Innovation in U.S. Food Markets: Evidence from Two Million Product Launches

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Abstract

This paper develops a systematic methodology to measure innovation in consumer goods markets by extracting product positioning strategies from branded food product labels. Using USDA FoodData Central, I analyze 1.98 million food products launched between 2019 and 2024 by 37,055 companies across 448 food categories, constructing eight innovation measures through algorithmic text analysis of product descriptions and ingredient lists. This approach addresses fundamental limitations of traditional innovation metrics—patents, R&D expenditures, surveys—which miss most consumer goods innovation occurring through product repositioning and ingredient reformulation. Natural positioning emerges as the dominant product strategy (46.5% of product launches), while plant-based alternatives experience 140% growth. Systematic patterns emerge: small firms pursue premium strategies (16.7% organic certification versus 10.2% for large firms), concentrated product categories exhibit higher innovation intensity (72.7% have a product positioning strategy versus 59.1%), and products with complex ingredient formulations drive natural positioning adoption (67.8% versus 11.8%). Strategic bundling reveals complementarities between natural and plant-based positioning. The dataset and proposed methodology enable analysis of competitive dynamics, organizational learning, and technology diffusion previously impossible to study empirically, with applications spanning innovation economics, industrial organization, and environmental economics.

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1 Introduction

Understanding innovation patterns in consumer markets remains a central challenge in economics, management, and finance research. While it is well documented that innovation drives economic growth and competitive advantage, empirical analysis has been constrained by data limitations that make it difficult to observe product-level innovation decisions at scale. Traditional measures rely on patents, R&D expenditures, or surveys, each with significant limitations for studying consumer goods innovation. Patents capture only a subset of innovative activity, R&D spending provides limited insight into specific innovation directions, and survey data suffers from small samples and potential reporting biases.

This paper documents how comprehensive product-level data from the USDA FoodData can overcome these limitations in the study of innovation in U.S. food markets. USDA FoodData consolidates detailed information on branded food products sold in U.S. retail markets by combining data from Label Insight, which uses automated extraction from product packaging, and the Global Data Synchronization Network, which provides manufacturer-supplied information. It captures the near-universe of U.S. retail food market (approximately 400 thousand product launches each year), including both mass-market products from large manufacturers and specialty items from smaller producers. Each product record includes complete ingredient lists, nutritional profiles, brand ownership details, and classification within 448 food categories, as mandated by FDA labeling requirements.

Food markets provide an ideal laboratory for innovation research for several reasons. First, the industry exhibits high rates of product introduction, with hundreds of thousands of new products launched annually. Second, mandatory labeling requirements generate detailed, standardized data on product characteristics and ingredients. Third, the diversity of firms—from multinational corporations to small specialty producers—and product categories enables analysis of innovation heterogeneity across different market contexts. Fourth, innovation in food markets often involves tangible product attributes (ingredients, nutritional profiles, positioning claims) that can be systematically measured and compared.

I show how USDA FoodData can be utilized for innovation research by analyzing 1.98 million food products launched between 2019 and 2024 and constructing innovation measures through system-

atic text analysis of product descriptions and ingredient lists. I create eight product positioning strategies that represent distinct innovation directions in food markets: "natural" claim products; "organic", identifying products with USDA organic certification; "plant-based", including products with soy protein, pea protein, quinoa, chia, hemp, or explicit plant-based claims; "dietary restrictions", which includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal products; "premium", capturing premium, gourmet, artisan, craft, and traditional claims; "functional", including probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy positioning; "technology and sourcing", covering non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; and "sustainability", including fair trade, sustainable, eco-friendly, recyclable, and biodegradable positioning.

Using these measures, I first document that natural positioning is the dominant positioning strategy, adopted by 46.5% of all branded food products launched in 2019–2024, while organic certification reaches 12.0% and plant-based alternatives capture 7.7% of the market. Natural positioning emerges as the dominant strategy, adopted by 46.5% of all products, followed by organic certification at 12.0% and plant-based alternatives at 7.7%. Premium positioning, functional products, and technology & sourcing strategies each capture 2-4% of products, while sustainability claims appear in only 0.3% of launches. Overall, 64.1% of all food products adopt at least one these positioning strategies.

Temporal trends reveal dramatic shifts in innovation focus between 2019 and 2024. Plant-based alternatives experience explosive growth of 140%, rising from 6.0% to 14.4% of new products, while natural positioning grows 35% from 44.7% to 60.2%. In contrast, established strategies show sharp declines: organic certification falls 58% and premium positioning drops 59%. These patterns suggest fundamental changes in consumer preferences and competitive dynamics, with firms pivoting toward emerging trends while abandoning traditional premium strategies.

Strategic bundling analysis reveals systematic complementarities between positioning approaches. The most common combination pairs natural positioning with plant-based alternatives, appearing in 88,891 products, followed by natural and organic combinations in 73,026 products. While 43.1% of products employ single positioning strategies, 21.1% combine multiple approaches, suggesting firms

view positioning strategies as complementary rather than substitutable.

Firm heterogeneity in innovation strategies correlates strongly with company size and portfolio characteristics. Small firms with 1–99 products launched in 2019–2024 show higher adoption rates of organic certification (16.7% versus 10.2% for the largest firms with over 10,000 launches), premium positioning (5.1% versus 2.3%), and sustainability claims (0.75% versus 0.09%), while large firms focus on mainstream natural positioning. Among top brands, specialized firms like Danone show distinctive patterns with 83.8% natural positioning and 32.5% organic certification, while private label brands of mass retailers like Walmart emphasize natural positioning (55.8%) with limited premium strategies.

Category-level analysis reveals striking variation in innovation intensity across food segments. Non-alcoholic beverages lead in natural positioning (69.1%) and functional claims (9.4%), while meat alternatives (such as those develop by Beyond Meat and Impossible Foods) show concentrated innovation with 78.2% plant-based positioning and 23.0% organic certification. Market concentration analysis highlights that highly concentrated categories exhibit greater innovation, with 72.7% of products in high-concentration categories adopting positioning strategies compared to 59.1% in fragmented markets.

Product complexity patterns show systematic relationships between ingredient count and innovation strategies. Products with many ingredients (16+) show substantially higher natural positioning adoption (67.8% vs 11.8% for simple products) and plant-based positioning (12.9% vs 1.2%), while organic certification decreases with complexity (18.1% to 7.7%). These patterns suggest that innovation strategies serve different functions for simple versus complex products, with natural positioning particularly important for processed foods requiring consumer reassurance.

The opportunities for future innovation research using USDA FoodData are rich and tangible. Researchers can study innovation racing by analyzing competitive responses to rival product launches within categories, examine organizational learning by tracking how firms' positioning strategies evolve as they gain experience in specific categories, and test theories of innovation complementarity by analyzing which positioning strategies are systematically bundled together. The temporal granularity enables identification of market timing effects and first-mover advantages in emerging categories like plant-based

foods. The ingredient-level detail allows analysis of technology adoption and diffusion patterns, such as how novel ingredients like quinoa or chia spread across firms and categories. Researchers can investigate how market structure affects innovation intensity by comparing positioning adoption rates across concentrated versus fragmented categories. The comprehensive firm coverage enables studies of how innovation strategies vary with firm size, portfolio breadth, and market position. Importantly, USDA FoodData includes each product's bar code, allowing for direct matching with datasets such as Nielsen.

This work contributes to a growing literature developing comprehensive datasets to advance innovation research. Similar to how Durvasula et al. (2023) created the NBER Orange Book dataset to study pharmaceutical innovation, Marx and Fuegi (2020, 2022) developed patent-to-science citation datasets to examine science-technology linkages, Lerner et al. (2024) constructed the China Patent Dataset to enable comparative innovation studies, and Mukherjee et al. (2025) analyze new product announcements based on news articles, I document how mandatory open-source labeling data can be systematically converted into innovation measures for consumer goods industries. While patent-based datasets excel at capturing formal intellectual property creation, consumer goods innovation often occurs through product repositioning, ingredient reformulation, and market positioning strategies that are not patentable but represent substantial innovative activity. The food labeling approach complements existing innovation datasets by capturing a different but equally important dimension of innovative activity.

The remainder of this paper proceeds as follows. Section 2 describes the USDA FoodData Central database, including data collection methods, coverage, and quality validation. Section 3 explains my approach to measuring innovation through product positioning strategies and discusses the advantages over traditional innovation metrics. Section 4 presents empirical patterns in food market innovation, including temporal trends and cross-sectional variation. Section 5 analyzes firm heterogeneity in innovation strategies, while Section 6 examines variation across product categories and market structures. Section 7 discusses future research applications enabled by USDA FoodData. Section 8 concludes.

2 The USDA FoodData Central Database

USDA FoodData Central, launched in 2015 and operated by the USDA Agricultural Research Service, consolidates previously separate federal food databases into a unified system for food composition research. The platform integrates five data types: Foundation Foods with analytically-derived nutrient values and sampling metadata; Experimental Foods containing products studied under controlled conditions; the Food and Nutrient Database for Dietary Studies (FNDDS) supporting NHANES dietary analysis; Standard Reference Legacy preserving historical food composition data; and the USDA Global Branded Food Products Database documenting retail food products.

Data collection combines two primary sources that together provide comprehensive market coverage. Label Insight, a Nielsen subsidiary, contributes 93.2% of records through automated extraction from product packaging using optical character recognition and natural language processing. The Global Data Synchronization Network (GDSN) provides manufacturer-supplied standardized information for the remaining records. This dual approach captures both mass-market products from large manufacturers and specialty items from smaller producers. Additionally, the mandatory nature of FDA labeling requirements eliminates many data quality concerns common in voluntary reporting systems.

For innovation research, the most valuable component is the branded foods database, which contains detailed information on branded food products launched in U.S. retail markets. I focus on the March 2025 release of the dataset, which covers 1.98 million products from 37,055 unique firms across 448 food categories during the 2019-2024 period (see Table 1). Each product record includes ingredient information ordered by weight, nutritional profiles, allergen declarations, brand ownership details, and classification within detailed food categories. The database is updated monthly, capturing the dynamic nature of food markets where new products are continuously introduced and existing products reformulated or discontinued. Data completeness is exceptionally high, with 99.7% of products containing ingredient information, 99.5% with category classifications, and 99.1% with brand owner identification.

PLACE TABLE 1 ABOUT HERE

Several features make this database uniquely suited for innovation research compared to traditional data sources. First, unlike patent databases that capture only innovations meeting patentability criteria, or R&D surveys that may suffer from strategic reporting, the labeling data reflects actual market behavior and product characteristics. This provides a more complete picture of innovation activity in consumer goods markets, where much innovative activity occurs through product positioning, ingredient reformulation, and market segmentation strategies that generate substantial value but are not patentable. Second, the temporal frequency enables analysis of innovation dynamics and competitive responses with monthly precision. Finally, the ingredient-level detail allows analysis of technology adoption, supply chain decisions, and product reformulation strategies that are invisible in other datasets.

3 Measuring Innovation Through Product Positioning

To address limitations of traditional innovation metrics in consumer goods markets, I develop innovation measures using USDA FoodData, focusing on product positioning strategies. Product positioning captures how firms attempt to differentiate their offerings, respond to consumer trends, and create competitive advantages through specific product attributes and marketing claims. These strategies reflect substantial innovation investments in product development, supply chain management, and market positioning, even when the underlying innovations are (for the most part) not patentable.

I construct eight product positioning categories through systematic text analysis of product descriptions and ingredient lists. "Natural positioning" products, representing firms' attempts to signal product simplicity and ingredient quality to health-conscious consumers; "organic certification" captures USDA organic certification, requiring substantial supply chain investments and regulatory compliance; "plant-based alternatives" includes products with soy protein, pea protein, quinoa, chia, hemp, or explicit plant-based claims, which tend to involve significant R&D in protein technology and ingredient sourcing; "dietary restrictions" encompasses gluten-free, kosher, vegan, vegetarian, dairy-free, and halal products; "premium positioning" captures premium, gourmet, artisan, craft, and traditional

claims, targeting high-value market segments; "functional products" include probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy positioning; "technology & sourcing" covers non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; and "sustainability" includes fair trade, sustainable, eco-friendly, recyclable, and biodegradable positioning. I also construct measures of "any positioning", representing whether the product includes any of these positioning strategies, and "positioning diversity", which counts a product's unique positionings.

PLACE TABLE 2 ABOUT HERE

Table 2 provides comprehensive definitions and component breakdowns for each positioning category. Natural positioning emerges as the most prevalent strategy, capturing 920,952 products (46.5% of the sample) through identification of explicit "natural" labeling claims. Organic certification reaches 237,310 products (12.0%), limited to USDA-certified organic products only. Plant-based alternatives encompass 151,682 products (7.7%), with soy protein representing the largest component at 82,230 products, followed by quinoa (19,822 products), pea protein (19,698 products), and chia (16,334 products). The remaining categories show lower but economically significant adoption rates, ranging from 33,728 products (1.7%) for technology & sourcing claims to 5,847 products (0.3%) for sustainability claims.

Validation procedures confirm the accuracy and economic relevance of these measures. For instance, manual verification of random samples confirms that automated text extraction algorithms accurately identify product positioning claims. Most importantly, as we discuss in detail below, the measures exhibit expected correlations with firm characteristics, market conditions, and temporal trends that validate their economic interpretation as innovation strategies. For example, large firms concentrate in mainstream positioning categories while small firms pursue specialized strategies, and temporal patterns align with documented shifts in consumer preferences and industry trends.

PLACE TABLE 3 ABOUT HERE

Table 3 presents summary statistics for the positioning measures and key control variables. Panel A confirms the positioning category prevalences, with standard deviations approximating 50% for most

categories, indicating highly skewed distributions where products either fully adopt or completely avoid each positioning strategy. Panel B shows that 64.1% of products adopt at least one positioning strategy, with an average positioning diversity of 0.91 strategies per product. Panel C documents substantial variation in firm portfolio sizes (ranging from 1 to 46,915 products) and category sizes (ranging from single-product categories to over 90,000 products), reflecting the diversity of firms and market segments.

While I focus on product positioning-based innovation measures, the USDA FoodData Central database enables construction of complementary innovation metrics. Product launch patterns capture innovation frequency and timing decisions. Ingredient list changes over time can identify product reformulation and recipe innovation. Product discontinuation data enables analysis of innovation failure and portfolio management. Nutritional profile changes capture health-focused innovation strategies.

4 Temporal and Bundling Innovation Patterns in Food Markets

The systematic analysis of 1.98 million product launches reveals substantial heterogeneity in innovation strategies across U.S. food markets, with clear patterns in positioning adoption, temporal evolution, and strategic combinations. This section documents two key dimensions of innovation patterns: their evolution over time and the systematic bundling of complementary approaches.

4.1 Temporal Evolution of Innovation Strategies

Table 5 reveals dramatic shifts in innovation focus between 2019 and 2024, with some strategies experiencing rapid growth while others show sharp declines. These patterns provide insight into changing consumer preferences, competitive dynamics, and the evolution of food industry innovation priorities.

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Plant-based alternatives show the most distinct growth trajectory, increasing 140% from 6.0% of products in 2019 to 14.4% in 2024. This explosive growth is consistent with technological advances in

plant protein processing, increased consumer interest in plant-based diets for health and environmental reasons (Sá et al. (2022)), and substantial venture capital investment in plant-based food companies (PitchBook (2022, 2025)). The growth pattern shows consistent increases through 2023 followed by acceleration in 2024, suggesting continuing momentum in this category.

Natural positioning also exhibits strong growth, increasing 35% from 44.7% in 2019 to 60.2% in 2024. The growth trajectory shows some volatility during the middle years but strong acceleration in 2024, indicating that natural positioning remains an attractive strategy for firms seeking broad market appeal. The high absolute levels combined with continuing growth suggest that natural claims have become increasingly central to food industry innovation strategies.

In contrast, established positioning strategies show significant declines between 2019 and 2024. Organic certification falls 58% from 11.4% in 2019 to 4.8% in 2024, representing the largest proportional decline among all categories. This is consistent with competitive pressure from natural positioning as a lower-cost alternative (Hu et al. (2024)). Premium positioning shows a similar decline of 59%, dropping from 3.6% to 1.5%, possibly indicating reduced consumer willingness to pay for premium positioning during the period or increased competition in premium segments.

Dietary restrictions show moderate growth of 60%, increasing from 2.4% to 3.9%, indicating steady demand for specialized dietary accommodations. Functional products decline 33% from 2.4% to 1.6%, while technology & sourcing claims fall 57% from 1.5% to 0.6%. Sustainability claims show a 40% decline from already low levels, dropping from 0.3% to 0.2%.

The overall metrics show positive trends in innovation intensity. Products with any positioning strategy increase 20% from 62.1% to 74.8%, indicating growing recognition of the importance of product differentiation. Positioning diversity per product increases 30% from 0.87 to 1.13, suggesting firms are increasingly combining multiple positioning strategies rather than relying on single approaches.

4.2 Strategic Bundling and Complementarity

Table 4 documents systematic patterns in how firms bundle different innovation strategies, providing insight into strategic complementarities and competitive positioning approaches. The bundling patterns suggest that firms view certain positioning strategies as complementary rather than substitutable, with specific combinations offering enhanced market positioning.

PLACE TABLE 4 ABOUT HERE

The most prevalent combination pairs natural positioning with plant-based alternatives, appearing in 88,891 products representing 4.49% of all launches. This combination reflects the strong consumer association between plant-based ingredients and natural products, suggesting these strategies reinforce each other in consumer perception. The high frequency of this combination indicates substantial strategic complementarity between these approaches.

Natural positioning combined with organic certification represents the second most common pairing, appearing in 73,026 products (3.69%). This combination leverages the premium positioning potential of organic certification with the broad appeal of natural claims, potentially capturing both mainstream natural consumers and premium organic segments. The lower frequency compared to natural-plant combinations may reflect the higher costs and complexity of organic certification.

Natural positioning paired with premium strategies appears in 33,245 products (1.68%), while organic certification combined with plant-based alternatives captures 28,404 products (1.43%). The relatively lower frequency of organic-premium combinations (5,394 products, 0.27%) suggests these strategies may be less complementary or may target distinct market segments.

The overall bundling pattern shows that 43.1% of products employ single positioning strategies, while 21.1% combine multiple approaches. The remaining 35.9% of products adopt no identifiable positioning strategies, indicating substantial heterogeneity in firms' approaches to product differentiation. The prevalence of multiple positioning strategies suggests increasing sophistication in product

positioning approaches, with firms recognizing the value of combining complementary strategies to enhance market positioning and competitive differentiation.

5 Firm Heterogeneity in Innovation Strategies

Innovation strategies vary dramatically across firms, reflecting differences in capabilities, market positioning, and strategic objectives. This section examines how positioning choices correlate with firm characteristics, documenting systematic patterns in how companies of different sizes and market positions approach product innovation.

5.1 Innovation Patterns by Firm Size

Table 6 reveals striking systematic differences in positioning strategies across firm size categories. The analysis divides firms into four groups based on products launched between 2019 and 2024: small firms (1-99 products), medium firms (100-999 products), large firms (1,000-9,999 products), and giant firms (10,000+ products). These size categories capture fundamentally different business models, from specialty producers to multinational food conglomerates.

PLACE TABLE 6 ABOUT HERE

Small firms demonstrate significantly higher adoption rates of premium and specialized positioning strategies. Organic certification reaches 16.7% among small firms compared to only 10.2% for giant firms, reflecting the higher margins and specialized supply chains that smaller producers can more easily maintain. Premium positioning shows an even starker pattern, appearing in 5.1% of small firm products versus 2.3% for giants. This pattern suggests small firms compete through differentiation and premium positioning rather than scale economies[1].

[1]This mechanism aligns with classic IO theory: differentiation relaxes price competition, allowing smaller firms to sustain profits despite lacking scale (Shaked and Sutton (1982)). Sutton (1991) further shows how endogenous sunk costs such as advertising and R&D support coexistence between large, scale-driven firms and niche, premium producers. Hopenhayn (1992) complements this perspective by modeling the dynamic coexistence of heterogeneous firm sizes through entry and exit.

Technology & sourcing claims exhibit the most dramatic size-related differences. Small firms adopt these strategies at 3.6%, nearly six times the rate of large and giant firms (0.6%). This pattern likely reflects small firms' ability to implement specialized sourcing practices like grass-fed or cage-free production, which may be difficult to scale across massive product portfolios. Sustainability claims follow a similar pattern, appearing in 0.75% of small firm products versus only 0.09% for giants.

Conversely, large and giant firms focus heavily on mainstream natural positioning. Large firms show the highest natural positioning adoption at 52.3%, compared to 37.1% for small firms and 47.1% for giants. This pattern suggests that natural positioning provides broad market appeal suitable for mass-market distribution, while specialized claims may be more effective for niche market positioning.

Plant-based alternatives show relatively consistent adoption across size categories (5.5-7.7%), indicating this innovation direction appeals broadly across different firm types. However, dietary restrictions decline sharply with firm size, from 4.5% for small firms to 1.7% for large firms, possibly reflecting the complexity of managing specialized dietary requirements across large product portfolios.

Overall positioning intensity remains relatively constant across size categories, with 62-66% of firms adopting at least one positioning strategy. However, positioning diversity shows interesting variation, peaking at 0.96 for medium firms and declining to 0.83 for giants.

5.2 Top Food Companies' Positioning Strategies

Table 7 examines positioning strategies among the 40 largest food companies by portfolio size, revealing substantial heterogeneity in innovation approaches that reflect fundamentally different business models. The analysis distinguishes between two primary firm types: traditional food manufacturers (General Mills, Campbell Soup, Kraft Heinz, PepsiCo, Nestlé) that develop and market branded products, and major retailers (Walmart, Target, Kroger, Whole Foods) that compete through private label offerings.

PLACE TABLE 7 ABOUT HERE

Mass retailers dominate the largest portfolio sizes, with Walmart (46,915 products), Target

(44,327 products), and other major chains representing six of the top ten positions. These extensive private label portfolios reflect retailers' strategic use of product-line length as a competitive tool (Draganska and Jain (2004)). Retailers can leverage their control over shelf space and supply chain relationships to rapidly expand product lines, enabling broad market coverage through private label strategies.

Traditional food manufacturers show concentrated expertise in specific positioning areas. PepsiCo leads natural positioning at 88.8%, reflecting its focus on mainstream consumer appeal across beverages and snacks. Campbell Soup shows the highest plant-based adoption (23.7%), followed by Conagra (22.1%), indicating substantial R&D investments in alternative protein technologies. Danone demonstrates specialized health positioning with 83.8% natural claims, 32.5% organic certification, and 7.5% functional products, reflecting its strategic focus on health-conscious consumers.

In contrast, mass retailers pursue broader but shallower positioning strategies. Walmart combines high natural positioning (55.8%) with limited premium strategies (2.2% premium, 0.8% technology & sourcing), consistent with its value positioning. Target shows moderate diversification across categories (46.4% natural, 12.7% organic, 1.8% dietary restrictions), reflecting its target demographic's preferences. Most regional chains fall between these extremes.

The variation in organic certification particularly illustrates strategic differentiation. Glencourt leads at 65.5% organic adoption, followed by Whole Foods (56.0%) and Danone (32.5%), while mass retailers show much lower rates: Walmart (5.2%), Target (12.7%), and most regional chains below 20%. This pattern demonstrates clear market segmentation, with premium-focused firms concentrating in higher-cost positioning categories while mass retailers focus on scalable mainstream strategies. Similarly, low adoption rates of plant-based positioning among mass retailers (3-6%) likely reflect the higher costs of these ingredients, making them less attractive for value-oriented strategies.

Premium positioning shows limited adoption even among large firms, with most companies below 5%. This pattern may reflect the inherent difficulty of maintaining premium positioning across extensive product portfolios, as suggested by Berry and Waldfogel (2010)'s finding that quality production strategies vary with market size and competitive dynamics. The concentration among smaller

regional chains (Smart & Final 6.3%, H-E-B 5.5%, Schnucks 5.5%) suggests premium positioning may be more viable for firms targeting specific geographic markets rather than national scale.

6 Product Categories and Innovation Intensity

Innovation patterns vary substantially across food categories, reflecting differences in consumer preferences, technological constraints, and competitive dynamics. This section examines how positioning strategies differ across product categories and explores the relationship between market structure, product complexity, and innovation intensity.

6.1 Category-Level Innovation Patterns

To enable systematic analysis, I aggregate the 448 original USDA food categories into 35 broader groups using ingredient similarity and market positioning (e.g., combining various snack subcategories into "salty snacks"). Table 9 documents positioning strategies across these categories, revealing striking variation in innovation approaches that reflect category-specific characteristics and consumer expectations.

PLACE TABLE 9 ABOUT HERE

Beverages lead innovation intensity across multiple positioning dimensions. Natural positioning reaches 69.1% in beverages, while functional claims appear in 9.4%—the highest rate across all categories. This concentration reflects beverages' suitability for functional ingredient addition and consumers' acceptance of health claims in liquid formats. Meat alternatives represent the most innovation-intensive category despite their small size (1,451 products), with plant-based positioning reaching 78.2%—over ten times the database average—while organic certification appears in 23.0% of products.

Traditional categories show more conservative patterns. Salty snacks (164,150 products) shows moderate natural positioning (37.0%) and limited specialized strategies, while candy (139,075 products) demonstrates 59.2% natural positioning but minimal functional claims (2.0%). Dairy categories exhibit

distinct patterns: yogurt shows exceptionally high natural positioning (79.1%) and functional claims (14.2%), reflecting its probiotic heritage, while cheese shows lower rates (33.6% natural, 5.3% organic).

Fresh produce shows interesting patterns despite inherent "natural" characteristics. Fresh produce itself shows only 21.0% natural positioning, likely because explicit "natural" claims are less common on unprocessed products. However, organic certification reaches 20.1%—well above the database average. Processed meat categories demonstrate variation: seafood shows low natural positioning (21.5%) but high technology & sourcing claims (11.7%), reflecting consumer interest in wild-caught, sustainable sourcing practices.

6.2 Market Concentration and Innovation

Table 8 examines the relationship between market concentration and innovation intensity using the Herfindahl-Hirschman Index (HHI) calculated from brand portfolio shares within each food category. The analysis reveals patterns consistent with theories linking market structure to innovation incentives.

PLACE TABLE 8 ABOUT HERE

High-concentration categories exhibit significantly greater innovation intensity across multiple dimensions. Products in high-concentration categories (HHI ≥ 0.025) show 72.7% adoption of positioning strategies compared to 59.1% in low-concentration categories (HHI < 0.01). This 23% difference suggests concentrated markets provide stronger incentives for product differentiation, consistent with models where firms compete through quality and positioning rather than price alone.

Natural positioning shows a particularly strong concentration gradient, reaching 56.7% in high-concentration categories versus 35.8% in low-concentration markets. Plant-based alternatives demonstrate an even steeper gradient, appearing in 10.5% of products in concentrated categories but only 3.8% in fragmented ones. These patterns suggest that in concentrated markets, firms invest more heavily in positioning strategies that can generate sustainable competitive advantages.

Notably, organic certification shows the opposite pattern, declining from 14.6% in low-concentration categories to 9.3% in high-concentration ones. This inverse relationship may reflect the commodity-like nature of organic certification—in concentrated markets, firms may prefer proprietary positioning strategies over standardized certifications that competitors can easily replicate.

Positioning diversity increases substantially with concentration, averaging 1.09 strategies per product in high-concentration categories versus 0.82 in fragmented ones. This pattern indicates that concentrated markets not only generate more innovation but also more complex, multi-dimensional positioning approaches. Firms in concentrated markets appear to pursue sophisticated bundling strategies rather than simple single-attribute positioning.

6.3 Product Ingredient Complexity and Innovation Strategies

Table 10 analyzes how innovation strategies vary with product complexity, measured by ingredient count, while Table 11 demonstrates the database's capability to track specific ingredient trends over time.

PLACE TABLE 10 ABOUT HERE

Natural positioning shows a dramatic positive relationship with complexity, rising from 11.8% for simple products (1-5 ingredients) to 67.8% for complex products (16+ ingredients), suggesting natural positioning serves as consumer reassurance for processed foods. Organic certification exhibits the opposite pattern, declining from 18.1% to 7.7%, reflecting practical difficulties of maintaining certification across complex supply chains. Overall positioning adoption increases from 38.5% for simple products to 80.2% for complex ones.

PLACE TABLE 11 ABOUT HERE

Table 11 illustrates the database's potential for tracking ingredient-level innovation patterns. Turmeric demonstrates sustained growth from 5.26% in 2019 to 8.71% in 2024, while stevia and monk

fruit show lifecycle patterns, peaking in 2022 before declining. These temporal patterns provide insight into ingredient adoption cycles and demonstrate how the database enables analysis of technology diffusion at unprecedented granularity. The 2024 declines across multiple ingredients suggest potential broader industry trends that merit continued monitoring.

7 Research Applications and Future Directions

The comprehensive nature of the USDA FoodData Central database enables numerous research applications across economics, finance, and management. The combination of product-level innovation measures, temporal granularity, and complete market coverage creates opportunities for empirical analysis that were previously impossible. This section outlines specific research questions and methodological approaches that researchers can pursue using these data.

7.1 Innovation and Competitive Dynamics

The database enables sophisticated analysis of competitive responses and innovation racing. Researchers can identify when firms launch products in response to competitors' innovations by examining temporal patterns in category-level positioning adoption. The monthly update frequency allows precise measurement of competitive response times and analysis of first-mover advantages in emerging categories like plant-based alternatives. Studies can test whether innovation spillovers occur through imitation, differentiation, or market expansion mechanisms.

The positioning bundling data supports analysis of innovation complementarity and competitive positioning. Researchers can examine whether firms systematically combine certain positioning strategies and how these combinations evolve over time. The data enable testing of theories about product differentiation in crowded markets and the role of multi-dimensional positioning in competitive strategy.

Market structure analysis becomes possible through examination of innovation patterns across concentration levels. The finding that concentrated markets exhibit higher innovation intensity raises

questions about the direction of causality—whether concentration enables innovation or innovation creates concentration. Natural experiments in category-level concentration changes could provide identification for causal analysis.

7.2 Organizational Learning and Capabilities

The longitudinal firm-level data enable analysis of organizational learning in product development. Researchers can track how firms' positioning strategies evolve as they gain experience in specific categories, testing theories of learning-by-doing in innovation. The data allow examination of whether firms develop specialized capabilities in certain positioning approaches and how these capabilities transfer across product categories.

Portfolio-level analysis becomes possible through examination of how firm size and scope affect innovation strategies. The systematic differences between small and large firms raise questions about optimal organizational forms for different types of innovation. Studies can examine whether diversified firms cross-subsidize innovation across categories and how portfolio effects influence individual product positioning decisions.

The private label versus branded manufacturer distinction enables analysis of different innovation models. Retailers' control over shelf space and supply chains may provide advantages in certain positioning strategies, while manufacturers' R&D capabilities may favor others. This comparison can inform theories of vertical integration and make-or-buy decisions in innovation.

7.3 Supply Chain and Sourcing Innovation

The ingredient-level detail enables comprehensive analysis of supply chain innovation and firm exposure to commodity markets. Researchers can construct firm-level exposure measures to specific commodities (e.g., sugar) and examine how price shocks affect product positioning decisions. The temporal patterns in ingredient adoption provide insight into technology diffusion across supply chains.

Technology & sourcing claims (grass-fed, cage-free, wild-caught) enable analysis of how firms

innovate through supply chain modifications rather than product reformulation. These strategies require different capabilities and face different constraints than ingredient-based innovations. Studies can examine the adoption patterns of sourcing innovations and their relationship to consumer willingness to pay for transparency.

The organic certification data provides opportunities to study regulatory innovation and certification adoption. The decline in organic adoption raises questions about market saturation, competitive dynamics, or changing consumer preferences. Cross-category analysis can identify which product types maintain organic growth and which show declining interest.

7.4 Financial Market Applications

The comprehensive firm coverage enables linkage with financial market data to study how innovation strategies affect firm valuation and risk. Researchers can examine whether markets properly value different positioning strategies and whether innovation diversity affects firm volatility. The temporal granularity allows event studies around major product launches or positioning strategy shifts.

Portfolio-level innovation measures enable analysis of how product innovation affects firm risk exposure. Firms with diverse positioning strategies may exhibit different risk profiles than those concentrating in specific approaches. The relationship between innovation intensity and financial performance can be examined across different firm sizes and market positions.

The ingredient exposure data creates opportunities for studies of operational risk and supply chain resilience. Firms heavily exposed to specific ingredients face different commodity price risks and supply disruption vulnerabilities. Financial researchers can examine how markets price these exposures and whether firms hedge them effectively.

7.5 Environmental Economics

The sustainability claims and ingredient data enable comprehensive analysis of environmental positioning in consumer goods markets. Despite low adoption rates, the temporal and cross-sectional patterns

in sustainability claims can inform studies of green marketing and consumer willingness to pay for environmental attributes. Plant-based alternatives also provide a natural laboratory for studying the adoption of environmentally-motivated innovations.

8 Conclusion

This paper documents how comprehensive, open-source product-level data from USDA FoodDate can transform empirical innovation research in consumer goods markets. Using 1.98 million food product launches between 2019 and 2024, I develop systematic approaches to extract innovation measures from mandatory labeling information and reveal patterns previously impossible to study at scale. Using these innovation measures, my empirical analysis yields several key findings. Natural positioning emerges as the dominant product positioning strategy (46.5% of products), while plant-based alternatives show explosive 140% growth between 2019–2024. Small firms pursue premium and specialized strategies while large firms focus on mainstream positioning. Market concentration correlates positively with innovation intensity, and product complexity drives positioning strategy adoption.

Future research opportunities span multiple fields. Innovation researchers can study competitive dynamics and organizational learning with unprecedented precision. Supply chain researchers can analyze commodity exposure and sourcing strategies. Finance researchers can examine how innovation affects firm valuation and risk. Environmental economists can study sustainable positioning adoption.

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Table 1: USDA FoodData Central Database Overview

Database Characteristic	Value
Total Products	1,981,655
Time Period	2019–2024
Unique Firms	37,055
Unique Food Categories	448
Primary Data Source	Label Insight (93.2%)
Data Completeness:	
With Ingredients	1,976,284 (99.7%)
With Category Information	1,971,025 (99.5%)
With Brand Owner Information	1,964,417 (99.1%)

Notes: Overview of the USDA FoodData Central database covering packaged food products sold in the United States. Database includes product-level information on ingredients, brand owners, and food category classifications. Data Completeness shows percentage of products with non-missing information for key variables. Primary Data Source indicates Label Insight as the predominant data collection method, representing automated extraction from product labels. Data source: USDA FoodData Central, 2019-2024.

Table 2: Product Positioning Category Definitions and Component Claims

Positioning	Component Claims	Top Components	Products	Share (%)
Natural Positioning	Natural	• Natural (920,952)	920,952	46.5
Organic Certification	Organic (USDA Certified)	• Organic (237,310)	237,310	12.0
Plant-Based Alternative	Soy Protein, Pea Protein, Quinoa, Chia, Hemp, Plant-Based, Meat Alternative	• Soy Protein (82,230) • Quinoa (19,822) • Pea Protein (19,698) • Chia (16,334)	151,682	7.7
Dietary Restrictions	Gluten-Free, Kosher, Vegan, Vegetarian, Dairy-Free, Fat-Free, Sugar-Free, Halal	• Gluten-Free (22,796) • Kosher (17,730) • Fat-Free (11,562) • Sugar-Free (9,359)	82,579	4.2
Premium Positioning	Premium, Gourmet, Traditional, Artisan, Craft, Handmade, Small Batch	• Premium (37,412) • Gourmet (14,431) • Traditional (9,570) • Artisan (5,672)	70,426	3.6
Functional Product	Probiotic, Prebiotic, Antioxidant, Superfood, Energy, High Protein	• Antioxidant (21,942) • Probiotic (13,402) • Energy (12,370) • High Protein (2,599)	57,567	2.9
Technology & Sourcing	Non-GMO, Grass-Fed, Wild-Caught, Cage-Free, Free-Range, Antibiotic-Free	• Non-GMO (17,531) • Grass-Fed (4,649) • Wild-Caught (4,583) • Cage-Free (4,266)	33,728	1.7
Sustainability Claim	Fair Trade, Sustainable, Eco-Friendly, Recyclable, Biodegradable	• Fair Trade (4,466) • Sustainable (1,300) • Biodegradable (46) • Recyclable (19)	5,847	0.3

Notes: Comprehensive definitions of product positioning categories and their component claims. Product counts represent unique products containing each claim type, with some products potentially appearing in multiple categories. Share calculated as percentage of total 1,981,655 products in database. Component Claims lists all claim types included in each positioning category. Top Components shows the largest individual contributors within each category with specific product counts. Natural Positioning includes products with explicit "natural" labeling claims. Organic Certification limited to USDA organic certified products only. Plant-Based Alternative encompasses protein alternatives and plant-derived ingredients. Dietary Restrictions includes religious, health, and lifestyle dietary accommodations. Premium Positioning covers luxury, artisanal, and craft positioning. Functional Product includes health-enhancing ingredients and nutritional benefits. Technology & Sourcing covers production methods and sourcing transparency. Sustainability Claim includes environmental and social responsibility claims. Data source: USDA FoodData Central, 2019-2024.

Table 3: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
Panel A. Product Positioning:					
Natural Positioning (%)	46.5	49.9	0	100	1,981,655
Organic Certification (%)	12.0	32.5	0	100	1,981,655
Plant-Based Alternative (%)	6.8	25.1	0	100	1,981,655
Premium Positioning (%)	3.5	18.4	0	100	1,981,655
Functional Product (%)	2.9	16.7	0	100	1,981,655
Technology & Sourcing (%)	1.6	12.5	0	100	1,981,655
Sustainability Claim (%)	0.3	5.4	0	100	1,981,655
Panel B. Overall Metrics:					
Any Positioning (%)	64.1	48.0	0	100	1,981,655
Positioning Diversity (count)	0.91	0.87	0	6	1,981,655
Panel C. Firm and Category Characteristics:					
Firm Portfolio Size	7,534	11,567	1	46,915	1,981,655
Category Size	32,987	26,305	1	92,148	1,981,655

Notes: Summary statistics for product positioning variables and control variables. Natural Positioning indicates products containing "natural" claims; Organic Certification indicates USDA organic certified products; Plant-Based Alternative includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims; Premium includes premium, gourmet, artisan, craft, and traditional claims; Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims; Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; Sustainability Claim includes fair trade, Sustainability Claim, eco-friendly, recyclable, and biodegradable claims. Positioning Diversity counts the number of positioning types per product (0-6). Firm Portfolio Size measures number of products per brand owner. Category Size measures number of products per food category. Data source: USDA FoodData Central, 2019-2024.

Table 4: Common Product Positioning Strategy Combinations

Positioning Combination	Products	Percentage (%)
Panel A. Most Common Dual Strategies:		
Natural + Plant-Based	88,891	4.49
Natural + Organic	73,026	3.69
Natural + Premium	33,245	1.68
Organic + Plant-Based	28,404	1.43
Organic + Premium	5,394	0.27
Panel B. Overall Bundling Pattern:		
Single Positioning Type	853,199	43.1
Multiple Positioning Types	417,813	21.1
No Positioning Claims	710,643	35.9
Total Products	1,981,655	100.0

Notes: Common combinations of product positioning strategies across all products. Natural defined as products containing "natural" claims. Organic defined as USDA certified organic products. Plant-Based includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims. Premium includes premium, gourmet, artisan, craft, and traditional positioning claims. Single Positioning Type indicates products with exactly one positioning strategy. Multiple Positioning Types indicates products with two or more positioning strategies. No Positioning Claims indicates products without identified positioning strategies. Percentages calculated as share of total products in database. Data source: USDA FoodData Central, 2019-2024.

Table 5: Evolution of Product Positioning Strategies Over Time

Positioning Strategy	**Product Launch Year**						
	2019	2020	2021	2022	2023	2024	Growth
Panel A. Product Positioning:							
Natural Positioning (%)	44.7	49.6	45.6	44.2	50.2	60.2	+34.7%
Organic Certification (%)	11.4	12.9	12.2	13.7	10.6	4.8	−58.0%
Plant-Based Alternative (%)	6.0	8.0	6.2	7.1	8.2	14.4	+140.0%
Dietary Restriction (%)	2.4	2.7	2.7	3.0	3.2	3.9	+59.8%
Premium Positioning (%)	3.6	3.2	3.7	3.1	3.2	1.5	−58.6%
Functional Product (%)	2.4	3.2	2.7	3.3	3.7	1.6	−33.3%
Technology & Sourcing (%)	1.5	1.4	1.6	1.8	1.7	0.6	−57.1%
Sustainability Claim (%)	0.3	0.3	0.3	0.3	0.3	0.2	−39.5%
Panel B. Overall Metrics:							
Any Positioning (%)	62.1	67.3	63.3	63.6	67.0	74.8	+20.4%
Positioning Diversity	0.87	0.96	0.89	0.91	0.97	1.13	+29.9%

Notes: Product positioning strategy adoption rates by publication year. Natural Positioning defined as products containing "natural" claims. Organic defined as USDA certified organic products. Plant-Based includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims. Dietary includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal claims. Premium includes premium, gourmet, artisan, craft, and traditional positioning. Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims. Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims. Sustainability Claim includes fair trade, Sustainability Claim, eco-friendly, recyclable, and biodegradable claims. Any Positioning indicates products with at least one positioning strategy. Positioning Diversity measures average number of positioning types per product. Growth calculated from 2019 to 2024. Data source: USDA FoodData Central, 2019-2024.

Table 6: Product Positioning Strategies by Company Size

Positioning Strategy	**Branded Food Company Portfolio Size**			
	Small (1-99)	Medium (100-999)	Large (1,000-9,999)	Giant (10,000+)
Natural Positioning (%)	37.1	45.0	52.3	47.1
Organic Certification (%)	16.7	14.1	9.0	10.2
Plant-Based Alternative (%)	6.9	7.7	7.0	5.5
Dietary Restriction (%)	4.5	3.4	1.7	2.1
Premium Positioning (%)	5.1	4.2	3.0	2.3
Functional Product (%)	4.3	3.7	2.7	1.4
Technology & Sourcing (%)	3.6	2.4	0.6	0.6
Sustainability Claim (%)	0.75	0.40	0.11	0.09
Any Positioning (%)	62.6	65.3	65.8	62.1
Positioning Diversity	0.94	0.96	0.92	0.83
N Products	344,264	504,101	619,806	513,484
Average Portfolio Size	37	413	4,008	23,806

Notes: Product positioning strategies by brand portfolio size categories. Size Category defined by number of products per brand owner: Small (1-99 products), Medium (100-999 products), Large (1,000-9,999 products), Giant (10,000+ products). Natural Positioning defined as products containing "natural" claims; Organic Certification indicates USDA organic certified products; Plant-Based Alternative includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims; Dietary includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal claims; Premium includes premium, gourmet, artisan, craft, and traditional claims; Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims; Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; Sustainability Claim includes fair trade, Sustainability Claim, eco-friendly, recyclable, and biodegradable claims. Any Positioning indicates products with at least one positioning strategy. Positioning Diversity measures average number of positioning types per product. Average Portfolio Size shows mean number of products per brand owner within each size category. Data source: USDA FoodData Central, 2019-2024.

Table 7: Top Branded Food Companies – Product Launches and Positioning Strategies

Brand Owner	Total Launches	Natural (%)	Organic (%)	Plant Based (%)	Dietary (%)	Premium (%)	Functional (%)	Technology & Sourcing (%)	Sustainability (%)
Walmart	46,915	55.8	5.2	5.5	1.2	2.2	2.2	0.8	0.0
Target	44,327	46.4	12.7	3.9	1.8	1.0	1.0	0.4	0.0
General Mills	32,642	69.7	18.6	10.1	10.2	2.6	1.0	0.2	0.3
Conagra Brands	31,556	59.7	3.3	22.1	3.2	3.2	1.1	0.4	0.0
Meijer	31,231	48.0	7.7	4.5	1.0	3.1	1.1	1.0	0.0
Safeway	29,484	43.1	1.6	3.2	1.0	3.5	0.7	0.7	0.0
Topco Associates	26,163	40.8	12.4	4.1	1.6	2.1	0.8	0.4	0.0
Wegmans	23,884	36.7	26.1	2.8	3.2	2.2	2.3	0.8	0.0
Kroger	23,636	44.9	16.4	5.3	1.1	1.6	1.4	0.5	0.0
Hy-Vee	23,176	45.4	1.3	4.7	1.0	3.7	1.1	0.2	0.0
Ahold USA	20,838	44.3	15.3	4.5	1.1	2.2	1.7	0.8	0.1
Campbell Soup	20,826	55.2	6.0	23.7	0.6	1.5	1.5	0.2	0.0
Kraft Heinz	18,585	64.6	1.1	3.9	0.6	1.9	0.8	0.1	0.0
Supervalu	18,256	41.8	0.3	3.7	0.5	1.5	0.6	0.4	0.0
Whole Foods	16,775	29.0	56.0	3.6	1.6	1.0	0.4	2.6	0.1
Wakefern	16,582	34.2	16.2	2.7	1.6	1.4	1.6	0.9	0.0
Giant Eagle	15,210	37.1	9.2	2.6	1.5	1.4	1.2	0.3	0.0
Harris Teeter	15,141	42.0	11.4	3.4	0.7	3.6	0.4	0.3	0.0
Nash Finch	14,666	44.3	0.8	3.4	0.7	2.4	1.2	0.7	0.0
Tops Markets	13,715	40.1	1.0	2.6	2.9	1.1	2.7	0.1	0.0
PepsiCo	13,339	88.8	3.3	5.5	2.0	1.1	2.6	0.0	0.0
Weis Markets	12,554	43.1	3.8	3.4	1.9	3.2	2.0	0.7	0.0
AWG	12,392	42.8	14.4	3.6	1.1	2.1	1.3	0.4	0.0
Schnucks	12,341	47.7	1.1	3.3	1.2	5.5	0.2	0.3	0.0
Nestlé USA	11,412	80.1	1.1	12.5	0.5	3.3	2.5	0.0	0.0
Raley's	11,129	29.0	11.8	2.4	0.9	1.7	0.5	1.1	0.0
Big Y Foods	10,408	39.7	1.6	3.3	3.1	1.6	0.4	0.4	0.0
Glencourt	9,916	30.6	65.5	5.7	3.0	0.4	1.2	3.0	0.1
Kellogg	9,788	62.6	2.7	14.0	0.9	0.1	0.6	0.0	0.0
Stater Bros.	9,762	40.1	0.1	2.2	1.0	2.7	0.7	0.1	0.0
Bimbo Bakeries USA	9,452	44.1	2.4	3.8	0.0	4.0	1.8	0.0	0.0
Ferrara Candy	9,039	74.0	3.5	3.2	0.0	0.3	0.1	0.0	0.0
Smart & Final	8,915	36.3	4.0	1.6	0.7	6.3	0.7	1.7	0.0
Food Town	8,601	48.7	0.2	4.9	0.2	0.8	0.7	0.0	0.0
Hannaford Bros.	8,519	47.3	1.1	5.0	0.7	0.5	1.3	0.1	0.0
Mars	8,301	59.9	0.1	1.1	0.3	0.1	0.2	0.0	0.0
H-E-B	7,879	48.3	17.0	3.1	1.6	5.5	0.7	0.7	0.0
Tyson Foods	7,842	60.3	0.5	16.0	1.6	3.7	3.1	0.1	0.0
Danone US	7,841	83.8	32.5	10.0	13.1	1.1	7.5	0.0	0.1
Aldi	7,724	46.1	7.4	5.9	3.0	3.2	2.0	0.6	0.0

Notes: Product positioning strategies and total product launches for top 40 branded food companies ranked by portfolio size. Total Launches shows cumulative products launched 2019-2024. Positioning percentages represent average adoption rates across all years (2019-2024). Natural Positioning defined as products containing "natural" claims. Organic refers to USDA certified organic products. Plant Based includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims. Dietary includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal claims. Premium includes premium, gourmet, artisan, craft, and traditional positioning. Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims. Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims. Sustainability includes fair trade, sustainable, eco-friendly, recyclable, and biodegradable claims. Companies shown after merging subsidiaries under parent companies. Data source: USDA FoodData Central, 2019-2024.

Table 8: Product Positioning Strategies by Category Concentration Level (2019-2024)

Positioning Strategy	Category Concentration Level		
	Low (HHI < 0.01)	Medium (0.01 ≤ HHI < 0.025)	High (HHI ≥ 0.025)
Natural Positioning (%)	35.8	47.2	56.7
Organic Certification (%)	14.6	11.9	9.3
Plant-Based Alternative (%)	3.8	6.6	10.5
Dietary Restriction (%)	2.2	2.3	4.4
Premium Positioning (%)	4.3	3.5	2.7
Functional Product (%)	2.3	3.0	3.2
Technology & Sourcing (%)	1.3	1.9	1.3
Sustainability Claim (%)	0.28	0.32	0.20
Any Positioning (%)	59.1	63.1	72.7
Positioning Diversity	0.82	0.88	1.09
N Products	465,938	1,097,316	407,771
Average HHI	0.007	0.016	0.139

Notes: Product positioning strategies by category concentration level measured using Herfindahl-Hirschman Index (HHI) calculated from brand product portfolio shares within each food category during 2019-2024. Concentration levels defined as: Low (HHI < 0.01), Medium (0.01 ≤ HHI < 0.025), High (HHI ≥ 0.025). HHI measures product portfolio concentration within each food category, where each brand's share equals their number of products in the category divided by total products in that category. Natural Positioning indicates products containing "natural" claims; Organic Certification indicates USDA organic certified products; Plant-Based Alternative includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims; Dietary includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal claims; Premium includes premium, gourmet, artisan, craft, and traditional claims; Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims; Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; Sustainability Claim includes fair trade, Sustainability Claim, eco-friendly, recyclable, and biodegradable claims. Any Positioning indicates products with at least one positioning strategy. Positioning Diversity measures average number of positioning types per product. Average HHI shows mean concentration level within each category. Data source: USDA FoodData Central, 2019-2024.

Table 9: Top Food Categories – Product Launches and Positioning Strategies

Food Category	Total Launches	Natural (%)	Organic (%)	Plant Based (%)	Dietary (%)	Premium (%)	Functional (%)	Technology & Sourcing (%)	Sustainability (%)
Salty Snacks	164,150	37.0	10.3	4.3	1.3	3.9	1.8	1.9	0.2
Beverages	139,878	69.1	17.7	5.9	0.6	3.0	9.4	0.7	0.7
Candy	139,075	59.2	6.6	2.3	0.6	2.6	2.0	0.9	0.4
Sauces & Condiments	135,679	41.7	13.8	2.8	2.2	4.4	0.9	1.6	0.2
Snack Bars	110,532	54.6	22.2	20.7	3.8	2.0	10.0	2.5	0.4
Baked Goods	104,675	68.5	6.5	5.3	3.6	2.7	2.9	2.3	0.6
Canned Produce	95,616	24.3	9.0	0.9	4.3	2.3	1.5	0.3	0.0
Bread & Bakery	85,810	36.9	7.9	7.0	3.1	4.8	1.3	2.0	0.2
Cheese	82,098	33.6	5.3	1.7	3.1	3.2	0.6	0.7	0.0
Ice Cream	69,055	75.5	9.3	4.5	2.4	13.9	1.9	1.9	0.6
Grains & Pasta	62,021	19.5	19.2	10.9	2.9	3.3	0.6	0.7	0.0
Frozen Meals	58,653	55.9	9.8	19.2	4.4	2.4	1.8	2.7	0.1
Baking Ingredients	57,127	37.2	11.9	2.5	2.9	4.0	2.4	1.3	0.3
Processed Meats	57,048	41.9	5.2	7.9	1.5	5.6	0.4	1.3	0.0
Seasonings	56,928	35.6	8.8	6.8	1.8	2.7	0.9	0.5	0.1
Cereals	46,963	55.4	17.4	11.0	6.4	0.9	3.8	1.5	0.5
Soups	41,518	57.8	16.2	27.6	3.5	2.8	1.3	1.5	0.0
Fresh Produce	40,902	21.0	20.1	0.7	0.2	1.4	0.3	0.3	0.0
Yogurt	40,173	79.1	17.9	3.2	20.2	1.4	14.2	1.1	0.2
Milk	39,834	44.2	18.2	7.0	3.6	1.2	2.7	0.7	0.6
Seafood	37,655	21.5	1.3	3.4	1.4	5.0	0.4	11.7	0.1
Meat	37,472	43.1	6.0	14.4	3.1	4.2	0.9	3.5	0.1
Prepared Meals	32,417	54.4	8.3	17.3	4.1	5.1	1.8	1.6	0.1
Frozen Produce	32,198	7.9	16.4	0.5	0.1	1.8	0.8	0.0	0.0
Water	29,379	80.4	8.7	0.5	0.0	1.1	2.6	0.3	0.2
Spreads	27,515	23.5	16.7	0.7	0.2	4.5	0.4	0.8	0.4
Other Dairy	20,281	31.1	11.8	2.8	2.4	1.1	0.8	5.1	0.2
Oils	19,108	8.5	19.2	0.4	0.2	2.7	0.8	1.0	0.2
Coffee & Tea	18,224	57.2	22.6	0.5	0.1	6.6	3.7	0.3	3.2
Other Produce	16,146	26.7	14.3	2.0	1.4	2.7	1.0	0.1	0.0
Nuts & Seeds	12,830	18.2	29.0	6.0	0.7	0.7	2.0	0.9	0.6
Desserts	11,299	67.0	3.3	3.0	1.7	1.0	7.1	0.1	0.0
Alcoholic Beverages	3,874	70.7	9.7	2.1	0.7	17.1	2.8	0.1	0.0
Supplements	3,239	74.7	21.1	22.6	0.8	0.7	15.9	3.8	0.3
Meat Alternatives	1,451	81.7	23.0	78.2	16.0	0.1	1.9	7.6	1.7

Notes: Product positioning strategies and total product launches for top 35 food categories ranked by portfolio size. Total Launches shows cumulative products launched 2019-2024. Positioning percentages represent average adoption rates across all years (2019-2024). Natural Positioning defined as products containing "natural" claims. Organic refers to USDA certified organic products. Plant Based includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims. Dietary includes gluten-free, kosher, vegan, vegetarian, dairy-free, and halal claims. Premium includes premium, gourmet, artisan, craft, and traditional positioning. Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims. Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims. Sustainability includes fair trade, sustainable, eco-friendly, recyclable, and biodegradable claims. Categories aggregated from 448+ original USDA food categories into major groups with more than 100 total products. Salty Snacks includes chips, crackers, pretzels, and popcorn. Beverages includes soft drinks, juices, energy drinks, and powdered drinks. Candy includes chocolate and sugar confectionery. Sauces & Condiments includes cooking sauces, dressings, dips, and condiments. Snack Bars includes granola, energy, and protein bars. Baked Goods includes cakes, cookies, and pastries. Canned Produce includes canned fruits, vegetables, and beans. Fresh/Frozen/Other Produce categories include corresponding fruit and vegetable products. Meat categories include beef, chicken, pork, turkey, processed meats, and seafood. Dairy categories include milk, cheese, yogurt, ice cream, and other dairy products. Meat alternatives includes meat and dairy alternatives. Data source: USDA FoodData Central, 2019-2024.

Table 10: Product Complexity and Positioning Strategy Adoption

Positioning Strategy	Number of Ingredients		
	Few (1–5 Ingredients)	Moderate (6–15 Ingredients)	Many (16+ Ingredients)
Natural Positioning (%)	11.8	48.1	67.8
Organic Certification (%)	18.1	12.2	7.7
Plant-Based Alternative (%)	1.2	4.1	12.9
Premium Positioning (%)	3.1	3.6	3.7
Functional Product (%)	0.8	2.6	4.5
Technology & Sourcing (%)	1.5	1.4	1.8
Sustainability Claim (%)	0.2	0.4	0.2
Any Positioning (%)	38.5	65.0	80.2
Positioning Diversity	45.3	88.8	122.8
N Products	498,771	726,973	755,911
Average Ingredients	3	10	31

Notes: Product positioning strategies by ingredient complexity levels. Complexity Level defined by ingredient count: Simple (1-5 ingredients, N=498,771), Moderate (6-15 ingredients, N=726,973), Complex (16+ ingredients, N=755,911). Natural Positioning indicates products containing "natural" claims; Organic Certification indicates USDA organic certified products; Plant-Based Alternative includes soy protein, pea protein, quinoa, chia, hemp, and explicit plant-based claims; Premium includes premium, gourmet, artisan, craft, and traditional claims; Functional includes probiotic, prebiotic, protein, fiber, vitamin, antioxidant, superfood, and energy claims; Technology & Sourcing includes non-GMO, grass-fed, wild-caught, cage-free, free-range, antibiotic-free, and hormone-free claims; Sustainability Claim includes fair trade, sustainable, eco-friendly, recyclable, and biodegradable claims. Any Positioning indicates products with at least one positioning strategy. Positioning Diversity measures average number of positioning types per product. Data source: USDA FoodData Central, 2019-2024.

Table 11: Adoption of Selective Ingredients Over Time

Year	Quinoa	Chia	Kale	Turmeric	Coconut	Avocado	Whey Protein	Probiotics	Stevia	Monk Fruit
2019	0.97	0.71	0.62	5.26	6.62	0.33	3.14	0.41	1.31	0.32
2020	1.14	0.97	0.73	5.92	7.71	0.59	4.61	0.58	2.12	0.69
2021	1.01	0.78	0.69	5.51	7.00	0.43	3.56	0.52	1.61	0.50
2022	0.96	0.90	0.74	5.63	6.30	0.66	4.48	0.57	2.53	0.98
2023	0.97	0.77	0.80	6.04	7.16	0.48	4.79	0.47	2.30	0.92
2024	0.28	0.31	0.15	8.71	3.78	0.35	3.29	0.07	0.80	0.05

Notes: Adoption rates of specific positioning ingredients over time, measured as percentage of total products containing each ingredient by publication year. Ingredients identified through systematic text analysis of ingredient lists. Quinoa, Chia, Kale defined as exact text matches in ingredient lists. Turmeric includes turmeric and curcumin. Coconut includes coconut oil, coconut flour, and coconut derivatives. Avocado includes avocado oil and avocado derivatives. Protein includes protein powder and added protein claims. Probiotics includes probiotic strains and probiotic claims. Stevia includes stevia extract and stevia derivatives. Monk Fruit includes monk fruit extract and monk fruit sweetener. Data source: USDA FoodData Central, 2019-2024.