**Case Teaching Note - 3M The Innovation Engine**

**Case Synopsis**

This case traces the development of 3M’s remarkable innovative culture from its early days through until 2018. Earlier versions of this case have appeared in prior issues of the text. The main focus of the case is on the evolution of culture at 3M, and how this culture drove the strategy of organic diversification through a continual stream of product innovations that have taken the company into a large number of different businesses. The case looks at how management deliberately institutionalized the emerging culture at 3M by creating rules and procedures that provided opportunities for, and rewarded, innovative risk taking. The classic example of this is 3M’s famous 15% rule, under which research scientists are allowed to use 15% of their work time to pursue any project of their choosing. Many other examples are given in the case. The case closes with a discussion of how 3M started to stumble in the 1990s, and looks at the actions taken by Jim McNerney, who was 3M’s CEO from 2000 to 2005, and his successors George Buckley and Inge Thulin. McNerney joined 3M from General Electric, and he introduced many GE practices at 3M.

**Author Note**

The case works best when positioned towards the end of a strategic management course. It is very useful for illustrating the material covered in chapters 10 and 13 of the text. The case also covers topics discussed in chapter 8 on global strategy. The case works particularly well when taught in conjunction with the case on GE that is included in the case selection of the book. I typically teach these cases back to back. These cases illustrate different ways of creating value from diversification. 3M has been focused more on organic diversification generated through innovation. GE has been much more aggressive on the acquisition front, and under Welch and Immelt diversified into a wide range of seemingly unrelated areas.

The comparison between 3M and GE is a particularly interesting one, given that McNerney was a former GE executive, and that he introduced many GE principles at 3M. If you aim to teach both cases, I recommend teaching the GE case first.

**Learning Objectives**

The learning objectives from the text that this case addresses:

3.5 Identify and explore the role of efficiency, quality, innovation, and customer responsiveness in building and maintaining a competitive advantage

4.3 Explain how an enterprise can use functional-level strategies to increase its innovation

8.1 Understand the process of globalization and how it impacts a company’s strategy

8.2 Discuss the motives for expanding internationally

8.3 Review the different strategies that companies use to compete in the global marketplace

10.1 Differentiate between multibusiness models based on related and unrelated diversification

10.2 Explain the five primary ways in which diversification can increase company profitability

10.3 Discuss the conditions that lead managers to pursue related diversification versus unrelated diversification, and explain why some companies pursue both strategies

10.4 Describe the three methods companies use to enter new industries—internal new venturing, acquisitions, and joint ventures—and discuss the advantages and disadvantages associated with each method

12.2 Articulate how strategy is implemented through the right combination of organizational structure, controls, incentives, process, culture, and people

12.3 Discuss how effective organizational design enables a company to implement its business-level strategy

**Strategic Issues and Suggested Discussion Questions and Answers**

*1. What are the roots of 3M’s culture of entrepreneurship and innovation? What were the key tenets of this culture as they emerged over time?*

Roots of Culture: 3M’s culture did not emerge fully formed from nowhere. A number of pivotal events, several of which were the result of serendipitous circumstances, played a large role in the early evolution of the company. They were…..

* 1920s: Okie’s serendipitous letter to McKnight, the inquiry that followed, and Okie’s subsequent development of waterproof sandpaper for 3M. “Wetodry” was 3M’s first patented product innovation. Its success focused management’s attention on the value of innovation.
* 1925: Dick Drew’s development of masking tape, initially over the objections of McKnight. Drew was responding to a problem he saw among customers in automobile manufacturing, and his response was based around leveraging technology to solve the problem. He took his knowledge of sandpaper adhesives, and applied it to develop sticky tape. Thus was born the long tradition of technology leveraging at 3M.
* In addition, Drew’s action convinced McKnight of the importance of giving individuals freedom to explore their own ideas - it convinced him of the value of autonomous action. It led to the institutionalization of the 15% rule.
* 1950s: The development of Scotch Guard was the serendipitous outcome of an accidental spill of rubber that 3M was making for jet fuel lines. The successful product demonstrated yet again the importance of leveraging technology.
* 1970s: The development of Post-it-Notes. Technology in search of a product. Developed by Silver, and shopped around for years, then picked up by Art Fry whose eureka moment came because a marker kept falling out of his hymn book. Developed on 15% time. Showed yet again the value of leveraging technology, serendipity, and autonomous action.

Tenets of Culture: Out of these events, and others like them, emerged a culture whose tenets stressed the following:

* Autonomous action by entrepreneurially inclined individuals was a primary engine of growth.
* Leveraging core technology to exploit new product market opportunities. At 3M, technology was viewed as having many different possible applications. There was faith in the notion that technology - any technology - could ultimately be leveraged to create new business opportunities. This found expression in the norm “while products belong to businesses, technology belongs to the company”.
* Viewing products as giving the company a “window on customer needs”. Get behind the smoke stakes was a key phrase of McKnight’s. Identification of these needs provided the inspiration for many product development efforts. The resulting “auto-catalytic” process was a primary engine of 3M’s product development efforts and growth.
* Recognizing the value of serendipity and exploiting it.
* Don’t overly manage early stages of new product development. Development trajectory is somewhat unpredictable.
* Decentralize Bottom up Organization! Good ideas come from deep down in the organization.
* Make a little sell a little. This idea was born out of the notion that the technology developed to support small product markets could ultimately lead to big opportunities if and when leveraged to other areas.

*2. How has the culture of entrepreneurship and innovation nurtured at 3M from the era of McKnight through to that of DeSimone? How has entrepreneurship been institutionalized within the company?*

A number of formal and informal developments helped to institutionalize entrepreneurship and innovation at 3M.

Formal Developments/Steps

* McKnight created a Central Research Lab (CRL) in 1937, whose explicit mission was to expand and leverage the company’s know-how in adhesives, coatings, materials technologies, and the like. Researchers were from multiple disciplinary backgrounds.
* McKnight instituted the 15% rule to encourage autonomous action by researchers.
* A structure was created to help leverage technology across businesses. This involved the Technical Council and the Technical Forum. One purpose of these formal structures was to help construct an informal network within 3M’s scientific community for leveraging technology. Get scientists talking to scientists in different divisions, and in the CRL.
* Lead User Processes: Go and watch customers work in demanding situations.
* Dual career structures that recognize that hierarchical power is not the only motivation or reward for entrepreneurially inclined individuals.
* Awards. Carlton Society and Circle of Technical Excellence.
* Substantial decentralization. Decisions and responsibilities pushed down to autonomous divisions. Helped maintain small company entrepreneurial atmosphere within a large company. Consistent with bottom up business development process.
* Renewal Philosophy. Grow and divided philosophy resulted in the almost continual creation of self-contained divisions that helped to maintain a small company atmosphere within a large organization. Also, this philosophy maximized the possibilities for entrepreneurial action within 3M. Created incentive for business whose growth drivers are spun off into separate divisions to find new growth drivers!
* Technology Auditing Process: From 1960s onwards, projects within a business received a technical review from peers who issued non-binding recommendations. Attempt to reduce the R&D failure rate.
* Requests for seed capital. Formal business plans not required for early stage funding. Scientists can shop their ideas around if their business unit decides not to fund them.
* Genesis Grants: Up to $100,000 to fund projects that do not receive money through regular channels.
* Pacing Plus Programs (1994): Attempt to focus resources on key development projects (suggests organization getting too decentralized).
* IPC (1999): Look for ways to leverage technology across company.
* Stretch Goals. Date back to McKnight. By 1977 25% of sales from products on the market less than five years. By 1990s, 30% of sales from product on the market less than four years.
* Exit. Systematic closure or exist of low growth or mature commodity businesses that did not meet 3M’s goals.

Informal Development

* The creation and celebration of heroes and the propagation of organizational myths. Many of these heroes were figures who “defied orders” in order to continuing research on products that ultimately become huge winners. In addition to Dick Drew, there was Alvin Boese (non-woven fibers), Philip Palmquist (3M’s reflective technology), and the project team that produced Thinsulate (over the repeated objections of CEO to be Desi DeSimone). These stories emphasize the importance of autonomous action.
* Encouragement of risk taking and acceptance of well-intentioned failures. Ideology supported by stories (more myths) of how “failed” technologies eventually found profitable applications. “60% of our formal new product development efforts never make it”.
* Patient money. The idea that it can take a long time for a technology to show its promise. Keep a handful of people working on a technology for years. Many stories used to illustrate this. Scotchlite did not show profit for a decade.
* Divisions own products, company owns technology. Important organizational norm.

*3. What were the strengths of the organization and culture of 3M during the McKnight to DeSimone era? What were the potential weaknesses?*

The strengths of this culture are quite obvious.

* McKnight and his accomplices helped to create an innovation machine that was constantly developing new technologies and leveraging technologies both old and new to exploit new product market opportunities. Through this process 3M created a large number of markets - both large and small - many of which it subsequently came to dominate. 3M had a long-term orientation, as demonstrated by its patient money philosophy.
* Employee turnover was very low – people were committed to the company. Knowledge did not walk out of the door.
* Incentive alignment: Stock incentive and profit bonus plans introduced early on.

Potential weaknesses include the following:

* By 1990s, company was not producing blockbusters. Why? Not making big expensive bets that were required to develop new technology. Signs that resources were spread too thinly over too many opportunities, hence the Pacing Plus Programs. Possible that too many projects were funded.
* Patient money philosophy may lead to a failure to kill projects.
* Decentralization implies duplication. Particularly evident in sales and purchasing. Also, possibly in manufacturing. Failure to realize scale economies may have resulted in high costs.

*4. The expansion of 3M into international markets was highly successful. What explains this?*

* Valuable technology and products transferred to foreign markets where incumbents lacked them. Expanding the market for the asset.
* Foreign ventures expected to pay their own way.
* Phased entry reduced risks of failure
* Enter via exporting and sales subsidiaries to learn about market.
* When volumes build, design and ship products converted to sizes and packaging that matched local market needs.
* Design and build plants overseas
* Move R&D overseas.
* FIDO: First in Defeats Others
* Hired local citizens, customized to local requirements
* Enforced patents (protect IP).
* Leverage technology between different national operations (Pathfinder program).

*5. What was the drawback with 3M’s international expansion strategy?*

* 3M pursued a localization strategy. Each national subsidiary developed as a stand-alone unit, hence there was a lot of duplication.
* In 1980s and 1990s environment changed.
* Fall of trade barriers and rise of regional groups (EU and NAFTA).
* Emergence of competitors pursuing a global strategy.
* Asian economic crisis exposed the highs costs of 3M.
* 3M had to change organization form. Move from country to regional organization in an attempt to realize scale economies.
* 3M is trying to become a transnational organization, balancing local responsiveness with the centralization of manufacturing activities in ordre to drive down costs.

*6. By the 1990s 3M was starting to develop some problems. What were the causes of these problems?*

* The things that made 3M great, decentralized organization and patient money philosophy led to the pursuit of too many R&D projects. Money was spread too thinly.
* Lack of blockbuster products
* Duplication within decentralized organization meant high costs – inability to realize scale economies due to duplication of manufacturing, marketing, sales and R&D functions.
* Pursuit of a localization strategy in international markets also lead to high costs and an inability to realize scale economies. .
* There was a lack of progress in improving operating efficiency. Several initiatives aimed at boosting productivity were introduced in the 1990s, but none were very successful, probably because there was am unwillingness to alter the underlying structure and culture of 3M.

*7. Why did 3M’s board hire an outsider, McNerney, to run 3M after DeSimone. What was McNerney trying to do at 3M? What were the pros and cons of his approach?*

3M needed to shift its culture. 3M was increasingly out of step with a more competitive environment. An insider may have been too hesitant to change the structure and culture of the organization.

* McNerney was trying to bring the GE playbook developed under Welsh to 3M. Specifically, he was trying to improve operating efficiency by introducing the following initiatives….
* Six-sigma
* Indirect cost control
* E-productivity
* He is trying to improve management capabilities by introducing….
* An advance leadership program
* GE type performance evaluation systems
* He is trying to produce more blockbuster innovations by
* Rationalizing the R&D investment process
* Placing fewer big bets on emerging technologies (those with a potential of over $100 million a year)
* Introducing the 3M Acceleration program (again more money on fewer technologies) and getting products to market faster.
* One central R&D lab to replace 12 technology centers, with remaining R&D done in divisions. R&D lab to look at “white spaces”.

Pros: Better resource allocation and higher productivity could reignite growth.

Con: If not careful, could harm the innovative engine at 3M.

3M’s performance did improve significantly under McNerney’s leadership, but in 2005 he left to take the leadership position at Boeing. The critical question is “did McNerney’s changes improve 3M’s productivity *and* innovation engine, or did they improve productivity but hurt the innovative capabilities of the organization?

*8. McNerney was succeeded by another outsider, George Buckley in 2005. What was the thrust of Buckley’s strategy at 3M?*

In many ways Buckley continued on the track that McNerney had charted, emphasizing productivity improvement methodologies such as Six Sigma, and was rewarded with sustained increases in employee productivity. However, he removed Six Sigma from the labs. Buckley had a scientific background, and he shared the belief of many in 3M’s labs that innovation can’t be routinized through Six Sigma. He was seen within the company as a strong supporter of researchers. The change seems to have worked, since 3M increased the sales from new product introductions under Buckley. Buckley also continued to push 3M to invest aggressively in emerging markets that were predicted to grow faster than the United States. The result of these initiatives – 3M passed through the great financial crisis of 2008-2009 more smoothly than many major corporations and by the second decade of the 21st century the company was registering solid growth and profitability numbers.

In many ways, McNerney and Buckley had succeeded in improving the efficiency of 3M, boosting productivity, while keeping the innovation engine churning. As a result, 3M was a stronger corporation than it had been in the 1990s.