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[NOVELLUS **STRATEGY CASE**]

Novellus STRATEGY CASE

Due to the fact that the speaker, Dr. Kevin Illcisin, is Tektronix CTO, we included Tektronix background here.

Tektronix Background

Tektronix, Inc., founded in 1946, is the world's second largest supplier of electronic testing and measuring devices. The company develops, manufactures, and markets oscilloscopes--instruments used to measure and display electrical signals--as well as logic analyzers, signal sources, spectrum analyzers, and communication and video test equipment.

Three U.S. Coast Guard veterans and an electronics expert from the U.S. Army Signal Corps founded Tektronix after World War II. Melvin Jack Murdock along with his friends Glenn Leland and Miles Tippery and bringing Charles Howard Vollum who was also electronic savvy established an electronic equipment company as Tekrad and then later renamed it Tektronix.

Du Mont Company was the leading manufacturer of oscilloscopes at the time. However Vollum designed an oscilloscope in 1946, which became far more accurate than anything then in the market. Soon Tektronix manufactured lighter models including the first portable oscilloscope. From a humble beginning, Tektronix managed to quickly pull off a spectacular growth from product offerings to market share and financial gain. Tektronix's revenue grew an astonishing 4,000 percent in the 1950s and continued to grow in 1960s controlling 75 percent of the world's market for oscilloscopes.

Tektronix serves many industries, including computing, communications, semiconductors, education, government, military, aerospace, research, automotive, and consumer electronics. Its culture was praised and the company was cited in the book: The 100 Best Companies to Work for in America. However, there was a growing concern during 1960s over Tektronix dependency on one product and lack of diversification. Over the next few decades Tektronix’s had a rollercoaster performance. Tektronix tried to grow by diversification in 1974 when purchased Grass Valley Group and in 2004 when acquired Inet Technologies. It split itself into two major divisions in 1999 and sold out its printer division to Xerox in a $950 million deal. It then was acquired by Danaher Corporation and became its subsidiary in 2007.[1], [2], [3]

Tektronix strategy is to focus its efforts on selecting product categories with the communications test and general-purpose categories where Tektronix either has a market leadership position or where Tektronix can grow to a market leadership position. They are focused on long-term growth from three perspectives:

- Growing market share in core product categories where Tektronix already has a strong market position
- Expanding the addressable market for core categories, and
- Leveraging existing strengths into adjacent products categories.[4]

Novellus Background

Novellus provided semiconductor device manufacturers with advanced chemical vapor deposition (CVD) processing solutions that delivered superior productivity, the highest film quality, and the lowest cost of ownership. Novellus Systems, Inc.'s vision was to achieve total customer satisfaction by providing advanced CVD technology with high productivity. The Company's products were differentiated by their ability to provide simultaneous solutions to productivity and wafer quality problems facing the worldwide semiconductor manufacturing industry.

Based in San Jose, California, Novellus Systems, Inc. was a leading semiconductor capital equipment manufacturer of chemical vapor deposition (CVD) systems. The CVD process places a layer of either conductive or insulating material on a silicon wafer in order to connect two or more levels of circuitry in the process of manufacturing semiconductors.

Brad Mattson and other former employees of Applied Materials founded Novellus. They built a prototype CVD system, but ran out of money to continue operations. In 1986 Robert Graham, senior VP in Applied Material that had tried to convince the company to buy Novellus and didn’t succeed, left Applied Material and joined Novellus as its CEO. He worked with his Japanese distributors and was able to manage the completion, sale and shipment of the first product, Concept One in 1987.

Novellus had a spectacular growth and performance history throughout its operation. From the time it went public in 1988, its stock price constant growth was evidence to its successful business. Within 5 years from its conception, Novellus was able to become one of the top three players in the semiconductor capital equipment manufacturers, competing head to head with Applied Materials and Genus. It continued its innovation by new offerings like Concept Two – ALTUS in 1992. As the competition with Applied Material was very tight and Novellus was growing in both size and market share, Applied Material filed a patent infringement law suit in 1995 claiming that Concept One designed was stolen from them. Novellus responded by a counter lawsuit on an Applied Material product design being stolen from Novellus. Novellus realized the need to grow by diversification and expanded beyond deposition technology into wafer surface preparation equipment market in 1995.

As the competition in the international market demanded a strong position, Novellus started to partner with Lam Research, another competitor. The partnership was very successful for both companies as it strengthen their position among their competitors and allowed them to win more customers and market share. This partnership proved the benefit of the merger. In 2011, Novellus accepted to be acquired by Lam Research for $3.3 billion and the sale closed in 2012. [5], [6]

Case Synopsis

Novellus looking for satisfying a client´s requirements, strategized to enter in a new business where competitors had a well-established position and very competitive products. Thanks to collaboration with the Common Platform, Novellus had access to comprehensive chip designs and support. For the costumer requirements, Novellus needed to develop new chemistries (process engineering) for a thin film technology that would enable the deposition of the semiconductor material layers.

Novellus' customer was entering into a new market where companies such as Intel, Samsung and TSMC dominated the semiconductor capital equipment (CapEx). Novellus was also a new comer, and its principal competitors, Applied Materials and ASM, had existing products with very good performance and competitive price. Based on the features of the competitor's products, Novellus had very low expectations for the profitability of the new business unit, however Novellus mangers realized that if they wanted to be successful, it was necessary for them to develop a film with specific features that could be differentiated from what there were already in the market.

Novellus' strategy to break into an established market consisted in focusing on the solution to be provided to its customer's clients. After receiving insights from the client's customers, Novellus's Managers, Marketing and Product Development engineering team opted for developing a differentiated product which was more reliable than the competitors' ones (10% less risk of field failure), and that would provide higher yields for the clients. Novellus strategy resulted in a successful business unit of $150 Million, which secured a position as a qualified supplier, so the company was able to get repeated businesses.

Dr. Ilcisin utilized Nabc and OST frameworks in forming the company's strategy. These methods helped him identify the needs, approaches to solve costumer's problem, benefits per cost, and competitors or alternatives. Novellus' need was to break into an established market and their solution was focus on providing solution to the customer's customers' need. The benefits per cost were regarding to offer a differentiated product that could have 2-month lead over competitors and that minimized requal costs. Also the OST method helped to succinctly identify Novellus goal, strategy as well as the tactics and actions required to reach its goal.

Scenario and Strategy Qualifiers	Description
What (and When) (the situation happened)	1) Novellus has historically focused on a single aspect of the semiconductor device process, the deposition of conducting and insulating material films. 2) The company wanted to expand beyond deposition technologies to develop new chemistries (process engineering) and enter in the semiconductor film

	market. 3) Novellus was entering a new market were competitors had an existing remarkable presence.
Who (are the Lead Actors)	1) Novellus in general, CTO, Marketing and Product Development engineering which includes process and Mechanical R&D in particular. 2) Novellus customers 3) Novellus customers' customers 3) Competitors in particular Applied Materials and ASM
Why (did Company A get to this situation, is Company A re-positioning itself, etc.)	1) Novellus wanted to grow and obtain more revenue from its customers 2) Novellus wanted to create a "footprint" in the tool business. The goal was to enter and then secure its position for extending revenue as qualified supplier in a profitable business. As the customer's transition costs were very high, Novellus was banking on the tendency of getting all the repeat business 3) This was an opportunity to leverage existing strengths into adjacent products categories
How (to change the company—strategy)	1) Novellus with superior process and mechanical R&D was able to produce a differentiated more reliable product that won the competition.

Case Study Analysis

Novellus' objective was to increase its market share in the worldwide-interconnected market and strengthen its position as a leading supplier of semiconductor processing equipment. The key elements of Novellus' strategy were:

- Emphasis on High Productivity Systems.
- Leadership in dielectric deposition, metals deposition, and surface preparation technologies.
- Focus On Major Semiconductor Manufacturers.
- Expansion of Asian Market Presence.
- Low Manufacturing Cost Structure.

In the described case study Novellus was trying to enter a new space outside its core competency where its competitors had strong presence. As depicted in Appendix I, we studied the case by constructing a Strategy Policy Matrix to analyze the effect of all involving factors on each other in such environment. This analysis confirmed the challenges that Novellus was facing and needed to strategize to overcome them. The identified challenges were:

- Novellus was going to produce a new product outside its core competencies that required creating new production capabilities.
- The Thin-Film market was highly competitive and already established. Novellus needed to differentiate its product to enter the competition.
- The product at the minimum requirement should not been worse than the competitors' ones.
- As Novellus was entering an existing competitive market it needed to focus on having a superior process and fast production.

Strategic Business Model

Based on these identified challenges, we believed that Novellus needed to apply a "Market Response Strategy", described in detail in Chapter 3 of Dr. Betz book [7]. This perspective is optimal to enter an established market dominated by a large competitor, and requires that the organization concentrate resources on the optimal opportunities with the goals of increasing sales and achieving a sustainable competitive advantage. As Novellus was entering an established market where competitors had very competitive products, it required the use of resources and non-optimization of profits in order to optimize short-term sales to acquire a significant share of a market.

Betz [7] suggested that any organization entering in an established market could benefit from this strategic if it is able to respond to market changes faster than competitors by *refining product successes, emulating competitors' product successes and correcting product mistakes*. If Novellus wanted to gain a dominant position in this new market, the organization had to offer a differentiated product that could offer some attractive feature(s) superior to the competitor offerings in order to create incentive for the customers to switch or select Novellus's product. This would also provide Novellus the possibility of more future businesses once it becoming a better established supplier.

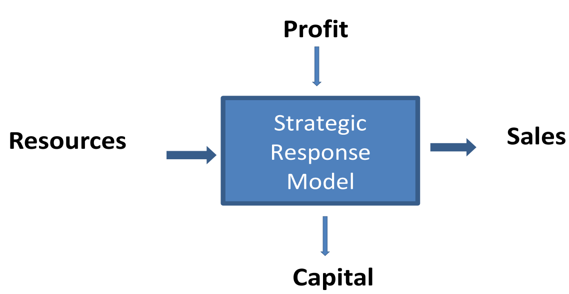

Figure 1: Market Dominance Strategy

In such market, and as depicted in Figure 1, Novellus needed to invest on a high quality operation using the companies earned profit and hiring appropriate resources needed to develop this competency. The results of these investments would be reflected in sales and long-term growth. Novellus utilizing its strong brand equity, and extensive experience from its other operations, needed to correct any product mistakes. It had to invest in an operation to emulate competitors' product success. This would be the only strategy to allow the company to survive and thriving its sales and reach the goal of capital gain.

Industry-Context Analysis

As Novellus was diversifying from its core competences, it was also necessary to consider the competitive conditions in the portfolio analysis. According to Betz [7] in large and mature industries, the market size is stable, and growth must come from the market share of a competitor. Novellus was precisely entering this kind of market, with the semiconductor capital equipment industry tending to consolidation and fierce competition[8]; competitor were already dominant in the market with well-performing products and aggressive price points. In this market, according to Betz , no business can experience large market growth except at the expense of competitors, Novellus in order to survive needed to become a dominant player, have large market, or being at the risk of existence in that submarket with a small market share. Therefore it was vital for Novellus to invest heavily on producing a differentiating product and focusing on growing its market share to establish dominancy. Following Betz [7] statement, becoming a dominant player in this market required for Novellus to be a low-cost and high-quality leader in order to maintain or gain market share. The only strategic way to survive over the long term would be to establish and maintain a significant market share.

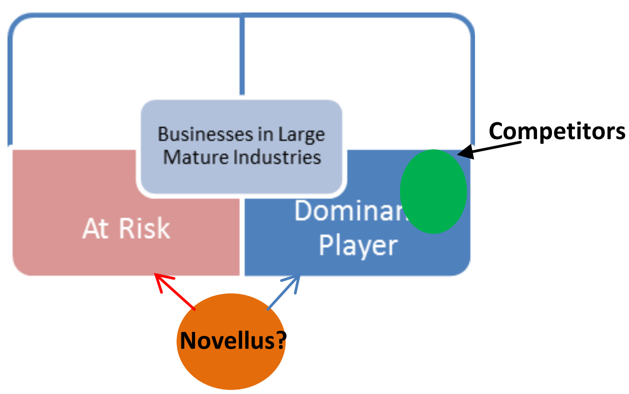

Figure 2: Novellus' Industry –Context

To ensure we haven't missed any of the factors that needed to be included during the strategy design, we also conduct a quick SWOT analysis as depicted in Appendix II. The SWOT analysis also led to a similar strategy: to develop a product that is differentiated and can provide superior features that allow winning customers over competitors.

Recommendation

We have decided to use the bottom-up perspective strategic [7] (business-up to the larger world) to provide our recommendation for Novellus' strategy. The involvement of Novellus in the Thin-Film business could provide a major source of income over the long term if costumers' requirements are met and the new product is superior to competitors and evolves to maintain its competitiveness. At the operating levels of businesses, Novellus needed to look to the strategic immediacy of the business's markets, competitors, operations, and knowledge. Betz [7] suggest five steps in bottom-up strategy thinking:

1. Examine the trends in sales in the markets of the businesses, and identify innovations that can alter these markets and costumer's applications.
2. Benchmark a firm's products and processes against competitors' products and processes and identify changes needed to maintain or surpass any competitor's current advantages.
3. Anticipate innovations in products/services and in production/distribution.
4. Reexamine current operations and control, and identify innovations in operations and control of operations needed to adapt to changes in market, competition, and new information and knowledge capabilities.
5. Formulate a business plan, with targets for market-share and profits along with required investments and resources needed to achieve the plan.

Following the above steps, it could be suggested for Novellus mangers to focus on the end costumer needs or desires, in order to provide a differentiated product that at the minimum was not worse than what the competitors were offering. Only this would allow winning customers over competitors, and then Novellus could grow by both diversification and innovation. To do so the company needed to develop the required capabilities to meet customer expectations, and prioritize product features where Novellus could have had a competitive advantage.

Here the Path Connecting Knowledge to Financial perspective is the High-Tech Production [7]. In this model, Novellus could foster superior manufacturing process and Mechanical R&D with the goal to source innovation of new operations, and technical production process to result in new thin-film product superior than the competitors'. Through this product and the future adjacent products lines using the superior operation, it aims to expand its market share as a supplier with the goal to reach higher prosperity.

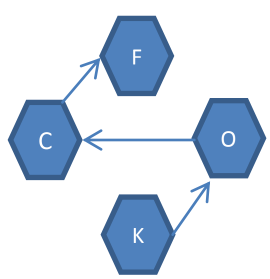

Figure 3: High-Tech Production Path

Figure 4 summarizes the operations plan we suggest for Novellus and that derives from a strategic bottom-up perspective analysis. Specific details are not provided since we lacked of relevant information regarding the company and competitors.

Figure 4: Operations Plan

Discussion

The case study is about Novellus finding an opportunity to diversify. As Dr. Betz has explained in detail in Chapter 12 of the textbook [7], diversification is one of the vehicle to drive growth. Novellus had grown primarily by innovation. Its prominent products including Concept One and Concept Two were the result of the company's innovative culture and strategy. When Novellus was approached by its customer, it found a window of opportunity to grow by diversification. And to reach this diversification they realized the challenge of competition and the need for product differentiation. As reliability was the key differentiation factor identified by addressing the Novellus customer's customer's needs, they focused their efforts in innovating a product more reliable than the competitors' ones (10% less risk of field failure), and that would provide higher yields for the clients. Novellus strategy resulted in a successful business unit of $150 Million which secured a position as a qualified supplier, so the company was able to get repeated businesses.

Dr. Illcisin summarized Novellus strategic approach for this case under Nabc and OST frameworks as following:

- Needs: Break into an established market
- Approaches: Provide solution to the customer's customers' need
- Benefits per costs: Differentiation

- Competition or alternatives: 2-month lead, Minimize requal costs

- Objectives: Film in 6 months with a new capability
- Strategies: Solve the differentiation problem
- Tactics:
    - End-user Voice of costumer
    - Stop existing optimization R&D
    - Cover all qualification costs (On-site People)
- Actions:
    - Personnel replacement

These frameworks seem to be very practical “back-of-the-envelope” tool to quickly identify the overall strategy. However, the Nabc fails to consider all the factors involved for a detail strategy formation. As identified, companies trying to enter a business in large and mature industries are at great risk and require a master planned strategy to become the dominant player. Though Novellus did choose a great strategy, it doesn’t seem that the framework was the reason for it.

Due to extensive working experience and depth of knowledge, Ilcisin has built up an intuition on how to strategize the business. We believe that his strategic thinking is massively benefiting from his intuition and it’s beyond the frameworks that he is following. Nabc and OST as the frameworks capture the heart of planning for a strategy. They can successfully address the need of customers while being competitive and feasible. However, they both seem very general and could be used for overall planning. There are many more sophisticated approaches that involve more detailed analysis and planning that captures aspects of strategy planning that these methodologies are lacking. For instance they are lacking Risk Analysis and Mitigation Plan.

We in particular favor the Holistic Strategy Planning process [7] that integrated many factors and consideration to ensure proper strategy planning and model. They include:

- Top-Down Strategic Thinking to do detail Planning Scenario capturing all the external underlying structures from Government, economy, culture and science & technology.

- Bottom-Up Strategy Thinking to create a business model considering markets and innovation, information and knowledge, competition and structure, and operations and control.

Since we lacked the knowledge about the high level factors like economy at the time of case study to form planning scenarios we were unable to conduct a Top-down strategy planning.

The Nabc framework is more related to the bottom up strategic thinking approach. Because it focuses on customer needs. It builds on it to come with an approach to address these needs, and become the underline focus for the cost benefit analysis compared to what the competitors offer. Also the OST while analyzing the objective, it ignores the environment in which the strategy should be planned.

Conclusion

Another important fact that Betz [7] points out is that successful vision is based upon the same conditions that all successful intuition rests—an experiential base. Therefore, the basis of experience provides the grounds for and foundation of intuition. The “Tao,” the “Way,” the “Strategy” is the perception, commitment, preparation, and policies before any battle and before all battles—the strategic philosophy of action.

We believe that Novellus success story in producing Thin-film and its ability to strategize a successful entry to an established market was due to its leaders’ “Tao”. Their great intuition based on extensive experience envisioned the opportunity to enter into a market where they could grow. They were committed to their strategy and ways to materialize a successful competition. Their product differentiation strategy gave them the appropriate preparation for superior competition.

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Appendix I – Strategies Policies Matrix

	Product	Production	Marketing	Organization	Finance	Diversify	Innovation	Competition
Product		This is a new product that requires creating a new production capability	The thin-film allows Novellus to market itself as a better supplier with its differentiated product influenced by end users requirements. This also allows growing market share.		The new product allows Novellus to enter "Substrate Technology" contributing to Novellus overall Capital market share. They finance the new division using the earned profits.	Thin-film allows Novellus to diversify it's manufacturing business.	As Novellus innovated the product to create a more reliable film, they incrementally innovated.	Thin-Film market is a highly competitive and established one. Novellus needs to differentiate its supply to enter the competition.
Production	Novellus focus on better production was through superior process and mechanical R&D to make the product more reliable.							
Marketing	Novellus marketing allowed creating better product by trying to meet end user's requirements.							The marketing strategy to meet end user's requirement as opposed to the direct customer enabled Novellus to create a more competitive product with higher reliability.
Finance	Novellus funds its new products with the current profits.							
Diversify				Creating Thin-film product strengthen Novellus position as a supplier organization. Novellus also needed to expand its organization to bring skilled personnel for the new business				Diversification while provide competitive advantage, it also makes the competition more massive and challenging (more market and bigger set of competitors)

Innovation	Novellus incremental innovation strategy allowed offering superior product				This incremental innovation strengthens Novellus financial position in the market through increased revenue and market share.	The Novellus incremental Thin-film product innovation allowed its further diversification		
Competition	Novellus needed to offer a more reliable product to establish a competitive position.	The existing competitive market pressured Novellus to have an effective and fast production.						

Appendix II – SWOT Analysis

Strengths:

- Established relationship with the customer.
- Novellus enjoys a strong brand equity as a high quality manufacturing equipment provider

Weaknesses:

- Novellus is new in an established market.
- Competitors have strong presence in this market.

Opportunities:

- Market growth by innovation.
- Revenue growth.
- Thin-film is a footprint win business that allows more repeated businesses due to high cost for transition.
- Opportunity for expanding market with the existing customers.

Threats:

- This is an established market.
- Competitors are offering higher performance and cheaper products.

Appendix II – Holistic Strategy planning