplier Relationships”⁴⁸.” Laseter breaks down the sourcing relationship into four quadrants based on Commitment to Cooperative Relationships and Commitment to Competitive Pricing. A highly cooperative, Highly competitive pricing relationship is “Balanced” where a low cooperative, highly competitive pricing relationship is “Darwinian.”

The “Balanced” situation relates well to what is specified here as an Alliance partnership whereas the “Darwinian” sourcing would relate well to the Dependant or the Point use scenarios depending if you are the recipient or the holder of market power. His argument for the “Low Competitive Pricing” sourcing cases does not work well here. Dell - and every other profit-seeking company for that matter - is very interested in Highly Competitive Pricing.

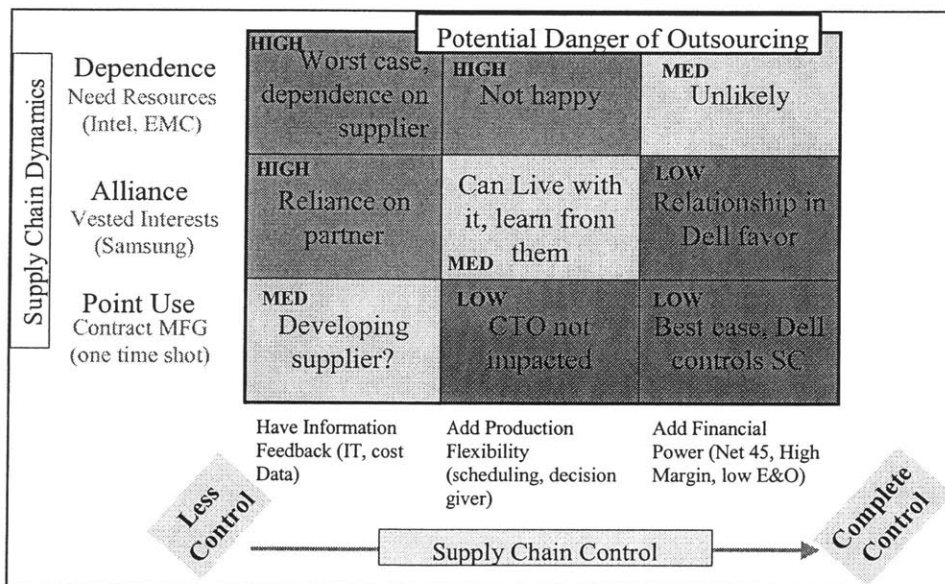


Figure 9-1 Supply Chain Excellence Strategic Matrix

⁴⁸ Timothy M. Laseter, “Balanced Sourcing: Cooperation and Competition in Supplier Relationships,” Jossey-Bass Publishers, 1998

9.2.1 Dependence

These are relationships for which The Firm has a great deal of need for the supplier's resources. There could be dependence on capacity or for knowledge as discussed. A good example of this relationship for Dell would be Intel. This company produces the processors currently used in 100% of Dell's computers. They have a great deal of market power and are a decision giver. Therefore, Dell is dependent on Intel for product development and delivery.

9.2.2 Alliance

Alliance relationships are those with whom The Firm has vested interests. It is a symbiotic relationship in which the products and services of one aid the growth of the other. A good example is the WinTel dynasty. As Intel processors speed improved Microsoft was able to write applications (e.g. Windows) that taxed these processor's performance thereby creating a need for faster processors. The inverse demand relationship is also true.

9.2.3 Point use

These relationships require very little monitoring and transactional "grease." The importance information such as price and volume, when and where to deliver is conveyed and the deal is closed. It is not anticipated that either company has any other interest in the other beyond this "one time shot" transaction.

9.3 Assessing the Control of the Supply Chain

Every company desires to be the 500 lb gorilla in their supply chain dictating their will to the weaker players. Porter's "Five forces"⁴⁹ are based on this fact and used by companies in repeated "games" as the bid for power ebbs and flows from one partner to the next. Outsourcing is an additional enabler to the Five Forces and can provide or relinquish

⁴⁹ Michael E. Porter, "Competitive Strategy: Techniques for Analyzing Industries and Competitors," New York Free Press, 1980

market power based on the capabilities they sow or send off. One way to determine the health of an outsourcing relationship is to look at the symptoms of the supply chain control. This allows an estimated prognosis of the power of the relationship that can be broken into three main areas of increasing supply chain power: Information Feedback, Production Flexibility, and Financial Control. These are discussed below and also listed along the horizontal of Figure 9-1.

9.3.1 Information Feedback

Information is crucial to making timely decisions – especially in a fast Clockspeed environment trying to react to customers and market forces in next to “real time.” As the lesser of the three supply chain power descriptors, *Information Feedback* is barebones minimum in a relationship and typically the weaker party (with only Information Feedback) would not favor outsourcing.

This can come from upstream in the form of pricing, production, and logistical data, or can come from downstream in the form of demand data and customer preferences and reactions to the product. For Dell, this is a crucial aspect. In order to deliver products in “Internet Time” is important to know where orders are in the production process. This gives customers peace of mind and allows Dell to respond quickly to operational problems.

9.3.2 Production Flexibility

Next in line and affording more supply chain power than *Information Feedback* alone is *Production Flexibility*. This is the ability to dictate changes in production (what will be produced, how to produce it, and when to ship it) and logistics to the supplier. Having this power increases the ability for The Firm to react to changes and maintain stability for their own operations. In the event of the aforementioned Longshoremen Strike, this was a crucial factor in using influence with suppliers to provide parts with Dell priority.

Companies who exhibit *Production Flexibility* in their supply chain can buy themselves some wiggle room (by demanding their materials be given priority) and position

themselves as market leaders by providing their suppliers with some differentiated asset. An example for Dell is their superior “Time to Market” time. Dell can get new products to market faster than their competitors which gives suppliers with high performance components (such as video cards) an effective outlet. Since this is when the lion’s share of the margins are “won” for a performance product TTM is highly desirable. However, use of this market requires access to Dell’s customers making Dell in an idea position to be a decision giver in production.

9.3.3 Financial Control

Finally, and with complete control of the supply chain, is Financial Control. The Firm with financial control is the 500-lb gorilla. These Firms reap high margins, receive a bulk of consumer surplus, push their excess and obsolete parts (typically due to end of product life or product changes) onto their suppliers, force others to hold their inventory, enjoy a substantially negative cash-to-cash cycles (otherwise known as Net45, or “float”)⁵⁰ and otherwise enjoy premier supply chain status. Every company seeks to be here.

9.4 Example ~ MITtech II, They’re back and stealing SC control

Consider Figure 9-2, The Supply Chain Excellence Strategy Matrix, applied to our theoretical company MITtech with the intent to allow them to produce a simple, yet visible, piece of our products, the chassis.

An initial assessment⁵¹ of the potential supplier may reveal that they have an adequate production structure, a willingness to learn, good quality, however they have poor production control, information technology, and poor access to the customer. The opportunity here for Dell is rather clear: getting an enthusiastic producer who can provide quality products and integrate them into Dell’s production control system. Threats are

⁵⁰ This is typical of companies that receive payment when the product is purchased and pay their suppliers for the product 45 days later.

⁵¹ A modified SWOT framework would be a potential analysis tool from the outsourcing companies perspective (*Strengths* ~ what are the companies strengths? *Weaknesses* ~ what are the companies weaknesses? How do these lead to *Opportunities* for us (i.e. using Intel best in class processors to promote our products)? How do these lead to *Threats* to us?).

difficult to ascertain, however a fundamental threat is that of the supplier taking over the business of that which they have been offered a piece.

An analysis of our supply chain control and our best supplier relationship for the outsourcing relationship shows us to be in the lower right corner of Figure 9-2. In this box we have a “point-use” relationship and we have complete control of the supply chain.

Supposing that MITtech performs admirably, we decide to give them more work and offer them the integration of the motherboard (an obviously crucial piece of the product and one that can have dramatic impacts on the usability of the product). MITtech gladly takes the work and proposed to put their engineers to work to integrate other peripherals on the motherboard (modems, videocards...) based on Dell’s customer needs. This obviously requires some customer visibility, product development visibility, and relational investment. Also the increased production volume and complexity means a loss of supply chain control in order for MITtech to optimize their operations. The Supply Chain Excellence matrix shows this movement to “Alliance” relationship and movement to “Production Flexibility.”

It is unlikely that MITtech will be comfortable with their current position and will seek more responsibility, say, adding their own low cost components in addition to integrating the motherboard, and manufacturing the chassis. It is also probable that they will have to develop a capable configure to order (CTO) manufacturing system to deliver the most value to Dell. Opening their services to other computer manufacturers will give them lower material costs (through volume buys) further reducing their costs and increasing their attractiveness. Combine this with the market trend of “commoditization” of personal computers, and it is likely that Dell would have to relinquish more Supply Chain control and we find ourselves in the upper left box on Figure 9-2 which is the most undesirable for outsourcing.

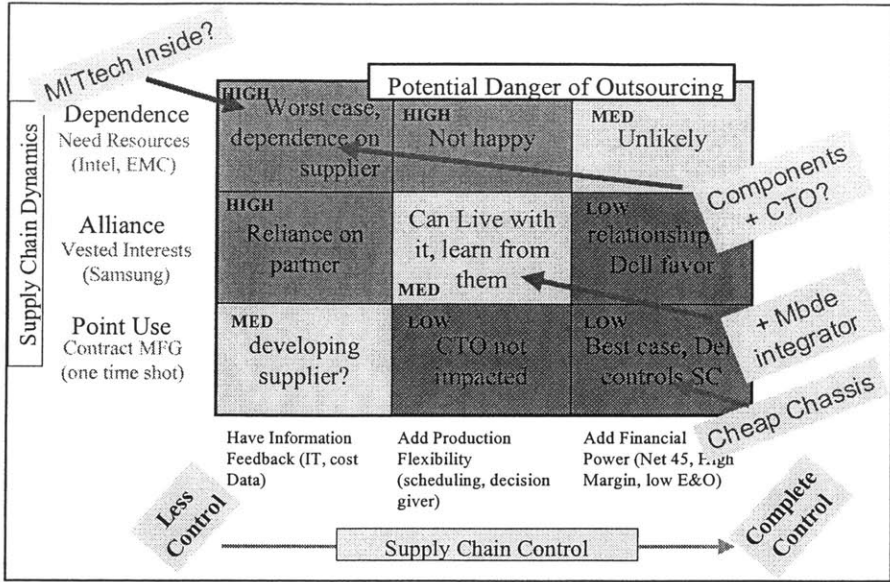


Figure 9-2 MITtech, Developing Supply Chain Power

10.0 Product Architecture ~ Determining if it is technically or
physically possibly to outsource

“Dell is a technology integrator, as such; the architecture of the industry must be modular enough to allow for standardization and commoditization.”

~ Kristie Burnham⁵²

This chapter on Product Architecture focuses specifically on the feature being outsourced. It is an inward look at the product to assess whether or not it is physically possible to be outsourced. This is determined by looking at the maturity of the feature and the potential for supplier dependence should it be outsourced. These are intertwined; the less mature the feature is the more capability (in the means of product/process knowledge) the supplier must have to produce it. The more capability the supplier has to produce it, the more potential there is for The Firm to become dependent on those capabilities of the supplier.

Additionally, and we believe separately from *Maturity*, are the interdependence between the Complexity of the feature and the Co-development of between The Firm and the supplier. Why are these separate? Because maturity and complexity, while related, are fundamentally different. A product could be immature and complex (i.e. Nano-technology applied to sound diagnostics) or mature and complex (i.e. micro-encapsulation of ink for carbonless paper). What we would like to capture here is the difference categories of products and the affinity for a company to be involved with the development of complex products for the sake of integration and control. The overall

⁵² Kristie Burnham, LFM Thesis, “Developing a Server OEM Strategy During Technology Commoditization” Massachusetts Institute of Technology, June 2002.

assessment is based on the premise of “Not outsourcing if we do not understand the product⁵³”

10.1 Assessment Of Feature Maturity (standardization and modularity):

The maturity of a feature is dependent on two factors. First, the classical sense of maturity – the time that the product has been on the market - leads to standardization. This is important to determine because it gives the relative idea of the novelty of the technology, how many producers are likely to have the capability to produce it, and, the amount of market power the producer is likely to have (if it is new and innovative). This last point becomes more of an issue if the feature is a fast *ClockSpeed* product. An additional argument states the more mature a feature the more standardized it has become enabling other companies to use these standards to produce the feature. These standards could be regulatory, an industry standard, or a de facto standard depending whether the impetus for the standard is the government, the industry, or the customer, respectively.

A graphical representation of feature maturity has been presented in numerous texts by the Commoditization Curve (not repeated here) that shows new, innovative products obtain higher margins than more mature, standardized products (commodities)⁵⁴.

The second aspect of maturity this model assesses and one that is crucial to outsourcing is the *Modularity*. Modularity is the ability to break a product into parts. The more modular a product is the more easily it can be divided and outsourced to outside companies and reassembled with loss of function, low cost, or quality. These interfaces among the adjoining pieces are typically standardized to facilitate their separability. Examples of very modular products include car parts and PC components (video card, joysticks, disk drives...).

⁵³ Of course this is ideal and dependent on The Firm’s capabilities. It is unlikely that Dell will enter the semiconductor business. However, methods of being involved with the development of the product should be sought and encouraged.

⁵⁴ For an in-depth discussion of the Commoditization Curve and its effect on outsourcing in the server business, see: Kristie Burnham, LFM Thesis, “Developing a Server OEM Strategy During Technology Commoditization,” June 2002.

Conversely, a product that is not very modular is said to be Integral. It cannot be easily separated without affecting its function. Design of integral products typically requires iterative development involving many different functions. It would be unlikely that a firm could buy parts “off the shelf” for an integral product and assemble them into a working product. Examples of an integral product would include: chipset architecture, airplane wings, or artificial hearts. The design of the artificial heart, for example, requires a great deal of design collaboration, physical interaction, and FDA regulation between components that makes outsourcing pieces to other companies prohibitive.

10.2 Supplier Dependence

Consideration on *Supplier Dependence* is a key issue when making an outsourcing determination. While outsourcing may be cheaper in the short term The Firm must reflect on the impacts of the supplier on their quality, their service level to the customer, and the transfer of market or supply chain power to the supplier who may demand more margin. Each of these is discussed below. Supplier dependence and feature maturity interactions are shown on Figure 10-1.

10.2.1 Quality Miss

Quality control is a challenge for every company. This becomes an even greater problem as portions of the product are being developed outside the immediate control of The Firm. It is important to assess how quality miss (our term for a quality problem with the feature) is seen in the eyes of the customer - would the quality of the feature be readily noticeable or would customers be indifferent. Additionally, if there is a quality miss, Who is responsible? What mechanisms are in place to remedy the situation? When will it be discovered? Where would the feature be fixed? Why would a third party expend resources to react as strongly as Dell would (this is largely an incentive question)?

A good example of this would be of our hypothetical company MITtech. Supposed Dell decides to outsource the product of the PC to this company for sale as a Dell-branded computer on www.dell.com. Additionally, this company services the PC as well as the repair. Now supposed the PC has widespread problems with catching on fire or failure to

“boot up” initially. For a third party company that does not have their name on the PC their only concern is continued business with Dell and reaping whatever revenue they can. For Dell, the concern and loss of welfare due to “bad press” would be horrendous. Surely there is a mismatch of incentives and responsibility in this case.

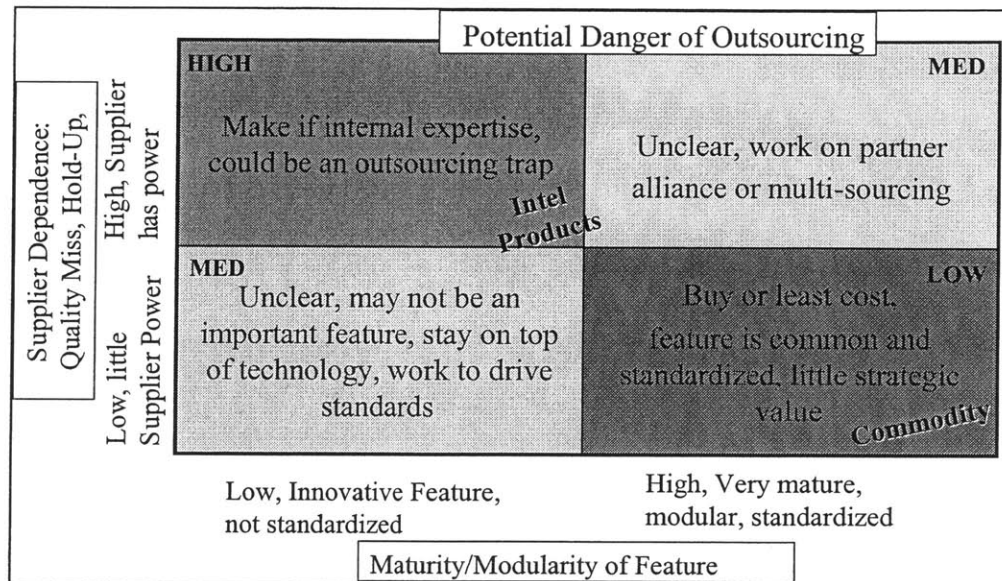


Figure 10-1 Product Architecture Matrix: Dependence / Maturity

10.2.2 Risk of loss of supply

Whenever The Firm brings another company into their supply chain, there is always the risk that they will not be able to deliver the require product. This risk increases when more responsibility is passed on to the supplier. Other times of increased risk are during a ramp up phase of a production introduction, the initial integration of the supplier into The Firm’s supply chain, and during shocks to the economy.

10.2.3 Hold Up

The market power or supply chain power of a supplier dictates how much margin they will be able to obtain at the negotiation table. The more power the more margin. For example: A powerful video card manufacture who was supplying cards decides they will “hold up” our production and to go to our competitor unless we agree to a higher price. We are at their mercy and will need to find the cash.

Other sources of hold up power include: high switching costs or a high specificity of the supplier to The Firm's supply chain (necessitating an costly integration of a new supplier), aggressive suppliers who integrate into other parts of the supply chain for more responsibility (e.g. dependence), and major differentiation of the product in the eyes of the customer.

10.3 Feature Complexity

Complexity deals with how difficult the product is to design, produce, manage, or deliver to the customer. Every company will have a different classification on what products complex to them. For Dell, complexity is defined as how close it is to "the core" or the processor. Features that are closer to the core are more complex, while features that are distant, or "peripheral," are not complex. The important consideration to make when assessing product architecture for outsourcing is the more complex a feature is the more difficult it will be to control (cost, quality, performance) that feature, the more capabilities will be required (or passed on) to the supplier, and the more dependent The Firm is likely to become on the supplier.

10.4 Involvement with Development

With regard to the above criteria for Product Architecture, *Involvement with the Development* is one tactic that can mitigate some of the dependency on the supplier. If the feature is immature and complex, becoming involved with the development can ensure that The Firm is both aware of the technology and possibly, can steer the development of in its favor. A good example is the development of LCD screens for outsourced procurement. When the technology was progressing, Dell wanted a design that would be more robust and favor their "configure to order" business (i.e. two instead of three hinge points). They worked aggressively with their suppliers (putting them in the bottom right quadrant of Figure 10-2) on the new design and developed a superior "de facto" standard that is now used with more laptop brands.

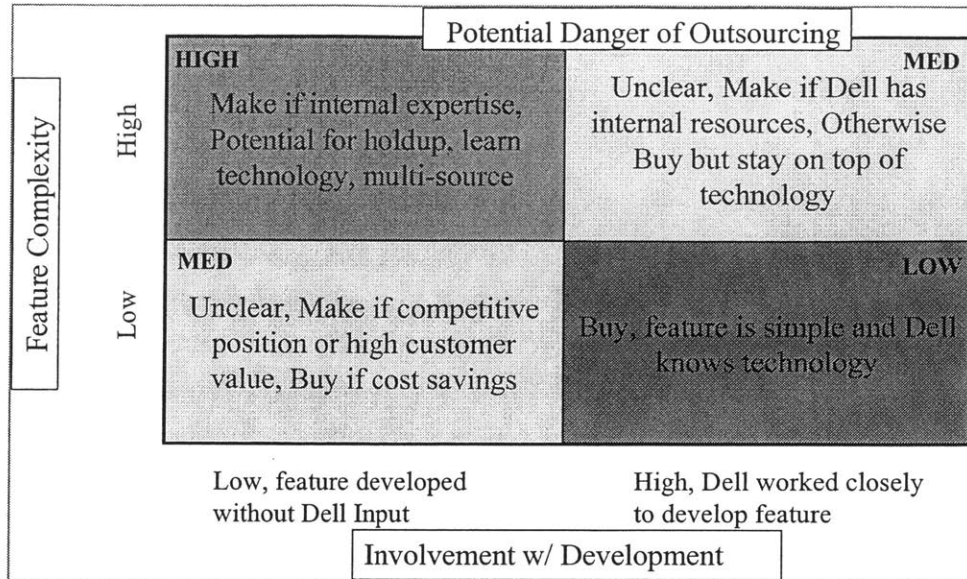


Figure 10-2 Product Architecture Matrix: Complexity / Involvement

This development can be broken into design development and manufacturing development to parallel the product development and manufacturing organizational structure of most companies.

10.4.1 Design Development

Analysis of the design development of the product seeks to place it in one of three categories: 1) completely designed by The Firm without outside input, 2) co-designed by The Firm and the supplying company, and 3) completely designed by the outside supplier without input from The Firm. All else being equal these are ordered in term of stronger to weaker positions for The Firm.

10.4.2 Manufacturing Development

The manufacturing development seeks to analyze the processes and the resources necessary to produce the product. If they are common to the industry then there is not an issue with outsourcing. However, if the processes or manufacturing resources are unique to The Firm then it is likely that the capabilities (and possibly supplier dependence) will need to be passed on to the supplier. An example of this would be Dell's superior ability to convey customer orders from the net into a manufacturing production schedule needed to produce products to meet a quick delivery time. Asking a company without significant IT

capability to produce components that will need to be delivered “just in time” to Dell’s Factory could require Dell to train them and possibly integrate them into Dell’s IT infrastructure.

11.0 Industry Climate ~ Industry Forces, future structure, and disruptions

“Technology is being commoditized and there is a refusal on the part of Intel and other people to realize how quickly this is happening.”

~ Hector Ruiz, CEO, Advanced Micro Devices⁵⁵

Industry Climate is potentially the one area most senior managers focus their efforts. It is the assessment and the decision making in this dynamic climate that Andy Grove discusses in his “Only the Paranoid Survive.” These dynamics, or rather the impacts of the dynamics on industries, are especially problematic for companies such as Intel and AMD, that require a large capital outlay to obtain the capacity needed to be productive in a demand upswing. The comment by Hector Ruiz, above, captures the concerns of an industry that is becoming more modular with supply chains becoming more fragmented.

The climate in a particular industry can be completely unknown, however there are key indicators that can give managers an idea of the business changes. This section proposes a methodology to aid decision makers by making them aware of key industry forces that affect business decisions, providing a framework to consider profitable industries, and aligning their external and internal cost structures with the decision.

11.1 Industry Forces

11.1.1 Changing Customer Preferences.

For a company who desires to add value in the supply chain, knowledge of customer preferences is paramount. In “Lean Thinking⁵⁶” the authors assert that this value should stem from: “a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer.” So this leads us to the next question: “what are these preferences and how do we assess them. As consumers we know that our

⁵⁵ As reported by Don Clark, “Intel, Shaking Off Downturn, To Unveil New Chip Technology”, Wall Street Journal, Aug 13, 2002

⁵⁶ Jones and Womack, “Lean Thinking,” Simon and Schuster, 1996

preferences change with technology, fads, and experience with a product. But knowing how and an when to modify a product to meet market demand can be harrowing. Chapter 6.0 discussed Customer Experience with the product on a mirco level, however, a more abstract method of determining trends is needed.

Windermere Associates have developed a model to better understand this transition called the *Buying Hierarchy* (for an example see Figure 11-1)⁵⁷. This model states that as products mature customer buying preferences trend from performance to reliability, then convenience, and finally cost. For example, PC customers originally preferred high performance (Intel wins with processor speed). Then when all PCs have good speed, they desired reliability with functionality (Compaq wins with modular products the work well together). Next, when all products are perceived as reliable, customers desire convenience (Dell wins with online, configurable buying). Lastly, as the product is commoditized⁵⁸, cost is the distinguishing factor (verdict is still out on this winner).

⁵⁷ As reported in Christensen's "The Innovator's Dilemma." Christensen applies the disruptive technology model to each step in the Buying Hierarchy

⁵⁸ There has been some debate as to whether the PC is in this phase or not. A recent Business Week article on Sun pegged CEO Scott McNeely as arguing against it (BW, "Will Sun Rise Again?," November 25, 2002). The concern at Dell is hotly debated with arguments against PC commoditization discussing a new functionality of the PC and its interaction with PDA's and the Internet and mass customization to particular needs (convenience phase).

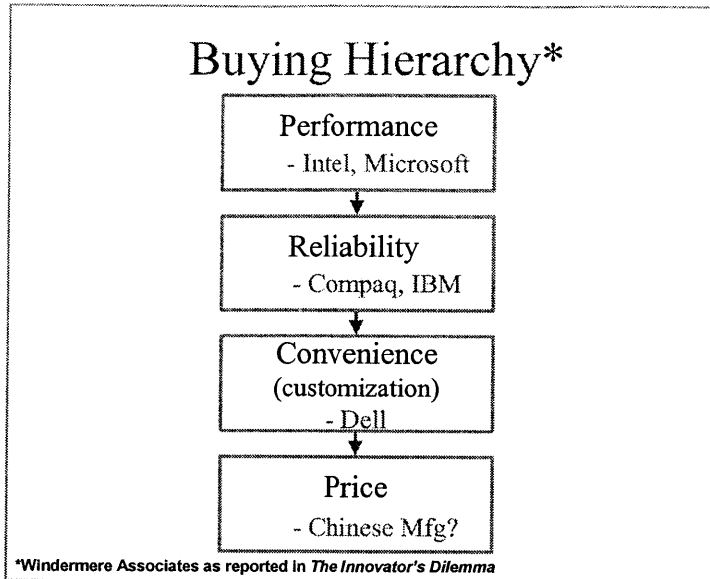


Figure 11-1 Modeling Changes in Preferences with the Buying Hierarchy

Christensen (et al) suggest that high performance is where companies should go to demand more margin⁵⁹. Noticeably, companies that win on an innovation strategy typically do win a great deal of surplus such as Microsoft's reported 85% margins on their Windows Operating System⁶⁰. However, this is only if performance is demanded or can be sold on the market. If it is not, then margins (or even better, total profit) is to be found based on winning the proper phase of the buying hierarchy.

11.1.2 Integration and Disintegration Forces in Industry

The Intel quote heading this section identifies the concerns of commoditization in the processor industry. By commoditization, they mean the products are becoming more standardized, undifferentiated, and common. Why the big deal?

⁵⁹ Christensen, "Skate to Where the Money Is," Harvard Business Review, November 2001

⁶⁰ Financial Times, "Microsoft shows 85% profit margins for Windows," November 17

The WSJ article mentions that Intel has chosen to lead by investing in innovative technologies and continuing their integrated⁶¹ structure where they wholly perform R&D, manufacture, and delivery of their product. If the industry continues to demand high performance at a cheaper price, then Intel could be “in the money.” However, if cost becomes the major differentiator and a modular architecture allows cooperative companies to produce the cheapest chip, then Intel, with their integrated, capital intensive cost structure, could be in trouble.

This technology inflection point rivals the “poster child” case of IBM in the 1980’s. Prior to the 80’s IBM computer architecture was entirely integral – they made the hardware, software, and manufacture of their products. When IBM decided to modularize the industry with the introduction of the personal computer they were certain the money would be made in the hardware. Keeping with the core competence management paradigm of outsourcing anything that was not (or will not) be core to the business, they outsourced the operating system to Microsoft and the processor to Intel. This turned out to be a terrific decision for MS and Intel but has plagued IBM. Current management has been determined not to repeat IBM’s outsourcing dilemma ever since.

Many researchers have studied this case to in order to understand the factors the dynamics and factors that underpin the situation of IBM. The work of Fine and Whitney has lead to a dynamic model to explain the cyclic nature of this integrality and modularity of business and presented it in a Double Helix Model show in Figure 11-2.

⁶¹ Integrated here is a term meaning the company is involved with multiple steps of the product development, manufacture, and delivery to market process.

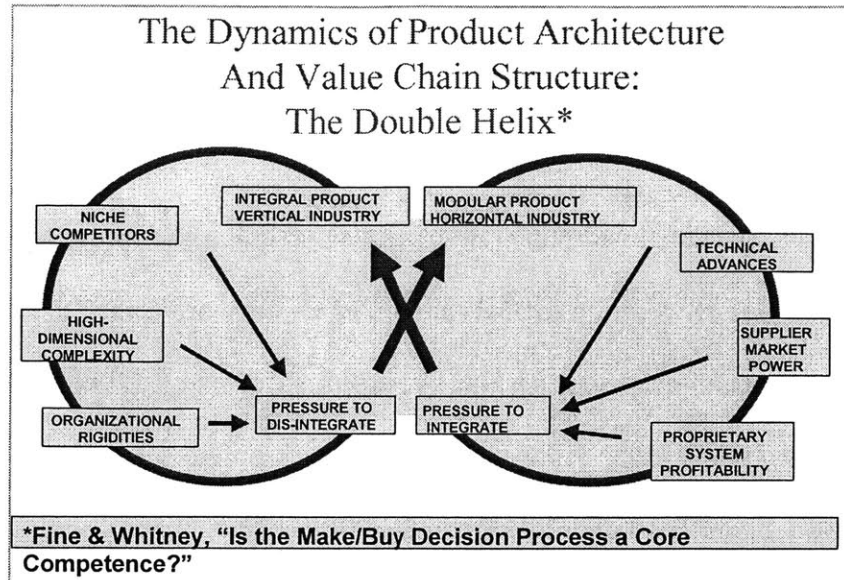


Figure 11-2 Double Helix Model for Understanding Industry Integrality

11.1.3 Industry Force of Disruptive Technologies

It is well known that sustaining technologies help an industry to maintain a competitive edge via incremental improvements in the product or process. An example would be the performance increases in the processor industry. Intel makes chips that are progressively faster and faster because that is what their customers know as the major distinguisher among competing products. Disruptive technologies are those that do not increase this incremental performance. Conversely, they are less competitive in that arena but find a niche in a different market. As this niche grows the product capability does also with the potential of overtaking the mainstream technology⁶².

This is important when assessing industry forces because technologies that may not appear to be a competitor today may greatly disrupt how business is done in the future. A good example for this could be voice recognition technology. If your company

⁶² For a robust discussion on this topic see Clay Christensen's Book, "The Innovator's Dilemma," Harvard Press, May 2000

considered itself an input/output peripheral manufacturer (i.e. keyboards, mice, monitors...) you would probably not be too concerned with voice recognition as it is a terrible replacement for a keyboard and has been relegated to the world of toys and simple menu commands. No administrative assistant is going to want to trade her keyboard for a voice recognition system that only gets the word right 75% of the time. However, as the technology increases there is potential for it to meet the needs of the administrative assistant to and beyond – supplanting keyboards all together. Keeping a watchful eye on disruptive technologies can help prevent a business shock.

Sidebar 11-1 Consumer Confidence and Emotions Impact Buying Preferences

Is Ethical Decision Making A Competitive Advantage? In light of September 11 Americans have responded with an unprecedented nationalism. U.S. flags and symbols of pride can be seen on automobiles and markets everywhere one looks. The walls near “Ground Zero” are inscribed with words of hope and US pride.

U.S. corporate response seems to be different as citizens look toward business entities to carry the same idealism. The major line of reasoning against Stanley Works’ desires to move the headquarters to Bermuda is the loss in American Jobs. American’s, it seems, want companies to exude the same patriotism as individuals. Corporations have other objectives however:

"We have a competitive disadvantage," Stanley CEO John M. Trani told BW Online on June 5. "If we locate offshore, we have leveled the playing field."⁶³ He went further to say that in response to nationalism “That is a fundamental issue. The reality is, we [all] have a desire for the way it used to be -- not for the way it is. And business leaders need to deal with the way it is and the way it will be, not the way it was⁶⁴”.

The question is: “Will consumers limit their spending dollars as well as their investing dollars on corporations whose practices they deem as ‘Questionable.’ ” If environmental marketing ploys have already successfully sold products to consumers who care about the

⁶³ Business Week Online, “Sealing Off the Bermuda Triangle?,” 25 June 2002

⁶⁴ Business Week Online, Stanley's CEO: We're Being Hammered,” June 10, 2002

manufacturing process as well as the product, who is to say the converse could not be true. As per capita income grows and people become less price sensitive, we may see more consumers involved with “interest buying” amid pervasive business corruption.

In a June 27th Time.com Article entitled “The Enron Effect” the author makes a point of the decay of corporate accounting and the effects on Wall Street once they are caught. The corporate sentiment seems to state, “fudge the numbers or do whatever you have to do to increase the bottom line.” A look at the newspaper in the past week had a montage of companies from the telecoms (WorldCom) to apparel designers (Martha Stewart Living Omnimedia).

The allegations of insider trading on Martha Stewarts personal portfolio of ImClone stock caused investors to sell shares of the company she runs⁶⁵. The two events should be unrelated in a logical financial sense; If investors did not feel MSO would lose any sales than it is unlikely they would have pulled out of the company. However, the increasing concern for business integrity has caught the eye of consumers.

“CEOs owe it to investors and employees -- both of whom have seen large amounts of paper wealth vanish -- to speak out, Welch said. Employees "are worried about whether their companies are right on," declared Welch at a business-strategy conference sponsored by global consultancy Bain & Co. at New York City's St. Regis Hotel⁶⁶.”

Employees are weak-kneed about their companies. Investors are weary. Is there a possibility that consumers will change buying preferences based on the ethics of a business? The market predicts that it will: “Fifty-eight percent of American survey by Toronto research firm Environics International last year claimed to have recently boycotted or spoke critically of a company they saw as socially irresponsible⁶⁷”.

Due to the increase in desire for firms to be more sacrificial and the increase of corporate misconduct, companies must be on the watch lest the consumer confidence in their product be shaken. Quality, reliability, aesthetics, feel, and now, apparently, business ethics are on the minds of Americans when they make product decisions.

⁶⁵ CNN News, “Martha Stewart stock dives more than 18 per cent on more ImClone questions,” 12:14 PM EDT Jun 27

⁶⁶ Business Week Online July 1, 2002

⁶⁷ Mark Hendricks, “Serve the Market, Save the World, American Airlines,” American Way, 7/01/02

11.1.4 Political Forces and Involvement in Supply Chain Dynamics

A Fourth Industry Force that must be assessed for outsourcing (and many other business decisions) is the political climate that affects the industry. Politics infuses itself into almost every decision that extends across company boundaries. This is true whether these are internal boundaries with organizational politics within a company or external boundaries with international politics.

In a recent interview with managers from Cemex - an international, Mexican concrete company - they related the promise of Mexican President Vincent Fox and his promise to “pave the floors of all the homes of the peasants.” Since Cemex is the dominant supplier of ready mix concrete in Mexico, the implications of this on Cemex’s business is obvious. If only all political relationships were this direct and favorable.

Internal political dynamics are ubiquitous in every corporation. These are the incentives of each division, the personal agendas of employees, and assumptions and biases based on imperfect information. All of this leads to local optimization for the outsourcing decision and does not typically take the long-term interests of the enterprise into consideration. A discussion of this local optimization for Dell is presented in Section 2.2.

External political dynamics occur across corporate and even country boundaries. Consider The Boeing Company’s entry into the Japanese market. Japan is a very industrious country with a strong manufacturing base. Jobs are always a concern for every country as is the capability to make new products. Japanese politicians are very astute and know that Boeing would like access to the Japanese market. Therefore a contract is framed: Japan will buy planes if Boeing gives them a stake in their manufacture and help them learn the capabilities required to build airplanes in effect, a technology transfer.

These global dynamics continue to play themselves out in China. China, realizing that large companies with growth strategies stand to benefit a great deal from access to their large market, use market access to develop their capabilities. Countries who want access to the Chinese market must give China a stake in the manufacture and product

development of those products. Companies who at one time closely safeguarded their intellectual property are provided China with proprietary data to help build their business infrastructure in return for a location inside of China to produce and market their products.

As companies decide what to give these governments, they must determine the long-term impacts of outsourcing key pieces of their business and the competencies that result. As other countries develop their infrastructure and knowledge base there is potential for them to become a competitor of the company who gave them the capabilities in the first place. At this point it is unclear what and when to outsource, however it is certain that these countries will not be satisfied with the small supplier roles they have handed.

11.2 Winning Margin in Dynamic Industries

Ideally, The Firm would like to build capabilities in industries that would make them profitable. Determining how this is done is somewhat of another question. The model presented in Figure 11-3 lists four areas of assessment to consider when making an outsourcing decision (spinning off of current capabilities) or integration (investing in new capabilities).

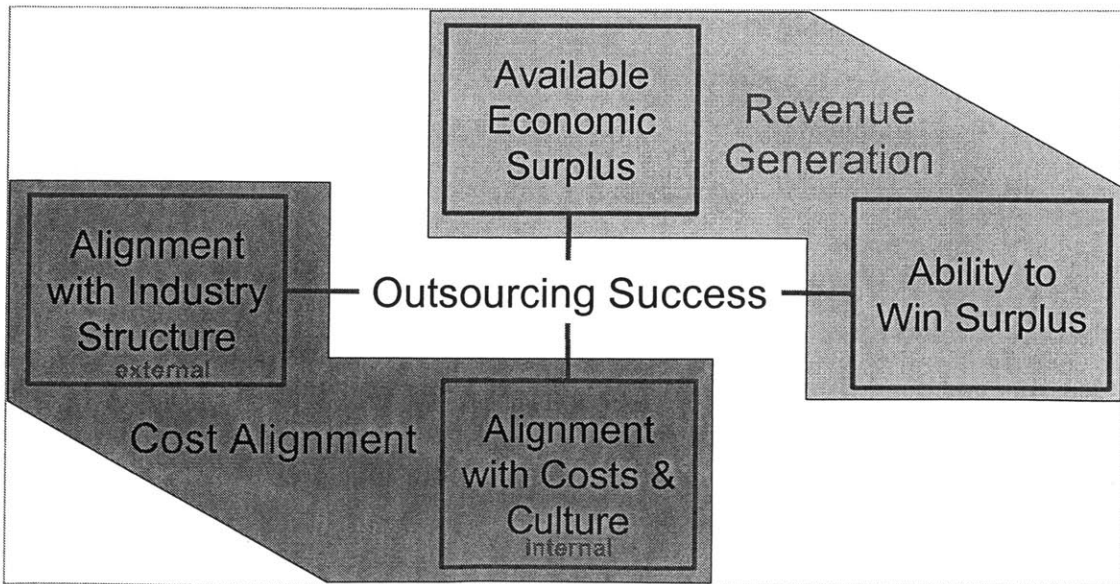


Figure 11-3 Model for Determining Where to Build Capabilities

11.2.1 Available Economic Surplus

Integrating where the money is. The purpose of the business is to make money. Obviously, in order to do this, managers should look to where the money is going to be in the future. In the PC industry, there has been a movement away from the hardware industry to the services and software industries because there is a belief that there will be a great deal of economic surplus.

The first box in Figure 11-3 identifies the economic surplus or the amount of money in the market. Economic Surplus can be determined from a combination of volume and reserved surplus of the consumer. The surplus can be sizeable from either a large volume of products demanded (high volume low margin) or a large reserve price that consumers are willing to pay (high margin low volume) – or a combination of both.

Value Chain Dynamics as a Method of Determining Economic Surplus. In discussions over the summer with Dell and MIT co-workers regarding the lean manufacturing enterprise, the conversation almost always started with a discussion on the Value Chain. The Value Chain is a method for determining where value is added in the supply chain. The logic would seem to hold that if you are involved in a section of the industry that adds a great deal of value to the customer, then you would stand to have a greater portion of the margins generated from satisfying that customer. For the PC industry this appears to hold true. From the Buyers Hierarchy, early consumers demanded performance and the companies that provided this, Microsoft and Intel, took a lion's share of the margin. The same could be said for Dell when customers bought from the most convenient PC maker.

This is not always a hard and fast rule however. In the Australian ready mix concrete industry, the majority of the value added is in the transportation phase as opposed to the processing and quarrying phases. But the economic surplus resides in the quarrying phase and somewhat with the processing⁶⁸. That has caused a backward integration of the processor into the quarrying and fly ash business where the economic surplus is and not

⁶⁸ Stuckey, When and when not to vertically integrate, Sloan Management Review 1993

where the valued added. The take away? Not all highly valued-added businesses are attractive due to additional industry forces.

Sidebar: Available Economic Surplus in the Server Industry

An example of this analysis is presented for the high performance server industry. These are users whose focus is on data processing, quick storage retrieval, and graphics acceleration ability. They may be gamers or researchers in a lab conducting simulations that require a high degree of computing power. A map of their preferences could result in Figure 11-4 applied to the buying hierarchy.

In this figure we see that their main preferences reside in the performance and reliability phases. It would make sense that, since the major differentiator for their buying preferences is performance, a reasonable corporate strategy would be one of innovation. Additionally, users of these high performance products are willing to be able to pay a large sum of money for cutting edge technology and astute companies flock to these opportunities. For example, Sun Microsystems, an integrated computer manufacturer, gets as much as \$250,000 for one of their higher end servers. In reading of Sun’s market strategy it appears they feel there is a large economic surplus in this market and are seeking to differentiate themselves by adding value in this phase of the hierarchy.

High Performance Server buyers marked by:	
Performance	<ul style="list-style-type: none"> •Want productivity tools: video cards for increased web media, faster processor for data access, wireless/PDA interfaces, •Performance processor for quick image procession and network access, •Easy configurability and connectivity, and •Configurable/customizable to specific use
Reliability	<ul style="list-style-type: none"> •Expect stability while using applications •Have trouble “shooting “know-how”
Convenience	<ul style="list-style-type: none"> •Expect quick delivery and, •Quick access to problem solving (service)
Price	<ul style="list-style-type: none"> •Less price sensitive

Figure 11-4 Buying Hierarchy for Performance Servers

11.2.2 Ability to Win Surplus

Commanding Revenues. Entering into a market with a large amount of economic surplus is not enough. In order to turn this market into revenue there must be some way for The Firm to convince consumers to buy their products and to win that surplus. An excellent study on models to win surplus is presented in the 2000 McKinsey Quarterly entitled “Gaining Advantage over Competitors.” These strategies are beyond the scope of this paper and are adequately covered therefore I will direct the interested reader to the source:

- “Sustainable Competitive Advantage,” by Kevin P. Coyne,
- “New Game Strategies,” by Roberto Buaron,
- “Attacking Through Innovation,” by Richard N. Foster, and
- “Hustle as Strategy,” by Amar Bhide,

Leading on Buying Preferences to Extract Surplus. I would propose however that all of these strategies should be taken in light of the Buying Hierarchy - as customer preferences for a product will change⁶⁹. Therefore, one strategy, say “Attacking Through Innovation,” may work well for product choices based on performance, however this may not be the best strategy once the product moves to the “convenience” phase. If high product margins come from adding value and “value add” is defined as meeting the needs of a consumer then it makes sense to pay attention to their change in needs.

11.2.2.1 Example: Dell’s Value-add to the Performance Server Market

For the High Performance Server Market, Dell has leveraged their strengths to enter the High Performance Server Market. In order to compete with the industry giant, Sun, Dell has developed a server infrastructure that meets the needs of these players by “clustering” servers together allowing them to pool resources. Now, customers who demand high performance can buy a number of Dell servers, based on their performance needs. Processing “jobs” are broken up and performed on a number of the clustered servers -

⁶⁹ Christensen applies disruptive technologies to this framework in “The Innovator’s Dilemma”

based on resource availability - reassembled, and presented. This is a much cheaper solution than a Sun workstation and places Dell in a good position once these customers become more and more cost sensitive (and thus move down the Buying Hierarchy) for these services. Here we show that the economic surplus is both available and that Dell is well positioned to earn a lion's share of the margin. Going to the strategic matrix for revenue generation, Figure 11-5, we find that Dell is in good shape (top right quadrant) and should maintain control over their product by not outsourcing it.

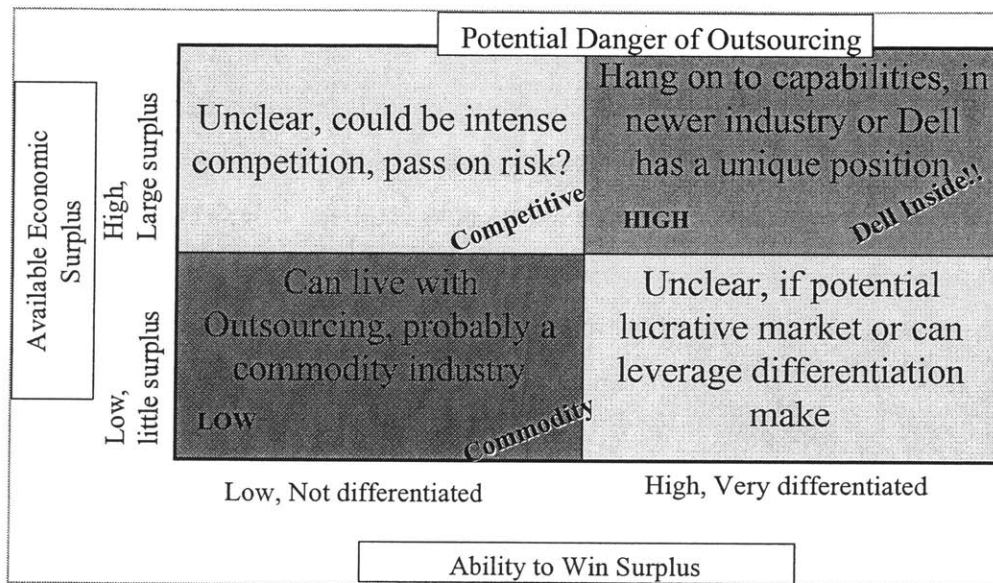


Figure 11-5 Revenue Generation Strategic Matrix

11.2.3 Alignment with Product and Industry Structure: Managing External Forces

Once revenue has been obtained for a product the focus turns toward reducing costs or friction to increase margin. These frictional costs result from external forces of managing products across organizations. In this section we will discuss the external forces that impact the cost structure of a firm. These can be broken into two parts: supply chain friction and technological friction. *Supply chain friction* is the loss that results from a product as it is managed through multiple levels of the supply chain. These losses include communication, handling, shrinkage, and loss of product control. *Technological friction* is the loss that results from the product being designed and developed across organization boundaries. These losses are more specific and include loss of functional control over

product specifications and increased costs of technically reintegrating the product once it has been “broken up” into pieces for outsourcing.

Everything else being equal, the more the product architecture does not fit the supply chain or the product development structure, the more it will cost to control and implement the design and supply of components. Alignment of the company with the product architecture is essential to decreasing supply chain and technological friction.

Product architecture is defined as “the assignment of the functional elements of a product to the physical building blocks of the product.”⁷⁰ Management of the product (physically and functionally) through the supply chain is a “hands on” process requiring: selection of supplier, evaluation of supplier competencies, awarding the bid, supervision of production processes and quality, delivery and inspection of product. Needless to say this can be a costly process and should not be repeated unless necessary. The more integral the product architecture the more control that is needed to ensure a quality product is delivered. Therefore, if a product is especially integral then it is necessary that the manufacturer work closely with the supplier; in this case a “Point use” manufacturing contract would not be wise.

Consider the development of a turbine engine manufacturer who is deciding to outsource the fan blades. The optimal design of the fan blades is heavily linked to the design of the rest of the engine and typically requires a great deal of iteration. If the design for the volute housing the fan blades changes the blades themselves will have to be redesigned to obtain the most efficient size, weight, and orientation to the new surfaces. If these blades were produced concurrently by involved suppliers (an integral solution) they would change their design, provide comments on how those changes will affect the overall performance of the engine, and furnish realistic cost data on the production of the components for which they were responsible.

Another option would be to bid (a horizontal type of supplier relationships) development of the fan blades to the lowest bidder based on a contract. In this case, the friction would

⁷⁰ Eppinger, “Product Development,” McGraw-Hill, 2000

prevent a seamless redesign - it is even not clear if the supplier would be willing to change anything without a costly penalty! Because of the *integral product architecture* a cheaper solution with less friction requires an *integral supply chain* of involved, committed supply chain *partners*.

11.2.3.1 Product Architecture Should Match Supply Chain Architecture⁷¹.

In the example above the turbine engine is an integral product; the engine is typically designed “concurrently” with development across multiple well-managed boundaries and design variables constantly in flux. I was recently discussing this with another student conducting product development research of Boeing airplanes (parts of which are also of integral Architecture). Part of his deliverables was to produce a database of design variables and sensitivity requirements that could be consulted by all parts of the design team. This would allow fan blade engineers to update the variables for the parts they were designing directly to the database so the folks who were designing the fan shroud would be able to get the most up to date information and see how the changes affected certain performance variables (increase in weight, reduction in power...).

In this case the product is integral, the product development is integral, and the supply chain should be integral. An integral (or vertical) supply chain is one that has only a few partners who are heavily involved in the development and supply process. In this structure relationships are very important because information, hence trust, is passed among partners to provide a global solution.

The other option is a modular product architecture that would require a modular supply chain. For Dell, most the products they consider for outsourcing are very modular. There are industry or de facto standards that exist and the product can easily be broken into parts. This favors the horizontal or modular supply chain because Dell wants to be able to switch suppliers based on their ability to supply high quality, high performance

⁷¹ For a detailed explanation of this see Fine, “ClockSpeed”

components at the most economical price. Control in this case is much easier since the boundaries and interfaces between components are specified and easily measured.

11.2.3.2 Matching Product Architecture to Industry Structure.

Not only should the product architecture match supply chain structure, but it should march the industry structure also. If the industry is tending to become more horizontal then it is desirable for the product to become more horizontal also. For Sun Microsystems, they must consider if the obstacles of their vertically integrated workstation strategy in a market that is almost entirely horizontal.

It is difficult for an integrated giant, such as Sun, to maintain high performance and low cost structure necessary to compete across all the components of the workstation (software, hardware, circuit boards...). If they fail to beat the highest performance in one segment it is likely that customers will choose another product that contains the high performance component. In this case, it is arguable that they should seek to modularized their product and develop as a niche supplier of one of their most enticing components.

11.2.3.3 Integration and Disintegration in the PC Industry

Here it is useful to demonstrate the trip around the Double Helix in the PC industry. Start with the integrated IBM of the 80's, consider the pressures on IBM to disintegrate the industry into the "WinTel-Dell" Dynasty in the 90's. As this continues, some parts of the industry will continue to disintegrate, while other's will experience pressures to integrate:

Retailers ~ Integrating into White Box & Service Space. As the PC industry becomes more commoditized, most entities in the supply chain are scurrying to differentiate themselves in some way or to move into more lucrative parts of the chain. Best Buy in an attempt to leverage their local service department and their store traffic has decided to offer a Best Buy branded PC⁷². This PC will be targeted at consumers and small

⁷² Jennifer Shah, "Best Buy Launches house-brand PC," EBN, July 22, 2002

businesses customers who know they are only a drive away from their PC service department.

PC System Designers ~ Clamoring to be “Nike” of the PC world. In a branding montage Dell, Gateway, and HP are battling to distinguish themselves on the basis of brand. As they continue to spin off manufacturing and move toward supply chain fulfillment entities it will become more and more difficult to distinguish themselves on anything else. Additionally, PC makers are moving into non-PC products such as printers, PDAs, and servers further increasing their need for branding and polishing their supply chain distribution networks. Couple this with the spinning off of manufacturing and a PC system designers could be the next *Nike* of the electronics world.

Chinese Manufacture ~ Gobbling Up the Pieces. Not everyone is trying to get rid of manufacture. In the low cost value market the Chinese are more than happy to take on the capital burden of producing products. This only makes sense since they are likely to be the locus of the next major PC market. This is expected to increase with cost pressures to promote economies of scale from the product of PCs for multiple systems designers and take advantage of their decreased inbound and outbound logistics networks. As these manufactures gain more business, look for them to forward integrate from chassis assemblers into components integration, peripherals, and service.

Processors ~ Industry is fragmenting. The processor industry for the PC is becoming a tough business ripe for disruptive technology. There is an oversupply of performance for most users in the market and the average user is unwilling to pay addition surplus for process speed and performance they will not need – at least not till another “killer ap” comes along. With the infusion of circuit board technology into China by Intel to gain market access it is likely that they will soon be able to produce circuit boards of mainstream performance. Adding more pressure that will cause a trip around the double helix towards a horizontal industry is the development of low volume, specialized,

specialized processor production. These companies are able to tailor-make a chip to client specification cheaply and with good quality⁷³.

11.2.4 Alignment with Costs & Culture ~ Managing Internal Forces

Keeping costs down is a major consideration for most companies. This becomes even more apparent as companies transition from a large growth business to a sustaining business. The section above on aligning the product to industry forces promotes some concerns of how to reduce friction in the deployment of product. This section is similar, however it focuses on the internal structure of The Firm and the frictions that result from misalignment of products and culture.

11.2.4.1 Alignment of Product Costs and Culture.

Any given product will invoke a certain cost structure needed to produce it. For example, if a company is desirous of producing a competitive airplane wing (or a high end server) they must be willing to spend the requisite R&D dollars necessary to have the technology to design it. Additionally, since airplane wings are difficult to manufacture and have a great deal of federal regulations involved in controlling processes, it takes a large capital investment to produce it. Just as products have a certain cost structure, so do cultures. Dell is a very flexible environment that sees itself as a cost leader and not necessary an innovation leader. A look at their research and development (R&D) budget from last years financial report shows it is \$111 Million/quarter; approximately ¼ of Sun Microsystems R&D investments of 458 Million⁷⁴. Clearly if Dell desires to break into the highly innovative business they would need to ramp up their research units. Attempts to enter into this market space may cause considerable friction for Dell and necessitate they break out of their current mindset as integrators.

Dell's culture as a system's integrator however has afforded them considerable success. Because they do not seek to be a product specialist but are content to be a "jack of all

⁷³ Michael J. Bass, "The Future of the Business," IEEE Spectrum, April 2002

⁷⁴ 2002 Condensed Consolidated Statement Of Operations, Unaudited

trades” they are in an ideal position to keep an eye on technology and integrate it at the right time in the market. Entering products that are mature and standardized across industries and interfaces is a good fit. The fluid culture where knowledgeable generalists can make good decisions quickly enables them to capitalize on modular product architecture and produce it at the lowest cost.

Dell as a low cost provider is also a good fit because they are content with a lower margin/high volume product strategy (compare 17% margins for Dell with 39% for Sun). Prices for most of the products in markets Dell has entered have dropped substantially. Consider Dell’s entry into the projector market. Prior to the entry of the \$2499 Dell MP1000 projector the leading projector prices were around \$4,000 and have since dropped.

Additionally, Dell is a culture that is very focused on costs. Their management paradigm is similar to GE’s in that it is a “management by objective” mentality. Most of these objectives that are directed from upper management is to lower costs. It is not uncommon for those in the manufacturing environment to rally around a major cost reduction initiative.

11.2.4.2 Modular Products Require Modular Culture

Difficult to emulate the Dell direct model. In a talk with Sloan classmates in September of 2002, Michael Dell answered the question of why other companies are not able to copy the Dell Direct Model. He replied that he did not really know, the model is simple enough and yet others are not able to pull it off. In talking with Dell employees, I have asked them repeated what their thoughts are on “Dell’s Secret Sauce.” The answers have had a very broad spectrum and ranged from manufacturing to online demand management. This “casual ambiguity⁷⁵” resulting from the uncertainty of pinning down the core competencies of the Direct Model makes it hard to mimic. The Dell model, similar to the Toyota Production System, remains difficult to replicate.

⁷⁵Coff discusses the difficulty in assessing competences in: Russell Coff & Kevin Laverty, “Dilemmas in Exercise Decisions for Real Options on Core Competencies”, SSRN Jan 2002.

Culture as Dell's core competence? Possibly one reason why no one is able to talk in detail of Dell's core competence in the direct model is because it is largely the soft topic of culture. Dell's culture is extremely modular. Work is done informally as individual contributors defining alliances to projects based on higher directives and occasionally, pet interests in a topic. Dell is a structured meritocracy. The ability to trace the success (or failure) of their highly modular projects back to individual contributors is a crucial management task. Those employees who are aligned with successful products are noted and rewarded.

Organizations at Dell are also highly segmented and modular. Dell's marketing method discusses "segmentation" of the market as a key tenant. It appears this has not been lost on organization boundaries. Employees are motivated by stock options, promotions, and opportunities to move around in the organization (finding places to work wherever they may have an interest). This is easily granted as employees often learn their jobs "on the fly" and movement across boundaries actually encourages group learning of product/process knowledge as generalists. The fluidity of movement, process knowledge, and incentives makes their modular culture idea for modular products.

Could Dell be as effective with an integrated product? Contrast this with a modular Dell culture working on an integrated product. Teams would work together to iteratively produce the product having little idea of how their own individual contribution relates to the whole and potentially lacking specific processes to manage the technological friction (i.e. Boeings iterative product development database). If the product were successful, it would be difficult to determine who was primarily responsible. Hence the meritocracy and informal network rules that are in place would break down. Employees would not be promoted as readily and enthusiasm to work diligently would be removed.

Additionally, the directive to move around the company would be a discriminator as integral products require specific knowledge of the product that would be lost with each rotation. The mentality of integrators who move around and have broad process knowledge would have to succumb to the employees who had technical background and specificity needed to solve the problems of the day – not integration but innovation. This

situation would be placed in the bottom left-hand corner of Figure 11-6 where the product does not match the culture of the company. In this case, the potential danger of outsourcing is very high – the costs to convince the company to outsource it and the low interest of the industry in taking on the outsourcing would make this a high potential danger to outsource.

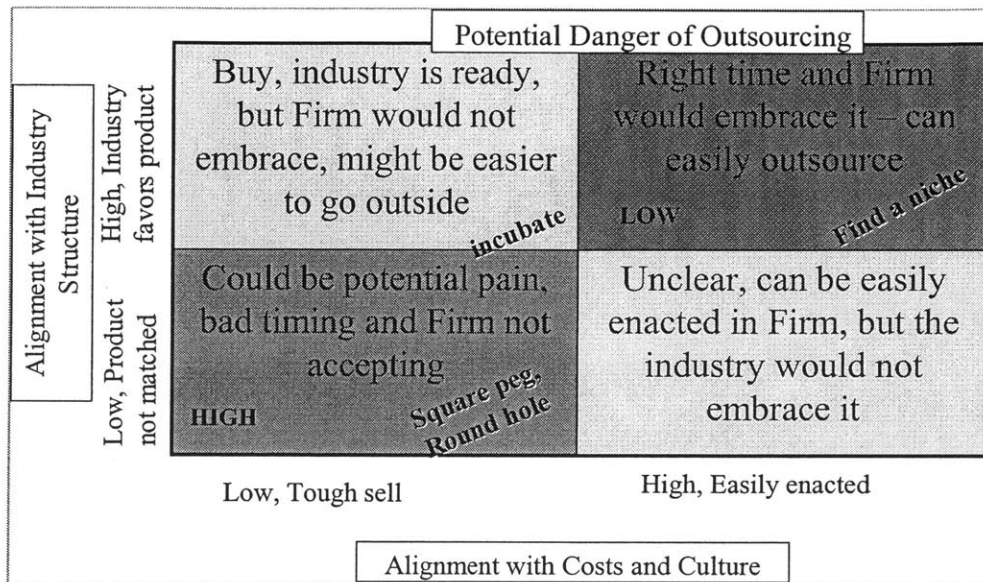


Figure 11-6 Cost Alignment Strategic Matrix

11.3 Summary of Assessing Industry Climate

This chapter began with a discussion of industry forces at work to keep managers “on their toes.” The assessment of these forces are indicators of the industry’s climate. We then discussed the assessment of this climate in the sense of revenue generation, which includes the market affording a sufficient economic surplus and the ability of The Firm to win that surplus. While this will lead to healthy revenues, it is not sufficient to develop healthy margins. For this, costs must be under control. The section has proposed alignment of costs with the industry, which is external to The Firm, and alignment of costs with product and culture, which are internal to The Firm. The following key points must be understood and assessed prior to the outsourcing decision to guarantee success in the long run:

- There must be an economic surplus in the market (else why bother),
- The Firm must be competitive on the consumer's phase in the "Buying Hierarchy" to obtain revenue,
- Competition must be consistent with the industry's position on the double helix to deliver differentiated value at acceptable cost, and
- Culture and cost structure must favor the product to decrease costs of implementation.

Part IV Deployment and Final Remarks

The use of the model is in its early stages at Dell Computer. The implementation presented in this section is ongoing and is an example of how the framework can turn into an outsourcing process at any organization. The model is adaptable and the iterative nature allows for reinventing it each time the business evaluates its outsourcing strategy.

12.0 Synthesizing the Models

Currently the cost models and outsourcing strategy are analyzed separately, the former by a new group called “New Business Development” the latter by senior management who make final decision based on cost data, business experience, and gut instinct. This chapter discusses how the two models are integrated.

12.1 The Make/Buy Balanced Scorecard

Building on Kaplan’s work⁷⁶, the model was developed to lend itself well towards a balanced scorecard. Kaplan outlines four items on a scorecard: objectives, measurements, targets, and initiatives. The six factors were designed to be a measure of success for outsourcing decisions. The strategy, on which each factor is based, determines the target for the initiatives. The objective for the outsourcing decision should clearly represent the strategy. The scorecard contains this data and is presents it to managers on “one sheet of paper” to give a representative view of the decision and how it can help the company. Because there are many considerations when conducting an analysis, it is important to use a “balanced” approach to ensure important factors are not overlooked.

12.2 Example Application of the Balanced Scorecard

One may be asking, what are the results of all of this analysis and how are they used? While the model has been applied to past outsourcing decisions for three distinct scenarios at Dell, perhaps it would be most instructive to present an example. After the

⁷⁶ Robert S. Kaplan, “The Balanced Scorecard: Translating Strategy into Action,” Harvard Business School Press, 1996.

analysis has been conducted, the process oversight committee “publishes the data onto a Balanced Scorecard such as the one in Appendix 4. The cost data is included on the scorecard however; these are straightforward (once assessed). Therefore, only the strategic considerations are discussed in Figure 12-1. Here, we see that a full bubble is favorable for outsourcing while an empty bubble is unfavorable.

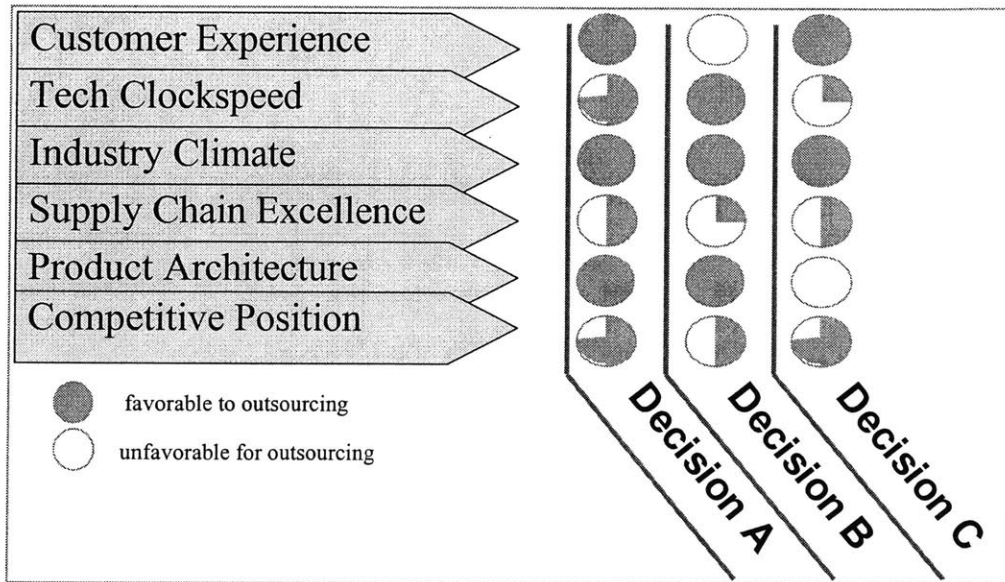


Figure 12-1 Example of Strategic Balanced Scorecard Entries

For *Decision A* we find that overall everything looks favorable with nearly full bubbles. The manager may outsource this part or process with little concern except for Supply Chain Excellence. Here, decision makers may ask the program manager for insight into problems or concerns of outsourcing on the supply chain. Possibly, supply chain partners are not able to meet production scheduling or do not integrate well into The Firm’s infrastructure. *Decision B* appears to have problems with the people and organization for the product. Suppose that customers have an affinity for the product feature that is being outsourced and make buying preferences based on it. *Decision C* also appears to have some concerns centered on the product itself with Clockspeed and Product Architecture scoring low marks. Here, engineering could be consulted to determine if the design is modular enough to be outsourced, if the feature’s roadmap has too many introductions, or if quality can be controlled. It is interesting to note that Supply Chain Excellence appears

to be a concern in all three cases. Indeed, it is typically the hardest factor to appease for outsourcing.

12.3 Providing Organizational Backing

Attempting to integrate the model into existing organizational units is a daunting process. While there are entities that do conduct strategic analysis, they are segmented and generally report to a line of business or major department (finance, marketing, product development and so on). This incentive mismatch has obvious problems for a model that is attempting to consolidate enterprise-wide interests. Therefore, it is necessary to design a new organization that has oversight of the process without pressure from existing organizations, the strategic process owner. This new team is able to oversee the process objectively while still allowing existing departments (core teams, program managers,..) to interface with the model.

The implementation framework in Appendix 5 contains the existing cost-based process used for outsourcing as with the integration of the strategic system. Here, the strategic process owner, focus groups, and the strategic outsourcing model (purple box) are placed in parallel with the alternate fulfillment model. This stream evaluates the strategic factors under the guidance of the program manager.

To provide project oversight and program stability, an oversight committee is added after the cost and strategic analysis to provide a “common-sense” check with the results, and ensure they are inline with the overall corporate strategy. If the results have passed their scrutiny then they are published on the Balanced Scorecard and presented to decision makers. If not, they are sent back to the program manager with constructive insight on how to reevaluate the decision.

12.4 Refining the Model

Make/Buy considerations are an ongoing practice. It is unlikely that any company will make just one and then continue to conduct the same business in the long term. The model that has been developed in this paper is a process that incorporates institutional

learning, academic research on outsourcing, and future concerns of outsourcing managers. These considerations are dynamic, therefore the model and the organization must be dynamic. Therefore, the process must include learning and disseminate it to those who are using the model. The following reinforcing loop shows the dynamics of this learning, the institutionalization of past decisions and a method for storage/retrieval of the scores and lessons learned of those decisions.

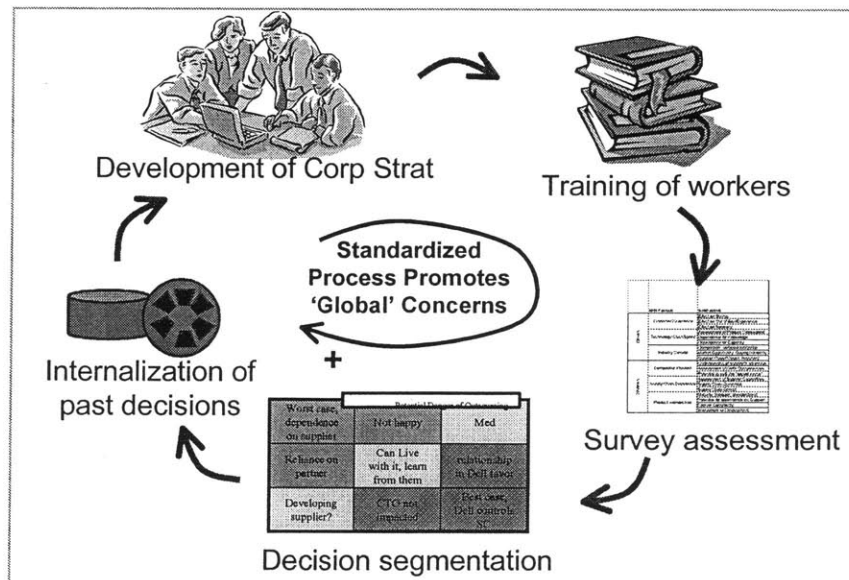


Figure 12-2 Outsourcing: The Repeated Game

A standardized process promotes 'global' concerns. Picking Development of Corporate strategy as our starting point (we could have chosen anywhere), we find that the workers who will be using the model must be made aware of The Firm's strategy and trained on making sound outsourcing decisions. In their focus groups, these trained workers then convey concerns and comments via the surveys that are in turn used to find a location on a strategy matrix. The favorability (or un-favorability) of the decision is published on the Balanced Scorecard and entered into a database. These decisions and lessons learned stored in the database are then used for future decision making. The next time there is a corporate strategy session (and there should be one for each product release if you want product that build capabilities) the database is consulted, the strategy updated with global concerns, and a new trip around the loop ensues.

13.0 Conclusions

The development of this model has led to an interesting framework for problem solving of a field that is largely based on “gut feel.” The framework of a decision support system for determining strategy of an outsourcing decision is broad, however the consistent application of the model to outsourcing can quickly focus the model to the strategic factors and categories that are of the most interest to The Firm. Additionally, the work has afforded the identification of a number of areas for future research on outsourcing.

13.1 Key Findings

Outsourcing at a functional, organizational level is locally optimized and short term. The mini-case studies presented in this paper demonstrate that the end result of an outsourcing decision is largely based on the incentives and interests of the organizational entity conducting the analysis. That is not to say that each organization does not have a strong rationale, however considering other organization’s interests are often difficult without a strong mandate or framework to do so.

Personnel evaluating the decision have concerns that may not make it back to decision makers. In interviews with workers who conducted the analyses, it was explained that they often had intuition that was not expressed in their report. This experience was not conveyed to senior managers who were left with the heavily scrutinized and simplified data with which to make a decision.

A global framework can provide optimization based on corporate-wide interests.

Incorporating the concerns and interests of each organization into a model that combines with corporate strategy allowed for the identification of factors that can be evaluated to ensure global optimization of the decision. These six factors cover a wide spectrum of organizational, product, and process boundaries.

The standardization of outsourcing decision systems allows for knowledge transfer and internalization of past decisions. There is always a tradeoff between centralized control and decentralized specificity. Standardizing outsourcing allowed for common training

and language necessary to convey successive decision analysis insight. Additionally, the standardized process allows for the population of a corporate-wide database to be used for subsequent decisions and for consultation during outsourcing strategy reviews. Every outsourcing transfers capabilities to some degree affecting all parts of the company.

The development of the model and the resultant strategy are adaptable to the company developing the model. The model presented in this paper is specific to the Dell Computer Company, however its general precepts, and methodology are adaptable to any organization. In most cases, this model analysis is broad enough that it can be used “as it stands.” The questioning in the surveys will provided focus as they can be eliminated from the analysis if they are scored as “not applicable.”

13.2 Areas for Future Study

13.2.1 Follow-on Strategic Outsourcing Decision System (SODS) Projects

- Modifying the Strategic Outsourcing model
- Rollout SODS on the Web
- Develop metrics database, populate with O/S decisions
- develop metrics assess how resources are providing bang per buck Supply Chain Efficiency)
- Add “soft costs” on Table 4-1 to model (i.e. How much does it cost Dell in loss of brand welfare if we outsource a “No touch” solution to MITtech and it has a poor customer reputation?).

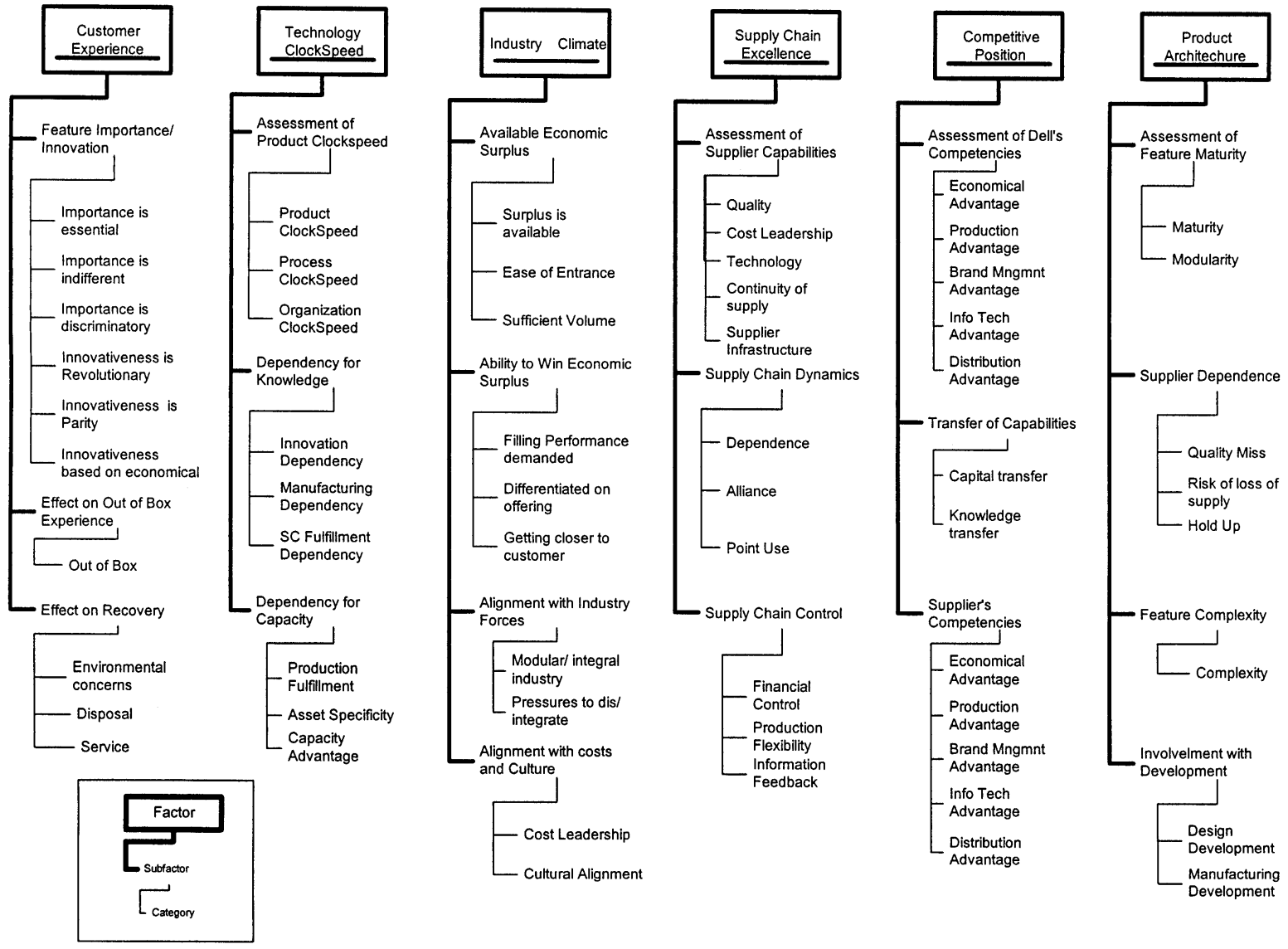
13.2.2 Outsourcing and Quality

- Develop a model to assess quality for 3 windows of quality:
 - their yield ~ How is supplier’s quality,
 - line reject rate ~ How well Dell is doing internally,
 - initial field incident rate ~ How well the product performs to the customer
- Develop a model to delegate production and still optimize efficiency, quality, and cost.
- Optimize the value chain with well-placed incentives (refine metrics so Q becomes a global approach instead of a local optimization).
 - In Mechanical Engineering, there are “Tolerance Stackup Models.” Develop a quality “stackup” model using a statistical approach across the entire chain.
- Develop a sensitivity study on quality metrics (their “Cost to Quality” (Taguchi) and which ones are worth The Firm’s time).

- Determine the impact of modularity on Q.
- Determine how standardization affects quality if it is outsourced.
 - How does this change for more integral products?
- Develop a model to determine how/if reintegration of features lowers quality costs.

APPENDICES

Appendix 1 Outsourcing Assessment Criteria Map



Appendix 2 Roles and Responsibilities for Strategic Outsourcing Model

<p>Core Group (same as PrP group)</p>	<p><u>Provide Direction</u> Determine overall objective Pick PM Scrub Results Serve as ‘Clearing House’ for final decision Facilitate implementation of decision</p>
<p>Outsourcing Oversight Committee ~ this entity should be static & not change hands for each decision</p>	<p><u>Provide Process Oversight</u> Ensure process is performed completely and consistently Educate teams on use of model Benchmark existing studies Ensure that the web tool is functional Populate the database with finalized decisions for posterity <u>Publish ScoreCard</u> Roll-up score from model and finances from M/B Council Note areas of concern and provide recommendations Format ScoreCard <u>Provide Process Feedback</u> Solicit and manage feedback on the process Institutionalize knowledge from past decisions Modify the process to accommodate new questions or programs Maintain depository of past scores for benchmarking</p>
<p>PM</p>	<p><u>Implement Process</u> Weight key criteria for each decision Assign surveys to team members for data entry Assures surveys are completed and representative of decision Furnish finished surveys to Process Oversight Committee</p>

Focus Groups	<u>Education on process</u> Watch short training slides of the process <u>Fulfill process</u> Each Focus group fills out their respective survey thereby conveying concerns to the PM <u>Wrap up process</u> Meet with PM in a final wrap up meeting to scrub results and sticky points Provide Feedback on the process
<i>Customer Experience Focus Group</i> ~ Product Marketing Group	<u>Inputs</u> Mrktg data on customer preferences on feature Intuition on effect on ‘out of box’ experience Familiarity with asset recovery process Intuition on relative importance for categories <u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process
<i>Tech Clockspeed Focus Group</i> ~ PG LOB Group	<u>Inputs</u> Knowledge of development cycle and roadmap for the feature Intuition on process dependencies Familiarity of capacity planning process Intuition on relative importance for <i>categories</i> <u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process
<i>Industry Climate Focus Group</i> ~ LOB Strategic Group	<u>Inputs</u> Industry data on where economic surplus is in market Knowledge of what competitor’s product offerings Understanding of how the product is differentiated in the market

	<p>Knowledge of Dell culture and costs Intuition on relative importance for <i>categories</i></p> <p><u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process</p>
Competitive Position Focus Group ~ Strategic Engineering, IT Department, OEM & SCM Group	<p><u>Inputs</u> Knowledge of suppliers advantage Knowledge of Dell's competencies Intuition on ability for Dell to transfer capabilities Intuition on relative importance for categories</p> <p><u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process</p>
Supply Chain Excellence Focus Group ~ OEM & SCM Group, Commodity Managers, SOSA Team Leader	<p><u>Inputs</u> Assessment of Supplier capabilities (SOSA – database) Knowledge of supplier relationships Familiarity with supplier contractual processes (for supplier power) Intuition on relative importance for categories</p> <p><u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process</p>
Product Architecture Focus Group ~ PG LOB Group	<p><u>Inputs</u> Knowledge of architecture of product Intuition on supplier's market power Knowledge of complexity of feature Knowledge of product development process Intuition on relative importance for categories</p> <p><u>Outputs</u> Completed survey with strategy matrix Concerns/recommendations for the process</p>

Appendix 3 Consistency Rules for Development of Model

1. SCORING.

- a. In order to “build in” the strategy into the survey:
 - i. Where possible, all scores of Strongly Agree (1) shall be favorable to outsourcing.
 - ii. All scores of Strongly Disagree (5) shall be unfavorable to outsourcing.
- b. The final score for each factor will be scaled to values of 1-5 (see RESULTS).

2. WEIGHTING.

- a. When going from one “level” to the next, use of weighting shall be used to make sure important factors are emphasized.
- b. The individual who has the knowledge of the separate constituents shall perform weighting. This is typically one level below their area of expertise (e.g. the PM weights the factors, the focus group weights the subfactors and categories...)
- c. When weighting the average “Impact” (both from the survey) for a *category* the calculation shall be:

$$\text{weighted impact} = (\text{average impact} + (\text{average impact} - 3) * \text{weight})$$

- i. This is then used whenever the *Category* is used individually (i.e. whenever the most impacting *category* is used to determine a position on the strategy matrix.
- ii. This method is chosen to accentuate the increase (or decrease) from “3” which is the neutral position. Note: the alternative would be: $\text{weighted impact} = (\text{average impact} * \text{weight})$. This biases all answers toward “favorable for outsourcing.”
- d. When weighting several categories together, for the overall impact for the subfactor, the conventional approach of using the sum of $\text{weight} * \text{average impact}$ for each category

3. NOMENCLATURE.

- a. Results for the survey will be dubbed “Impacts”.

- b. “Weights” are used for prioritizing by both the focus groups and the program manager,
 - c. “Points” are used internally for each sheet for computation,
 - d. Final results from the spreadsheet shall be dubbed “Score”.
 - e. In the survey, “Feature” is reserved for the Part, Process, Or Product being considered for outsourcing.
 - f. “Product” is used for the whole product that would be sold with the aid of the feature
4. LEVELS. Leveling is used to break up the interests and questions into areas of assessment.
- a. The highest level are the 6 “Factors.”
 - b. There are typically three (4 for Product Architecture) “SubFactors” for each Factor.
 - c. SubFactors are broken into 2 – 6 categories.

5. RESULTS. Each of the 6 factors shall be published as:

Scale for Score (these may change for each survey)

Very High, (1) Dangerous to Outsource

High, (2) Potential Outsourcing Trap

Med, (3) Proceed with Caution

Low, (4) OK to Outsource

Very low, (5) Favorable to Outsource

6. FORMAT.

- a. The following cells will be color-coded according to the schema below.
 - i. The average impact score cell
 - ii. The average impact weighted cell when it is used to assess the subfactor instead of the average impact cell
 - iii. The potential outsourcing danger cell in the strategy map or matrix

- b. The CELL color scheme for *Impacts* shall be green \leq 2.5<yellow<3.5 \leq Red.
- c. The CELL color scheme for *Scores* will follow *Impacts* where applicable

7. ROLL-UP.

- a. The average impact for each category will be formatted to shade as in part 6 above.
- b. The *Potential Outsourcing Danger* shall be reported for each subfactor as in part 5 above.
- c. When it is obvious that there is a specific “location” for the outsourcing decision, a **Strategy Matrix** shall be presented to determine position and to show the *Potential Outsourcing Danger* of that location.
 - i. The position on Strategy Matrix shall be determined from the subfactors. The position will then be color-coded and the potential danger specified
- d. When one position cannot be determined (making a location on a strategy matrix nonsensical), a **Strategy Flow Chart** shall be used to show the combinations of locations). This is helpful when there are multiple positions on the matrix.
 - i. All cells in the Map shall have a value that will be color-coded to the schema in part 6.
 - ii. The final score will be based on which range of cells have the highest percentage on a weighted average. For example:
 1. If there are 5 points for a very *High*, 4 for a *high*, 3 for *med*, 2 for a *Low* and 1 for a *very low*.
 2. There are 4 cells with a *high*, 2 for a *low*, and one for all others. The total number of points would be $(5*1 + 4*4 + 3*1 + 2*2 + 1*1 = 29)$
 3. The *High* range would have $16/29 = 55\%$, the *Very high* would have the next highest at $5/19 = 17\%$
 4. The final assessment would be “*High*”







Balanced ScoreCard

Issue:

Product Part Process

Motivation:

Strategic Value Added:

- Cust Experience (CE)  favorable to outsourcing
- Tech Clockspeed (TC)  favorable to outsourcing
- Industry Climate (IC)  favorable to outsourcing
- SC Excellence (SC)  favorable to outsourcing
- Product Architecture (PA)  unfavorable for outsourcing
- Competitive Position (CP)  unfavorable for outsourcing

Economic Value Added

OEM Unit Cost \$ _____
Dell Unit Cost \$ _____ *From New Business Development*

Synthesis

- Gut check (does it fit Dell's Strategy)
- Does it fit the business Model
- Are incentives/values aligned for success

Recommendation/Concerns:

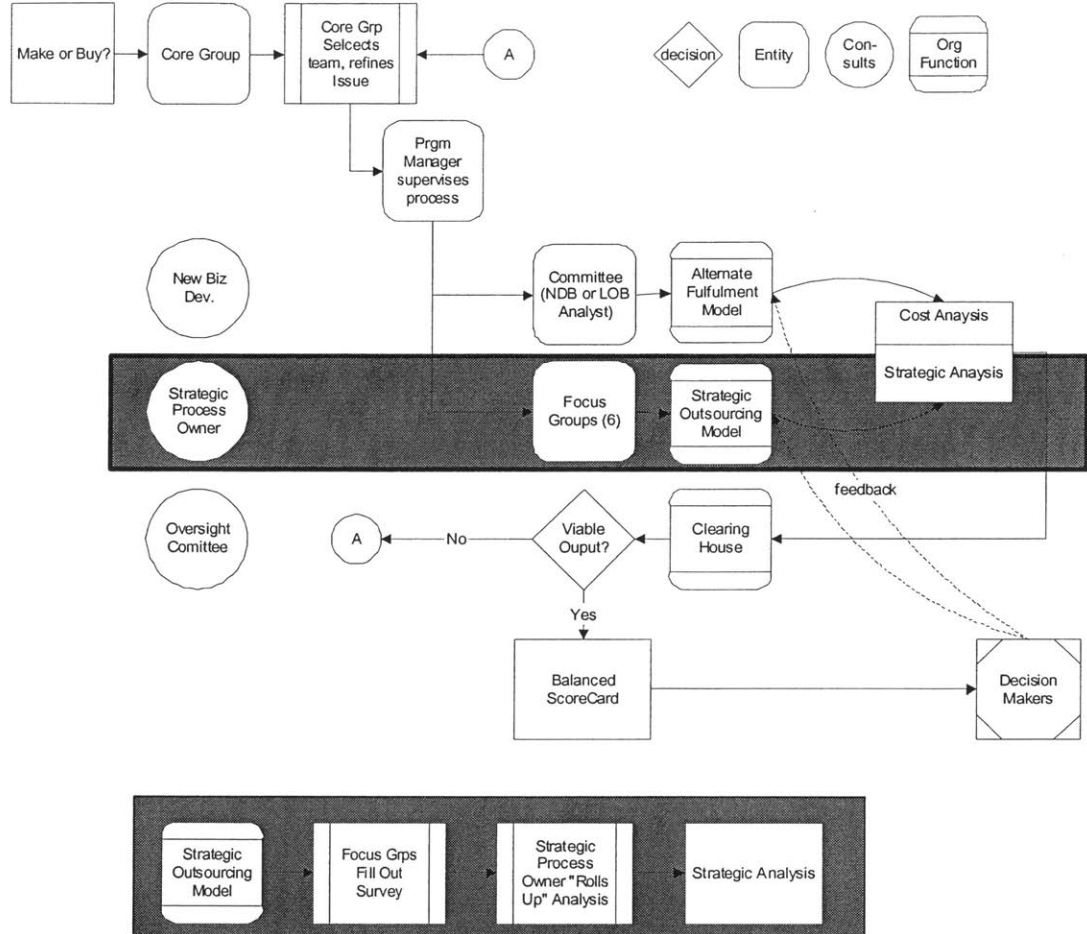
Filled in by Model Owner

Appendix 5 Implementation of the Strategic Outsourcing Model

Combined Implementation Flow Chart

Concurrent* Outsourcing

Process Flow Diagram
Thursday, October 17, 2002



*New Strategic process (shaded boxes) to be combined with Alternative Fulfillment Model

Appendix 6 Bibliography / Literature Review

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