



Partnership for Innovation in Education

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THE 3M COMPANY

3M is looking to develop a new bandage wrap for young athletes. To determine the best options, 3M is looking at a range of product fabrics that will meet each of the specifications requested by the product engineering, finance and innovation departments. Can you help fulfill this assignment?

Situation

Dan Burns was excited to go to the first Xavier University basketball game of the season. Halfway through the game, star center Matt Stainbrook fell after making a lay-up. Matt was taken out of the game, and a trainer wrapped his knee for extra support.

Later in the game, Matt ran back onto the court with his knee still heavily wrapped. Although he was playing the best he could, Dan could tell he was still in pain. The thick, now sweaty, wrap made it awkward for Matt to run well. On Monday, Cameron Smith, Dan's boss at 3M, asked him about the game. Dan said, "It was a good game, but Matt Stainbrook injured his knee. They had to bandage him up, but even though the wrap was very thick, it kept on sliding down his leg because of how sweaty he was."

Cameron replied, "Hmmm, we are always working on improving our wraps and bandages, and I'd like you to share your insights with the team. Right now, they are testing different materials, and I want you to look at their data and decide which materials would be best for the redesigns."

Dan leaned back in his chair and gazed out the window. He watched as schoolchildren played in a nearby playground, thinking this new material might help young kids too, in a way different than the athletes 3M promoted in their advertising. With that, he walked down the hall to discuss his thoughts with 3M's new product engineers.

Background

Five businessmen in Minnesota founded 3M in 1902. After their first venture was unsuccessful, they decided to launch a new type of sandpaper instead. After a decade of work, they were able to sell a high-quality product.

In the 1920s, they developed the world's first waterproof sandpaper, masking tape, and Scotch® Cellophane Tape. Throughout the next hundred years, 3M continued innovating new products.

Since then, the company has expanded to become a multi-billion dollar company with its products sold in almost 200 countries. At the end of 2013, 3M reported \$30.8 billion in sales. \$19.7 billion (64%) of sales were done internationally. They have more than 88,000 employees globally and work to use their employee talents.

3M's values are centered on respect. Overall they seek to “act with uncompromising honesty and integrity in everything we do.” They respect their customers by satisfying them with “innovative technology and superior quality, value, and service” and their employees by “valu[ing] and develop[ing] our employees diverse talents, initiative, and leadership”. The company also works to “respect our social and physical environment around the world”. 3M must also respect their stockholders (people who have bought a fraction of the company) by making a profit and continuing to grow.

3M is divided into five business groups, allowing the company to innovate, manufacture, and distribute their products more efficiently. These groups are Consumer, Electronics and Energy, Health Care, Industrial, and Safety and Graphics. This case will focus on products from a division within the Consumer Business Group: Consumer Health Care.

3M's Market

Mintel Oxygen reports the 2013 U.S. First Aid Market was \$3.1 billion, a 4% increase from 2008 sales when adjusted for inflation. Mintel projects that the industry will increase to \$3.5 billion in sales by 2018.

But during this time, there will be more and more people aging. In fact, beginning in 2009, there are more than 9.4 million people aged 55 or older. Many baby-boomers (people born between 1946-1964) participated in physical activity as young adults and continue to do so, even as they age. Dr. Nicholas A. DiNubile, an orthopedic surgeon, says that “Boomers are the first generation that grew up exercising, and the first that expects, indeed demands, that they be able to exercise into their 70's.”

But while they are staying active, the *New York Times* reports that injuries to baby boomers have become the #2 most common reason for visits to doctors. The paper also found that boomers' injuries heal more slowly than younger people's because of a decrease in blood flow and growth hormones. Many use braces for their wrists, ankles, and knees to decrease pain.

The sports industry is another segment that interests 3M. In 2012, the Bureau of Labor Statistics found there were 14,900 professional athletes and sports competitors in America. They project this number will increase by 7% by 2022. Because this is such a small increase, jobs will remain highly competitive and sports players may feel the need to push themselves past their limits, which could lead to more injuries.

The Sports and Fitness Industry Association has also found that more than 21.5 million children between the ages of 6 and 17 play a team sport. On average, boys start playing organized sports earlier than girls, (the average boy starts when he is 6.8 years old, the average girl starts when she is 7.4) and children from households that make more than \$100K a year start earlier than those who make less than \$35K (6.3 years old versus 8.1 years).

A very common injury in sports is a sprained ankle. However, once someone suffers a sprained ankle, future injuries are more likely to occur. Dr. Matt Matava, a Professor of Orthopedic Surgery Washington University School of Medicine, says, “Most NFL teams require their players to have their ankles taped or braced during competition in an attempt to reduce the risk for recurrence.”

Products

3M has hundreds of products in many different categories. Some of their most well-known consumer products are Scotch® Branded Tapes, Post-it® Notes, and Command™ Strips. You might even have some of these in your home! Some of their different categories include Home and Leisure, Manufacturing and Industry, Office, and Healthcare.

The stretch wrap and bandages are part of the Consumer Health Care Division. These products target both individuals with chronic (on-going) issues and temporary ones, such as small cuts or scrapes.

3M owns Nexcare™ Brand First Aid Products, which includes bandages, tapes and wraps, found in grocery stores, pharmacies and other retail stores. Both the bandages and tapes/wraps have a variety of options such as material, use, and colors available for consumers.

Consumers have a wide range of choices in the bandage care category. They can choose to purchase bandages with licensed characters like Superman® or Strawberry Shortcake® and choose different sizes and styles of bandages, in addition to bright colors and waterproof options. There are also heavy-duty bandages, more flexible bandages for hard-to-cover areas, and bandages for people with sensitive skin.

Nexcare™ Brand tapes can be used to tape gauze to a cut or injured area, provide extra support, or secure splints. Their wraps can be used to secure dressings over a wound or to support and secure sprains.

3M also owns the Ace™ Brand line of braces and supports. Ace™ Brand offers elastic bandages and tapes, braces, and sports tape.

Research and Development

3M emphasizes their commitment to developing new products and making their current products better. They do this through a process called research and development. While 3M historically spent 5% of their revenue on research and development, 3M has indicated that it will increase the amount to 6% by 2017, which amounts to an extra \$300 million.

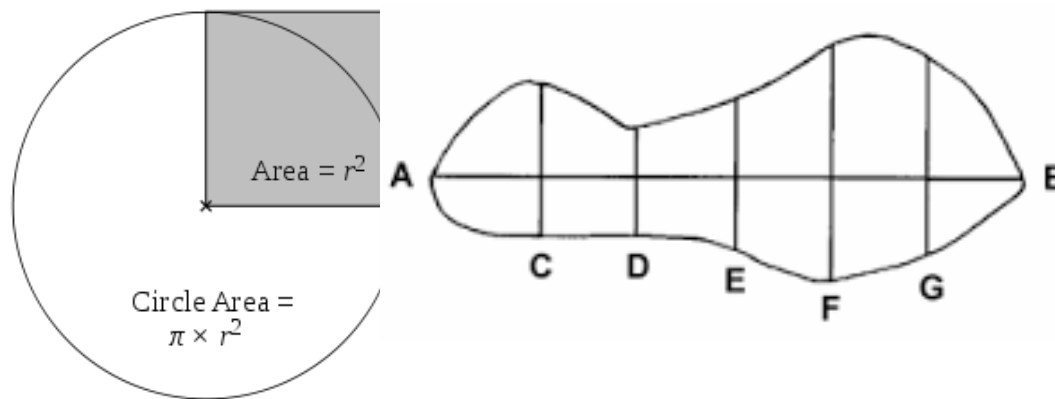
3M's new products and innovations make up a large percentage of its sales. While in 2008, 25% of their revenue came from products innovated in the past five years, it has risen to 34%.

3M encourages its researchers to discuss with each other what they are working on and what other ideas they might have. Researchers spend lots of time talking with consumers so that they can fully understand what needs consumers have and what consumers want to see in products. Once the researchers have a good idea of what they want to make, they develop a prototype (an initial and very basic version of the final product). If the prototype is approved, they can then go into testing different materials.

To determine what type of material should be used for a bandage, wrap, or brace, developers could test different variables such as the absorption rate and moisture dispersion.

-Absorption rate is how quickly it takes for a fabric to take in a specified amount of liquid.

-Moisture dispersion is how large of an area the liquid takes up. This can be measured using the diameter (the width) if the area is circular, or the length and width if the area is irregularly shaped.



$$\text{Area} = \text{Width} \cdot \text{Height}$$

Cost Analysis

During R&D, researchers must know the costs of their materials. All for-profit companies like 3M need to make a profit on their products, which means they need to sell them for more than it costs to make them. But customers have a certain amount they are willing to buy a product for, called a “price point”. If a product is priced above that point, a customer won’t purchase it.

To meet the “price point”, some companies manufacture products using inexpensive materials that wear out. This means the material won’t allow the product to be the “best performer”, but it will meet the product budget. However, an ineffective product can hurt overall sales and lower a company’s profit. And even more importantly, the company might suffer sales losses because customers don’t trust the brand anymore for quality products. Keep this in mind as we develop our new product material!

The Problem

3M has asked that you help create a new product using a fabric that does not retain water, and also yields high performance among athletes. Dan has 19 materials to test. Stage your selection process by applying scientific concepts and engineering. Which material should Dan recommend for wraps, supports, and/or bandages?

QUESTIONS TO BE RESEARCHED:

- What are the characteristics of the material? Would the material work better for a wrap or a bandage?
- How much liquid did the different materials absorb?
- What was their moisture dispersion rate?
- What consumer segments, such as highly active sports players or aging baby boomers, would the product be used for? What are their needs? How much are they willing to pay?
- How much does each material cost?

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