

Dupont, commercial applications and waste issues

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The Lally School of Management & Technology Rensselaer Polytechnic

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Applications Biomax®, a polyester material that can be recycled or decomposed, holds up under normal commercial conditions for a time period established in the product specifications.

The material itself can be made into fibers, films, or resins and is suitable for countless agricultural, industrial, and consumer products: mulch containers, mulching film, seed mats, plant pots, disposable eating utensils, blister packs, yard waste bags, parts of disposable diapers, blown bottles, injection molded products, coated paper products, and many, many others. In the United State alone, where the average household creates over three tons of disposable waste each year, the number of potential applications for Biomax® is immense.

Its development represents a potentially huge business for DuPont and an important solution to the mounting problem of solid waste in developed countries. In 1989 at the inception of the project, DuPont executives were pressing research units to find new products with commercial applications. One of these research units had developed a new "melt-spun" elastomeric material and was seeking commercial applications through the Success Group, its business development unit. The initial target application was as a substitute for the tapes then used on disposable baby diapers, which at that time used more expensive DuPont Lycra for that purpose.

Rather than lose that business, however, the division dropped the price of Lycra. The project had reached its first dead end. A senior research associate of the Success Group, Ray Tietz, had noted the degradable characteristics of <https://assignbuster.com/dupont-commercial-applications-and-waste-issues/>

this new material. " One of the problems they had with the fibers we made with this material was that it would disintegrate if you boiled it in water. This was because of the sulphonate in it. I knew that if I made a polyester with this stuff in it, it would probably hydrolyze quickly. It might even be biodegradable. John Moore, the head of the Success Group, was a high energy " promoter," as one colleague described him. He was determined to find a customer for whom degradability would be an important benefit—hopefully, a big one. A logical target was Procter & Gamble, a major vendor of disposable diapers. Procter & Gamble first introduced the disposable diaper in 1961 and by 1989 had built it into a huge business. Its success, however, coincided with a period of growing environmental This case was prepared by Mark Rice, Gina O'Connor, Richard Leifer, Christopher McDermott, Lois Peters, and Robert Veryzer, Jr. of the Lally School of Management and Technology, Rensselaer Polytechnic Institute, Troy, NY as a basis for class discussion, and is not designed to present illustrations of either correct or incorrect handling of management problems. All rights reserved © 2000. To order copies or request permission to reproduce materials, call 1-518-276-6842 or write Dr. Gina Colarelli O'Connor, Lally School of Management & Technology, Rensselaer Polytechnic Institute, 110 Eighth Street, Troy, NY 12180.

No part of this publication may be reproduced, stored in a retrieval system, used in a spreadsheet, or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise, without the permission of the Lally School of Management & Technology. 1 DuPont's Biomax® awareness, and it didn't take long before the millions of used

diapers sold by P and its imitators were attracting the attention of activists and regulators. By the 1980s, a growing number of voices were talking about either banning or significantly restricting the use of this class of products.

Sensing the public mood and nervous about possible regulations, P was more than willing to listen to Moore's pitch about the new degradable material. It even revealed its interest in the development of an entirely new material, one that was both degradable, and that didn't have the "crinkly" feel of plastic or the "rustling" sound of paper. The diaper that P's people envisioned would be a laminate with a cloth-like feel on the inside and a waterproof film on the outside, and they encouraged DuPont to work on a prototype. Sensing a huge potential market, Moore's people were quick to oblige P. We spent a lot of research effort trying to make a degradable polymer that would be tough enough for the job," Teitz later recalled. Months of effort produced a new laminated material that Teitz and others in the Success group thought would meet P&G's needs. Time and events, however, combined to work against them. Sensing that political pressure for restrictive regulation was on the wane, and that cost-conscious customers would not pay a premium for biodegradable materials, Procter & Gamble discontinued interest in the material under development by Moore's development unit.

From Degradable to Biodegradable The Success Group was now at a dead end. Furthermore, the standards for environmental acceptability were changing, becoming more stringent. Being degradable (i. e. , a substance that would disintegrate) had become passe; the new standard was biodegradability. Further, anything that passed itself off as biodegradable had to disappear in a reasonably short period of time. As of 1991, two years

into the project, no one knew for sure whether DuPont's new material would qualify as biodegradable.

Given these new conditions, senior management was concerned about John Moore's ability to command the respect of the technical community and decided to assign a new project manager, Ron Rollins. Credibility on the issue of biodegradability would be necessary for market acceptance. Obviously, no one would make a commitment to the new material until DuPont had firm data on its snack food appeal to microbes and on the rate at which it would disappear. Some suspected that the big opportunity with P&G had been missed because of the absence of solid test data.

To test the material, which by this time had been registered as Biomax®, and to assure the credibility of its data, the project recruited a highly respected company scientist on a part-time basis. Henn Kilson was a DuPont Fellow with experience in biodegradation. His job was to design and implement a system for evaluating the biodegradation of the new material. The choice of Kilson for this job was deliberate; he was, in fact, DuPont's representative to both an international committee and one formed by the American Society of Testing and Materials to set standards for biodegradability.

Before long, Kilson's researchers were busily making and composting prototype diapers that incorporated the newly developed laminated material. Using a sludge composting facility in Fairfield, Connecticut as a test bed, researchers tossed the 2 DuPont's Biomax® prototypes into the unsavory mess, and at the end of the composting cycle raked through the remains to observe the number and size of the remaining materials. This exercise

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determined the rate of disintegration, but never answered the question of biodegradability.

Meanwhile, Kilkson found a European company that was actively involved in compost testing. A number of trials with Biomax® samples were conducted; all indicated a favorable rate of biodegradation. However, Kilkson was not satisfied with the validity of these tests. Researchers also struck up a relationship with the city of Charlotte, North Carolina, which had a program for bagging and composing grass, leaves, and other yard wastes. The Charlotte facility used lots of manpower to empty bags of waste into a huge grinder and then transfer the ground waste to a composting pile.

If employees could simply toss these bags into the grinder without having to cut them open and dispose of them separately, program managers reasoned that they could save substantially on labor costs. Of course, the ground up remnants of these bags would have to disappear -- and quickly. The DuPont people gave the Charlotte facility a supply of net bags made from Biomax® and enlisted their collaboration in testing biodegradable characteristics. Ideally, all remnants of these bags would be undetectable in less than a year.

The bags themselves were made at a DuPont plant in Canada using a process introduced by a research associate in another laboratory. Employees in that tab were, like Rollins' people, also searching feverishly for commercially attractive projects that the operating units of the company would support. Results at the Charlotte facility were positive. Not only did the bags decompose quickly, but they degraded biologically as well. The Charlotte experiment gave the Biomax team something to cheer about. The <https://assignbuster.com/dupont-commercial-applications-and-waste-issues/>

bag-making plant in Canada was also elated; it too was looking for a big market to serve.

Things were at last looking up. But real customers willing to write out real purchase orders were still illusory. Meanwhile, Down in the Banana Groves ... By 1992, the Ron Rollins' Success group had been disbanded and Biomax® seemed destined to sit on the shelf---one of many good ideas developed by DuPont scientists for which no market application could be found. Before this happened, however, the material caught the eye of Terry Fadem, head of the Corporate Development Group. Fadem thought that Biomax® was worth another try.

Even though a real customer had not signed on, the new polymer had two important features: first, no major capital investment would be needed to produce it in commercial quantities; and second, the potential market for a biodegradable alternative to the mountains of synthetic materials piling up in the industrialized world was huge-at least in the abstract. European consumer products companies, Fadem knew, were facing much stricter environmental controls than were their North American counterparts. The "Greens" were an active political force, particularly in Germany. Perhaps he could get some commitment from a European customer.

According to Fadem, " I was of the opinion that if that didn't work, or if we didn't get some break in the market that was big enough, that we should either put the technology on the shelf or sell it off " So Fadem provided funds to support a small team of people working part time to keep the project alive As luck would have it, a break in favor of 3 DuPont's Biomax® Biomax® appeared, but from a source that neither Fadem nor anyone else would have

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anticipated: the banana plantations of Costa Rica. Steve Gleich was a senior technical researcher working the DuPont's Research Division for Agricultural Products.

A chemical engineer by training, Gleich was experimenting with different packaging systems for controlling the delivery of pesticides. One was by means of a water soluble " bio-disappearing" film, as he later described it. The pesticide was distributed evenly through the film; when the film became wet it disappeared into the soil, leaving the chemical behind. Thus, farm workers could lay lengths of the chemical-laden material over a row of strawberries, for example, and the first watering or rain would lay down a perfectly even and prescribed dose exactly where it was needed. Gleich was aware of the Biomax® project.

He was also familiar with work on biodegradables being conducted by a joint venture company owned by ConAgra and DuPont. One day, another packaging engineer told Gleich, " If you solve the banana bag problem down in Costa Rica, you'll be a big hero. " Banana bag problem? Gleich had no idea what he meant. So the engineer pulled a low-density polyethylene bag from his drawer. " They use millions of pounds of this stuff in the banana plantations," he said. " They put a bag over every banana bunch. Some are impregnated with pesticides, but most are simply used as little hot-houses to ripen the fruit and protect it from bruises. This bit of information flipped on a switch in Gleich's mind. Millions of pounds of nondegradable polyethylene translated into two things: big revenues for the vendor and a massive waste disposal problem for growers. If a bag material could be designed to disintegrate and biodegrade at the right time, growers could eliminate major

labor and waste handling costs. Working with contacts in Fadem's development unit, Gleich arranged to have 50 bags made from Biomax® and sent down to a sales agent working with Delmonte's banana operation in Costa Rica.

These bags were used to cover the fruit in the normal way and were observed over a 3-4 month period. As the bananas were harvested, the bags, now brittle, began to break apart into small strips and fall to the ground, where they could easily be raked up and composted. These first bags, however, turned brittle too soon in the cycle of fruit production, causing some bruising. So the enterprising researcher asked for another batch of bags -- slightly heavier and formulated to come apart more readily.

This second batch worked much better and Delmonte and its competitors, Dole and Chiquita, were soon expressing interest. They also wanted to explore applications for melons, strawberries, and other fruit. Ironically because of an internal squabble between the field manager and his counterpart at the head office, the field manager refused to install the redesigned banana bags and this application reached a dead-end. About this time Steve Gleich was assigned new duties within his business unit and his involvement in the Biomax® project waned.

The little band of part timers continued seeking applications. Some new potential agricultural applications emerged, but the project was going nowhere fast. Finally, Fadem convinced senior management to provide substantial corporate funding for a high profile advertising campaign soliciting inquiries. Approximately thirty serious responses were received. 4 DuPont's Biomax® They were deemed sufficiently promising that in 1996 <https://assignbuster.com/dupont-commercial-applications-and-waste-issues/>

Biomax® was transferred out of development and into DuPont's polyester resins and intermediates business unit.

When Fadem's team contacted the business unit manager to initiate the handoff, the manager asked where the prototype materials had been manufactured. She was surprised when Fadem told her that the prototype production had been done in her manufacturing facilities. Additional applications development work was required before significant production could be undertaken, and hence, even after the transfer, Terry Fadem's team remained involved. A product manager in the business unit was assigned the task of completing the technical and market development for Biomax®.

Unfortunately for the project, he had only just begun the effort when he was promoted. The project was at a standstill for almost a year until a new product manager was assigned and brought up to speed. The second product manager forced his team to assess the thirty plus leads that had been generated by the advertising campaign and to select four on which to focus. As of mid 2000, development of the product and the search for commercial applications continued. The new product manager was convinced that the first significant revenues were just around the corner. 5