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The consumer marketing of biotechnology

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Abstract What leads to the different consumer attitudes towards biotechnology? This paper shows how consumers come to accept biotechnology applications and how marketers of biotechnology have handicapped their effectiveness by making the following incorrect assumptions: (1) the biotechnology controversy will soon be forgotten; (2) science sells and fear fails; (3) consumers buy products, not processes; (4) good medicine means good food; and (5) biotechnology education is a trade association concern. After examining these mistaken assumptions, implications for more effective consumer education and marketing are given.

Keywords: biotechnology, marketing, GMO, advertising, labelling, packaging, consumers

Introduction

Many would like to believe that the challenges faced by Henry T. Ford are not unlike the challenges facing the biotechnology industry today. Road commissioners and horse breeders were probably not pleased when the Model T rolled off the assembly line. Yet when society looks back at how the Model T revolutionised lives, the view is positive.¹ But selling biotechnology is very different from selling cars. Instead of building up speed, biotechnology is finding the road is increasingly crowded with confused consumers and with sceptics who do not want biotechnology to progress.

This vast commercial potential has provoked debates over biotechnology and shows that consumers generally do not have enough knowledge to evaluate the potential benefits and risks involved in genetic engineering. One poll showed that American consumer attitudes towards biotechnology fell into four groups:² those who favoured biotechnology (31 per cent),

those who opposed biotechnology (18 per cent), those with mixed feelings (26 per cent), and those who did not know or who did not care (26 per cent). But views were sharply divided. Some people liken biotechnology to other forms of progress such as the automobile or computer:

Man has been engineering his environment since day one, so what's the fuss all about? I'm all for using less resources to improve yield. A hundred years from now people will laugh at our superstitions regarding this new technology. Just as in the past, what's new and improved is often mistaken as harmful.

Others were less sanguine:

The genetics scares the hell out of me. I am in the stage of my life that most of it is behind me, and hopefully the genetics will not affect me, but it sure will (affect) the generations below me.

What leads to these dramatic different consumer attitudes towards biotechnology? This paper provides a framework for understanding how consumers come to

accept biotechnology applications. Given this framework, it is then shown that even sophisticated marketers of biotechnology, such as life science corporations, unnecessarily limit their effectiveness by *wrongly* assuming that (1) the biotechnology controversy will soon be forgotten, (2) science sells and fear fails, (3) consumers buy products, not processes, (4) good medicine means good food, and (5) biotechnology education is a trade association concern. After examining these mistaken assumptions and providing more accurate perspectives, this paper provides implications for more effective consumer education and marketing.

How consumers form attitudes toward biotechnology

Some consumers focus on the benefits of biotechnology, while others focus on the risks.³ Some study the issue carefully, while

others view it emotionally.¹ According to consumer psychology, there are two general ways or routes – central and peripheral – in which attitudes are formed.⁴ When people are motivated to understand an issue, and have the ability and opportunity to do so, their attitudes will be formed through a *central route of attitude formation*. When they are not motivated to understand the issue, lack the technical or cognitive ability to understand it, or lack the opportunity to think about it, any message they hear will be peripherally processed.

In this framework, a person's values, beliefs and information processing style all contribute to how he or she understands the benefits and risks of the biotechnology process and of specific biotechnology foods.⁵ These factors, in turn, combine to form a person's attitude toward biotechnology. Figure 1 illustrates the two different routes of forming attitudes towards biotechnology, and it emphasises the distinction between accepting the *process*

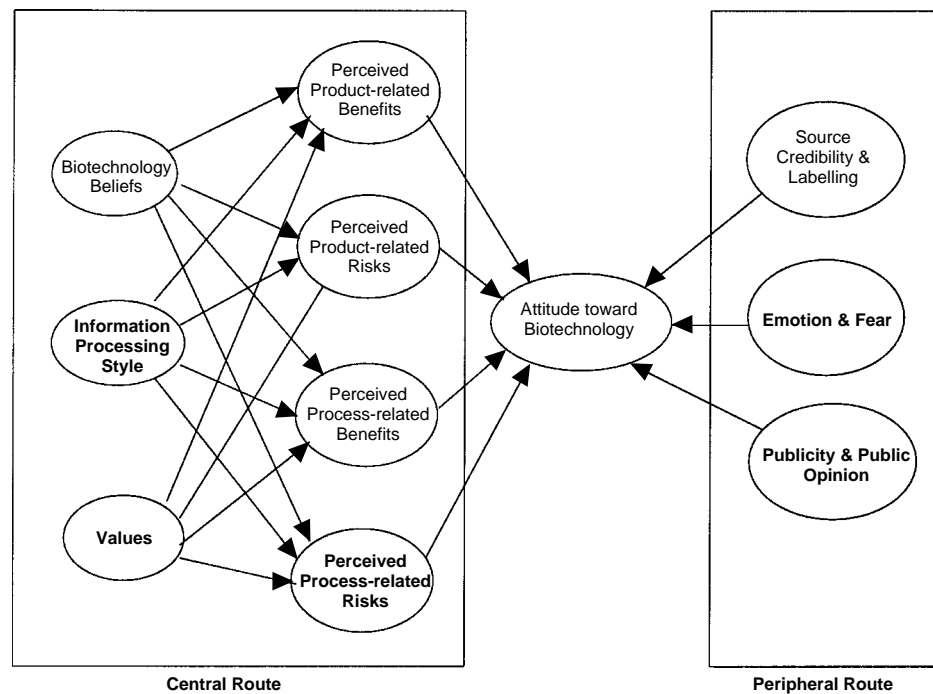


Fig. 1. Determinants of consumer attitude towards biotechnology

of biotechnology versus accepting the products of biotechnology.⁶

When attitudes are centrally formed, a consumer's attitude towards biotechnology is determined by beliefs about various aspects of biotechnology weighted by the importance he or she gives to each belief.⁷ Attitude is the net sum of all positive and negative beliefs about the target weighted by their importance:

$$\text{Attitude} = \sum(\text{belief}_i \times \text{importance weight}_i)$$

Because beliefs are subjective, they can vary dramatically among consumers. Furthermore, the importance weights given to specific information or beliefs can vary across people even if they share some common beliefs. These differences can lead two people with very similar experiences and beliefs to have two different attitudes toward biotechnology.

Recent studies have shown that many consumers generally view genetic engineering technology as a risky process.^{8,9} As shown in Table 1, some people perceive environmental risks (threats to ecological balance and reduced biological diversity), safety risks (lack of control and difficulty in measuring safety) and ethical considerations (the discomfort with 'playing God' and concerns for health and welfare of animals). However, if genetically modified products offer important benefits, these benefits can

outweigh the perceived risks related to genetic engineering technology.¹¹ Just as there are environmental risks, there are also environmental benefits (reduced use of chemical pesticides and water and soil protection), healthcare benefits (development of medicines and 'edible vaccines' along with better nutrition and food quality), and agricultural benefits (protection against disease, increased productivity, and biodiversity and sustainability).

When consumers have little motivation to process biotechnology information, little ability to understand it or little time to digest it, their opinions will be formed by the peripheral route. Under these circumstances, their focus is not on the claims made in the message, but is instead on non-message factors or cues, such as public opinion, sound bites, emotions generated by advertising, labelling, or the credibility of spokespeople or endorsers (recall Figure 1).

This general notion that people can be aware of an issue without having specific knowledge of it is well supported. Sheehy *et al.*¹² reported that the majority of consumers, even highly educated ones, had little or no *knowledge* of biotechnology. Their *awareness* of biotechnology, defined as 'having heard of the term', was high, however. This 'high awareness but low knowledge' characterisation is common in

Table 1 Benefits and risks of biotechnology

Benefits of biotechnology	Risks of biotechnology
<p>1 Environmental benefits</p> <p><i>A Reduced use of chemical pesticides</i></p> <ul style="list-style-type: none"> • Improved ability of crops to defend against destructive insects • Reduction and elimination of the need for chemical pesticides • More selective use of weed control and to use of environmentally gentler herbicide <p><i>B Water and soil protection</i></p> <ul style="list-style-type: none"> • Reduction of nutrients in farm runoff, increasing crops' fertiliser efficiency and conserving topsoil • Low phytic acid corn and phytase feed enzymes reducing harmful phosphorus in farm animal waste • Reduction of excess soil nutrients through more efficient use of fertiliser • Reduction of greenhouse gas effects by keeping carbon sequestered in soil 	<p>1 Environmental risks</p> <p><i>A Threat to ecological balance</i></p> <ul style="list-style-type: none"> • The risks of releasing genetically modified organisms into the environment • Unpredictability of their effect on the ecological balance of the environment <p><i>B Reduced biological diversity</i></p> <ul style="list-style-type: none"> • Creation of herds of 'multiple twins' of cattle, and single super-variety of crops that lead to extinction of traditional breeds or varieties • A single variety or breed is more vulnerable to devastation by rare pests or disease than a combination of different varieties

Table 1 (Continued)

Benefits of biotechnology	Risks of biotechnology
<p>2 Healthcare benefits</p> <p><i>A Development of medicine products</i></p> <ul style="list-style-type: none"> • Production of human insulin needed by diabetics by inserting the gene coding for this hormone into bacteria • Development of interferon and human growth hormone • Genetically engineered vaccines such as those for hepatitis A, hepatitis B, meningitis and herpes simplex • Identification of the cause of specific conditions such as cystic fibrosis <p><i>B 'Edible vaccines'</i></p> <ul style="list-style-type: none"> • Fruits and vegetables that contain vaccines against deadly and debilitating diseases such as hepatitis, cholera and malaria • Fruits and vegetables with higher levels of antioxidant vitamins to prevent cancer and heart disease • Fruits and vegetables that contain vitamin A to prevent blindness <p>3 Agriculture and food processing benefits</p> <p><i>A Protection against disease</i></p> <ul style="list-style-type: none"> • Disease-protected varieties with the plant equivalent of a vaccine. • Cloning and transfer of genes resistant to various animal diseases to increase the immunity <p><i>B Increased productivity</i></p> <ul style="list-style-type: none"> • Reduction of farming costs and increased yields on a per hectare basis due to reduction of the need for chemical agents and labour to control weeds and insects • Improvement in bacteria and yeast for the production of fermented dairy, meat, vegetable and cereal products • Use of transgenic technology can accelerate desirable characteristics from one animal species to another in such areas as growth rate or reduction of fat, and produce proteins in the milk of sheep or cattle <p><i>C Biodiversity and sustainability</i></p> <ul style="list-style-type: none"> • Biotechnologies that increase productivity on existing cultivated area reduces pressure to encroach further on wildlife habitat which is the greatest threat to biodiversity <p>4 Nutrition and food quality benefits</p> <p><i>A Better nutrition and quality</i></p> <ul style="list-style-type: none"> • Soybean, corn and canola oils produced via biotechnology perform better at higher temperatures, displacing the need for hydrogenated fats that contain unhealthful <i>trans</i>-fatty acids and have lower levels of saturated fat • Delayed-ripening traits allow fruits and vegetables to vine-ripen for better flavour and to remain fresh longer for better shipping and storage and increases availability of nutritious fruits and vegetables and improves their taste and quality 	<p>2 Safety risks</p> <p><i>A Lack of control</i></p> <ul style="list-style-type: none"> • Genetically modified organisms are alive, therefore much less predictable, and more difficult to control <p><i>B Difficulties in measuring safety</i></p> <ul style="list-style-type: none"> • Concerns for the fact that the safety of biotechnology products cannot be absolutely assured • The safety of a biotechnology product is determined based upon the best information available at the time • Lack of established objective and concrete measures of safety of biotechnology products <p>3 Ethical considerations</p> <p><i>A Discomfort with 'playing God'</i></p> <ul style="list-style-type: none"> • Concerns about playing with living organisms • Vehement debates over 'playing God' <p><i>B Concerns for health and welfare of animals</i></p> <ul style="list-style-type: none"> • Concerns about the health or welfare of experimental and farm animals produced using rDNA technology • Past incidents where experimental pigs carrying the gene for human growth hormone suffered from crippling arthritis • Criticisms of the use of bovine somatotrophin (BST) on the grounds that increase in mastitis in cows who have been administered BST <p><i>C Religious taboo</i></p> <ul style="list-style-type: none"> • Polkinghorne Committee's report (1992) concerns about ethical issues related to the transfer of genes from animals whose flesh is forbidden for use as food by certain religious groups to animals that they normally eat. • Is the sheep that has a transferred gene from a pig a sheep or a pig?

Source: Biotechnology Industry Organization.¹⁰

the biotechnology area because genetic engineering is new and complex.¹³

Mistaken marketing assumptions about biotechnology

The accelerating growth of biotechnology and its applications is interfering with consumer understanding. Yet a large part of the confusion consumers have about biotechnology can be attributed to misguided communication efforts. Proponents of biotechnology, particularly the life science corporations, base their marketing campaign on a commodity promotion mindset and on ‘market share advertising’. Their strategy has been to focus on the advantages of the technology and on the long-term benefits that are not specific to consumers but are more focused on the ‘global good’ of the products.¹⁴ These actions, and others, suggest a series of mistaken marketing assumptions (see Table 2) about consumers that biotechnology marketers use that unnecessarily limits their communication effectiveness.⁶

Mistaken marketing assumption 1: the biotechnology controversy will be forgotten

Just as opponents of biotechnology generally discuss their opinions with other opponents,¹⁵ so do proponents discuss theirs with other proponents. As a result, proponents and marketers can underestimate the seriousness of the issue, believing that most people believe the way they do. They then erroneously believe that controversy over biotechnology will ‘blow over’.¹

This belief – or hope – was one held by many leading British firms.¹⁶ In 1994, public sentiment toward biotechnology was neutral if not moderately positive. The industry, therefore, only half-heartedly attempted to build public support or enthusiasm for biotechnology because attitudes towards it appeared to be improving each month.¹⁷ Yet, although attitudes were improving, they were neither fully formed nor stable. As a result, when ‘mad cow disease’ became an issue, the industry had not generated the appropriate level of education or a solid enough basis of support to keep the issue in perspective and to keep biotechnology moving forward.

Today, many proponents believe that improving sentiments of the non-vocal majority indicate that the biotechnology controversy will pass. The fallacy of their assumption is that they are only one ‘mad cow disease’ episode away from losing all the biotechnological ground that has been gained. Because of the highly sensitive nature of this issue, even a moderately unrelated event could cause an ill-informed majority to generate a fatal overreaction in public opinion. Even if the biotechnology controversy passes, proponents continually need to counteract public misperceptions with effective education.

Mistaken marketing assumption 2: science sells and fear fails – people will be biotechnology advocates once they have the facts

Consider the case when a person’s attitudes have been formed through the peripheral route to persuasion. With relatively low awareness and knowledge of biotechnology along with no established measures of

Table 2 Revising mistaken marketing assumptions about consumers and biotechnology

Mistaken marketing assumptions	More accurate assumptions
The biotechnology controversy will be forgotten Science sells and fear fails	Continuous biotechnology education is critical Facts may mean less than memorable, emotional phrases
Consumers buy products, not processes Good for medicine means good for food	Accepting the process can sell the products People believe they are experts with food, not medicine
Biotechnology education is a trade association issue	Biotechnology is a branding and education issue

benefits and risks, his or her attitudes could be easily swayed by peripheral cues such as public opinion, publicity, sound bites, source credibility, labelling, and emotion and fear. To this person, careful scientific reports and expertly articulated third party testimonials will have little direct impact on their attitude toward biotechnology. Indeed, even a judicious US Food and Drug Administration (FDA) endorsement might have less impact than a memorable phrase or the dismal portrayal of genetic engineering applications in a movie (eg *Species*, *Jurassic Park*, *Gattaca*, *DNA*).

One indicator of how peripheral processing dominates attitude formation can be found in the significant role that religious and ethical influences can dogmatically play in influencing public concerns about biotechnology applications. Animal rights activists protest against biotechnology on the ground that genetically modified animals might suffer vulnerability to specific diseases as the result of such modifications. Some religious groups oppose the use of biotechnology on the ground that experimenting with lives is 'playing God'. These religious and ethical concerns will become even more vocal as further advances in gene technology bring fear of human gene selection and cloning. Groups opposing the use of biotechnology on these grounds authoritatively dictate specific viewpoints to consumers without encouraging objective evaluation.¹⁸ Phrases or soundbites such as 'playing God' can lead one to peripherally process the issue and to label biotechnology as wrong without considering its benefits.

The fallacy that 'science sells'¹⁹ is based on the notion that if consumers are given the facts, they will come to predictable conclusions. Yet even with identical information and beliefs, people will arrive at different conclusions. A well-to-do vegetarian might believe cost savings are less important than caring for animals. A second person might focus more on how biotechnology increases the world food supply and slows land commercialisation. A third person might focus on comparing organic gardens of yesteryear to the

unknown issues of tomorrow. Recalling Figure 1, attitude formation is further complicated by the fact that consumers not only have different information, but have different values, and different ways of combining this information.

Mistaken marketing assumption 3: consumers buy products, not processes

For some people, a product becomes acceptable when its benefits outweigh its costs. Opponents and many 'undecided' people need to accept the process before they will accept the product. If we examine the tactics of anti-biotechnological factions, they do not focus on product benefits (nutrition or cost savings) but on the unknowns about the process. They encourage people not to consume a product if they cannot accept the process by which it is developed. For marketers to counter these concerns, it is important to focus on a step-wise approach that educates people about the process *and* about the products.

A step-wise approach of disseminating general information, such as what biotechnology is and what would be affected by it, is the first step of the process. Some consumers need a basic level of knowledge about biotechnology before they can process more specific and detailed information. Once the technology or process itself is understood and accepted by consumers, then information about benefits and risks involved with specific products can be more effectively conveyed. This way, consumers will be able to develop a basis for knowledge on which they can make educated decisions regarding specific biotechnology products. Figure 2 illustrates how the hierarchy of communication objectives can be structured in relation to the level of consumers' biotechnology knowledge.

Proponent fallacy 4: good for medicine means good for food

Consumers accept biotechnology for medicinal purposes, but not necessarily for foods. These different attitudes toward biotechnology medicine and biotechnology

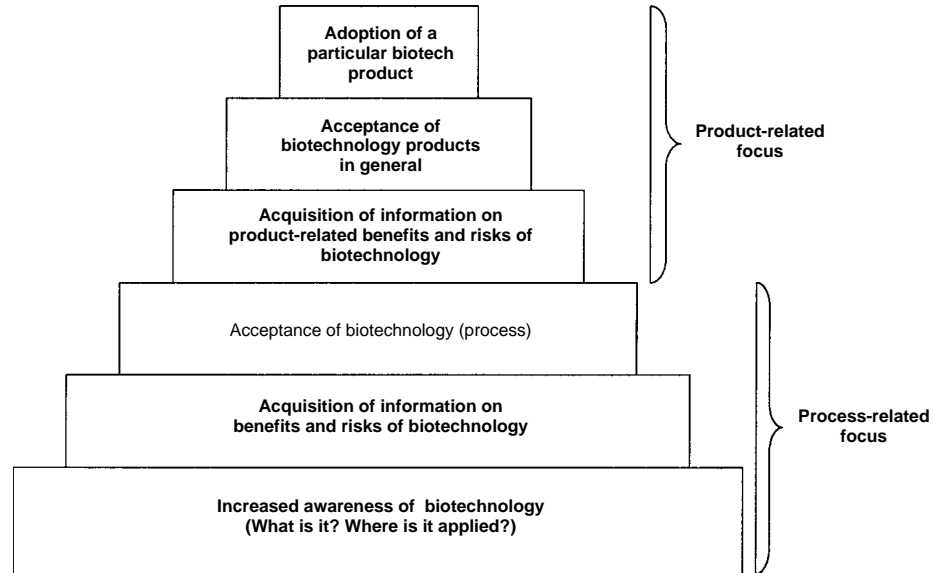


Fig. 2. The step-wise process of consumer education

food can be explained by the way the situation is framed – or perceived – by consumers. As Kahneman and Tversky²⁰ have shown, people show a risk-taking tendency when the outcome is perceived as the reduction of a loss ('I don't want to be sick'), but they show a risk-averse tendency when the outcome is perceived as a gain ('I want to be healthy').

In general, biotechnological applications in the medical domain are perceived as loss reductions. For example, the benefit of a new medicine developed with biotechnology can be generally believed as improving the lost health of an already ill patient. Thus, it is perceived as a reduction of a loss. The benefit of a food product produced with biotechnology, however, is perceived as improved nutrition for a product that already has a satisfactory level of nutrition from a consumer's point of view. Thus, it is perceived as an increase of a gain or benefit.

If the differences in the acceptance of biotechnology across application domains are due to differences in how the benefits and risks are perceived or framed, how can opinions be changed? Consumer acceptance of food-related biotechnology may be

improved by framing the benefits in terms of the reduction of potential dietary hazards instead of framing them in terms of enhanced nutrition or quality.²¹ The reduction of these gains and losses is food-specific. As these benefits and losses become more evident, they can be promoted on a food-specific level (eg broccoli) or on a category-specific level (eg green vegetables). Similarly, an environmental position would take the same approach. Consumer acceptance could also be improved by framing the benefits in terms of the reduction of destructive pesticides and waste instead of framing these benefits in terms of enhanced ecological balance.

Mistaken marketing assumption 5: biotechnology education is a trade association issue

Biotechnology education is not a trade association issue. Biotechnology education is partly a branding issue. Biotechnology must provide a clear, systematic, vivid, focused message that is important to consumers. In the biotechnology marketing battle, the opponents of biotechnology

clearly have the upper hand. The powerful 'brand' visuals that are associated with names such as 'FrankenFoods' and 'Super Weeds' leave little wonder why the public is able to latch on to 'bumper-sticker logic' and be swayed toward scepticism or opposition. These vivid phrases promote peripheral processing instead of a thoughtful consideration of benefits and risks. It has even been claimed that the phrase 'genetically modified organism' or GMO was a product of focus groups conducted by biotechnology opponents. It was selected as a banner for the biotechnology arena because it evoked the greatest number of negative associations and attitudes.

Trade associations, scientific organisations and the government probably cannot effectively brand biotechnology in a way that leaves it clear in a consumer's mind. The majority of trade association efforts in this regard have not been as effective as hoped for or claimed.²² Some notable examples (such as the 'Got Milk' campaign for the American Dairy Council) won awards, but reportedly contributed little to increase sales among non-users. If firms are to compete with the 'spin' that opponents of biotechnology create, they need to realise that branding biotechnology deserves some of their best marketing minds.²³ It is too important to be outsourced or trusted to a risk-averse, consensus-building trade association or government agency.

Strategies for accelerating the acceptance of biotechnology products

The most critical objective in the marketing of biotechnology is to manage both short-term and long-term public opinion. Current negative public opinion about the use of biotechnology, especially in food industry, is largely due to the uncertainty that stems from a lack of information. Even in the case that current negative public reaction to the use of biotechnology is temporary, as was the case for other innovative technologies such as electricity and computers, marketing strategies should focus on

counteracting public misperceptions and educating consumers about the benefits of biotechnology. The main task is to accelerate consumer acceptance through the use of more effective persuasion strategies, and the use of targeting, packaging, pricing, promoting and educating.

In contrast to managing short-term public opinion, the controversy over safety and the ethical issues involved in the use of biotechnology is a persistent problem that will continue even if biotechnology becomes widely embraced. Biotechnology is quickly advancing and some of the current safety issues may indeed become non-issues. However, current public concerns are grounded on what has happened with past misuses of biotechnology. Concerns may be partly due to the fact that living organisms are adaptive and their change is not completely predictable or controllable. For the long run, therefore, the biotechnology industry, researchers and the government should try to safeguard potential hazards. Different roles that should be played by different groups are suggested below.

- **Self-regulation by the biotechnology industry.** Consumers generally perceive biotechnological information provided by the industry to be the least credible. Not surprisingly, they are most distrustful of a safety system that is solely industry-regulated. Because it is the major provider of biotechnology products for consumers, it is critical for the industry to earn consumers' trust. The biotechnology industry should strive to develop objective measures for risks and benefits of products and establish self-regulated safety measures of the processes used. In the meantime, a self-regulatory effort by the industry may begin to help gain consumer confidence, especially if allied with a consumer group.
- **The role of government as the safeguard.** Despite some doubt regarding the efficiency of government, many focus groups and surveys indicate that consumers believe the government should play some role in providing regulation and safety protection with respect to

biotechnology. These provisions and assurances of safety by the government will contribute to eliminating some of the concerns consumers hold about biotechnology.

- **University research and endorsements.** Universities and other research institutions account for the majority of genetic engineering and biotechnology research and development. They are, therefore, well positioned to play a safety-assurance role as well as to provide up-to-date information on biotechnology advances and applications. While industry sponsorship of university research raises some concerns, the public still views these educational and research institutions as the most credible and trustworthy source of biotechnology information. An active effort to establish and maintain integrity and impartiality of research by these institutions is important.

Continuous education is critical even if it appears that many consumers are not interested in the issue. Although a person might be uninterested in biotechnology today, windows of potential influence frequently open and close. Continuous education keeps interested consumers informed and offers disinterested consumers the opportunity to learn. The more effort that is invested in education, the less risk there is that consumers will some day overreact to biotechnology on the basis of emotion, fear, memorable phrases or unfounded benefits.

Prototyping the target audience to maximise educational effectiveness

Marketers need to realise that understanding a person’s processing style and how it influences attitudes is critical. Classifying or prototyping consumers into several categories based upon prior knowledge, information processing style or current biases toward biotechnology can provide a sound basis for developing more effective education strategies.²⁴ This enables stylised messages to be delivered in stylised ways. To illustrate how messages can be stylised, consider three categories of consumers: (1) those with centrally formed attitudes toward biotechnology, (2) those with peripherally formed attitudes, and (3) those with no attitude. Table 3 shows how marketing efforts should vary across these different consumers.

Suppose a marketer wants to inform consumers with peripherally processed attitudes about newly discovered biotechnology information. The most effective education efforts would use one-sided messages that eliminated misperceptions and that were delivered by a biotechnology expert. This is different from how the same information should be directed to a consumer who had formed no firm attitude toward biotechnology. In this case, the message should be focused at a more basic level, perhaps through publicity. If mass media were instead being used, it would more effective to use a highly recognisable endorser than a qualified, but

Table 3 Attitude profiles of consumers and relevant education strategies

Attitude profile: how existing attitude was formed	Relevant education strategy
Centrally processed attitude	<ul style="list-style-type: none"> • Use two-sided message: benefits and risks • Provide reliable statistics • Provide clear evaluation criteria
Peripherally processed attitude	<ul style="list-style-type: none"> • Consistently reinforce attitude • Focus on eliminating illusions and misperceptions • Consistently reinforce attitude with one-sided message • Use expert endorsers • Keep them abreast of up-to-date information
No attitude	<ul style="list-style-type: none"> • Use visible and credible endorser • Minimise misleading publicity • Focus education message on basic information • Using publicity and advertising to increase awareness

unknown, expert. The more effectively consumers are educated, the more constructive will be the progress of biotechnology and the progress of those influenced in the world because of it.

Packaging must accommodate consumer needs and concerns

Consumers' attitudes and purchase decisions are based on a variety of information and cues that come in a variety of direct and indirect forms. Packaging is one of these. From a marketing standpoint, it is critical that any decision to label a package must account for how the label would affect the target market. For some consumers, voluntary labelling makes no difference, for others, it provides an unwarranted warning or red flag, and for others it might serve as a signal of quality, respect or genuineness.

Should a company voluntarily choose to label a biotechnology product, the labelling and product packaging should reflect the positive aspects of the industry and methodology involved in production. When possible, consumer advocacy organisations and research institutions should be utilised as endorsers for the products or technology as they are viewed as most trustworthy.

Furthermore, if the decision is made to label a product, care should be taken in how it is done. Consumers have negatively predisposed attitudes towards particular terminology such as 'genetic engineering.' Regardless of the reasons behind these attitudes, it is important to avoid the unease invoked by the terminology, such as GMO. Manufacturers should seek to avoid the use of potentially negative terms either through omission or the use of different terminology.

Pricing must be cautiously and carefully adjusted to increase exposure

Pricing biotechnology products must be priced to encourage first-time buyers to sample the products instead of more conventionally produced brands. Marketers sometimes promote a new brand in a mature category by reducing their price of

that brand by 20 per cent for an initial promotion. However, it is important to stress both value and quality when marketing to consumers and to avoid the development of the negative cost-quality inference that often accompanies less expensive products.

Considering that consumers generally lack knowledge and information to evaluate the value of biotechnology, price is likely to be the sole indicator of the quality. In high-margin markets, prices should be consistent with other high-quality dietetic and health foods in order to aid in establishing the products as quality performers. One option is to keep the price of a biotechnology product at parity with other brands, but to offer a larger product for the same price. This can also be accomplished by keeping the price stable while clearly underscoring the benefits of the biotechnology product that is being offered at the same price. Furthermore, multiple unit prices (ie 3 for \$3) and purchase limits (ie limit 12 per customer) can dramatically increase the number of units bought by 27–112 per cent, thus giving consumers a longer and more representative exposure to the product.²⁵

Placement should position products as comparable alternatives

When contemplating product positioning in the market as a whole and at the individual store level, marketers can position or align products with their non-biotechnology counterparts. This reduces the likelihood that the product will be viewed as 'fake' or 'synthetic'. Introducing the products into healthfood stores or into the 'healthier' sections of grocery stores can be appropriate for some products. The importance of positioning decreases, however, in biotechnology-savvy markets wherein differentiation techniques may even work as an advantage.²⁶

Additionally, efforts should be made to associate the products with highly respected, natural images. By leveraging, innovative promotion and product positioning, the products can achieve an air of familiarity, quality and conventionality.²⁷

Summary

The accelerating growth of the biotechnology advances and its applications are making consumer understanding difficult. This incomplete understanding of biotechnology is leading to divided opinions.²⁸ Providing a theoretical framework for understanding what factors affect consumers' acceptance of biotechnology produces clear implications for labelling, promoting, publicising, advertising and pricing. The first critical step, however, involves revising incorrect assumptions about consumers.

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