Analysis of Consumer Perception of Product Attributes in Pet Food: Implications for Marketing and Brand Strategy

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1. Introduction

The pet food industry continues to grow due to higher disposable income and increased popularity of pet ownership amongst millennials. Research shows that pet food sales increased by 27% from $59.3 billion in 2010 to $75.25 billion in 2016 (Statista, 2017a). The increase in pet food demand is accompanied by increasing preference for specialized product attributes such as natural, organic, health benefits, and many others. Research shows that many pet food trends today mimic human food trends as there is a growing tendency among pet owners to humanize their pets (Pet Food Industry, 2015; Zion Market Research, 2017). These trends have forced companies to re-evaluate their production and marketing strategies in order to take advantage of the profit potential. They have begun using product differentiation based on various intrinsic attributes (e.g. color, texture, smell, appearance, etc…) and extrinsic attributes (e.g. brand, denomination of origin, image, etc…) (Beaton, 2017). As companies aim to accommodate the increasingly specialized demands of consumers, they must be aware of consumer's perception of value associated with different product attributes. The ability of the companies to accurately analyze and interpret consumer value perceptions and expectations is crucial for successfully capturing and maintaining market share in expanding specialty pet food categories (Ampuero & Vila, 2006; Rettie & Brewer, 2000; Silayoi & Speece, 2007).

There has been emerging literature in this area examining customer preferences and willingness to pay for specific attributes of pet food (Fidler, Light, & Costall, 1996; Serpell, 1996; Zasloff, 1996). However, the extent of this literature is limited by the availability and quality of consumer data. Recent advancements in information and communication technologies combined with the growing trend of online shopping in general and pet food, in particular, have generated new data source and provided an opportunity for analysis of consumer perceptions. The online pet food and supplies purchases in the U.S. have increased by 58% from $1.18 billion in 2011 to 1.86 billion in 2015 (Statista, 2015). Studies in other areas such as human food, health, services, banking, and many other markets have used online review data to study consumer preferences (Ampuero & Vila, 2006; Chen & Xie, 2004; Kolbe & Burnett, 1991). However, there are no such studies in pet food. The growth in pet food and increasing profit potential combined with increased online shopping provides a good opportunity for research in this area.

1.1 *Objectives*

The purpose of this paper is to provide insight into consumer perception of pet food product attributes. The specific questions answered by this paper are:

- What are the most prominent product attributes in the pet food industry?
- What pet food companies provide the prominent product attributes?
- What characteristics of the products attributes are pet food companies marketing to consumers?
- What characteristics of the products attributes do consumers value most?
- What characteristics of the product attributes do companies market most?

- What adjustments should pet food companies apply to their marketing strategy align with the characteristics which consumers value most?

Specific objectives include: identifying major emerging consumer trends in pet food, examining strategies used by pet food in designing and communicating points of differentiation targeted at emerging consumer trends, and analyzing consumer perception of the value associated with intrinsic and extrinsic attributes of specialty pet food products. Successful achievement of the objectives will provide valuable insight of the most prominent product attributes in pet food and what characteristics of the product attributes consumers enjoy the most. Successful understanding of this information has potential to provide competitive advantage to pet food companies as it provides reasoning for them to place more emphasis on the marketing of more profitable product attributes. Incorporating these adjustments will help to increase their customer base by highlighting the characteristics consumer's values the most.

1.2 *Overview of Paper Structure*

The remainder of the paper will flow as follows. The next section provides an over and analysis of the pet food industry. This section aims to shed light on the structure, demand, and current marketing strategies of the industry. Following the Pet Food Industry section will be the Literature Review section. This section will set the stage for the understanding of the importance of product positioning and consumer perceptions in business. The section will then discuss key studies which have been conducted to measure consumer perception using online consumer review analysis and the limitations of this. The next section will consist of the data and methods section. Data description, collection techniques, and cleaning techniques will be discussed here. The section then discusses the two analysis techniques used. Following this, I will discuss the analysis results and conclusions drawn from the research.

2. Pet Food Industry

2.1 *Industry Overview*

2.1.1 *The Market*

In 2016, the global pet food industry totaled $75.25 billion in revenue (Phillips-Donaldson, 2017a; Statista, 2017a; Zion Market Research, 2017). The pet food industry is broken into three different markets: dog food, cat food, and small pet food. The dog food market has proven to be the most profitable market of the three as it accounted for 60% of the $75.25 billion total pet food sales in 2016 (Mintel Group Ltd, 2016; Statista, 2017a, p. 201; Zion Market Research, 2017). The global cat food industry is also a major contributor to the total pet food sales, representing 35% of the market share. Within the dog and cat food markets, there are three product categories consisting of dry food, wet food, and treats. The dry food category is the primarily demanded product in both markets as it offers both convenience, lower prices, and better storage capabilities than wet food; all factors which consumers seem to value most (Dog Food Advisor, 2011; Vetifo, 2014). The small pet food industry primarily consists of dry food for both birds, small mammals, and reptiles.

2.1.2 *Market Leaders*

In 2016, the industry was primarily controlled by the top 5 companies in the market as they combined for 49% of the market share; all of which are U.S. based companies. Mars Petcare Inc. was the leading global pet food company as their revenue totaled $17.2 billion ("Leading global pet food companies based on revenue 2016 | Statistic," n.d.; Phillips-Donaldson, 2017a). Horizontal integration of the dog and cat food markets has been a successful strategy in helping them achieve the leading role in the global pet food market. In 2016, Mars. Inc. offered products in all dog food, cat food, dog treats, and cat treats categories; ranking first amongst wet pet food sales and second in dry pet food sales (Pet Food Industry, 2017). This strategy has also proven successful to Nestle Purina Inc., who ranked second amongst all global pet food companies in 2016 recording revenues of $12.1 billion dollars ("Leading global pet food companies based on revenue 2016 | Statistic," n.d.; Pet Food Industry, 2017). Although they operate in the same markets as Mars Inc., Nestle's strong market share is primarily due to the strong brand presence in the dry food category in both the dog and cat food markets. In 2016, Nestle Purina recorded the highest revenues in both dry dog food and dry cat food markets in the U.S. (Passport, 2017b, 2017a). This is expected as they were the trailblazers of the current dry pet food extrusion production techniques (Cellania, 2013; Elenbaas, 2015). The remaining three companies in the top five rankings consist of Big Heart Pet Brands at number three, Hill's Pet Nutrition at number four, and Blue Buffalo ranked number five. ("Leading global pet food companies based on revenue 2016 | Statistic," n.d.; Pet Food Industry, 2017). Big Heart Pet Brand also operates similarly to Mars and Nestle, as they offer a wide variety of products in the dog and cat food markets. However, Hill's Pet Nutrition and Blue Buffalo operates exclusively in the premium categories of the dog and cat food industries. The increased adoption of the humanization trend has allowed these two companies to operate successfully in the exclusive premium market (Passport, 2017b, 2017a; Pet Food Industry, 2015).

2.2 *Industry Analysis*

2.2.1 *Porters Five Forces Analysis*

Porters Five Forces Analysis provides a great representation of the market as it ensures the systematic use of the 5 principles to assess the current status and likely evolution of an industry (Besanko, Dranove, Shanley, & Schaefer, 2010). High internal rivalry in the market exist when many companies produce and market similar products aimed at the same target markets (Phillips et al., 2014). Due to the high competition, mild concentration of the market, and low product differentiation, the pet food industry's internal rivalry component is considered to be high. In addition, the low investment cost, barriers to entrance, and easy entrance policies, the threat of new entrants are considered to be high; implying easy entrance into the market as the industry becomes more profitable. The bargaining power of suppliers is medium as of now due to the large numbers of suppliers in the market, and because pet food production does not rely solely on specialized ingredients. This component represents the ability of an input supplier to demand higher prices which would extract industry profits (Porter, 2008)The bargaining power of buyers for the entire pet food industry is considered to be medium due to inelastic demand for pet food products, low switching cost, and the high volume of products which are purchased. The threat of substitute products in the pet food industry is considered to be low due to there being only one

alternative to commercial pet food, high reliance on products, and elastic product demand. Although home preparation of pet food is a viable alternative, many consumers heavily rely on ready-made, store-bought pet food for convenience, easy storage, and nutritional value (Cellania, 2013; Elenbaas, 2015; Phillips et al., 2014).

2.2.2 *Driving Forces*

The primary socio-economic forces driving the pet food industry are population growth, pet ownership growth, and disposable income. In the U.S., these three forces increased by 20%, 13% (from 2007-2017), and 62% respectively (Mintel Group Ltd, 2018) (U.S. Bureau of Economic Analysis, 2018) from 2001-2017. One of the primary technological forces which has had the most impact on the pet food industry is the use of internet purchasing. According to a Passport report, U.S. internet retailing of pet food has increased from 1.5% of distribution share in 2012 to 8.4% in 2017 (Passport, 2018). This percentage is expected to reach 13.3% in 2018. Changing consumer preferences is the primary driving force in the pet food industry today. As highlighted in a 2017 Mintel Report of the US pet food industry, pet food demand continues to shift towards the premiumization trend as pet owners increasingly look to align the diets of the pets with their own personal healthy diets and beliefs (Mintel Group Ltd, 2017). As these forces continue to change over time, the pet food market is expected to continue adapting to these changes.

2.3 *Marketing & Sales*

2.3.1 *Current Marketing Strategy*

Fierce competition in the pet food market has led to increased marketing cost, increased competitiveness for shelf space, and decreased niche advantage (Beaton, 2017; Fuchs & Claudia, 2011). Of the many solutions available to address the hyper-competition in the market, one in particular which has been adopted by pet food companies is product differentiation. They now attempt to stand out through increased innovation in pet food products and easy to use repackaging schemes highlighting the quality of their products (Beaton, 2017; Grand View Research, 2016). This has become a crucial component of the pet food marketing scheme as companies has now realized the importance of appealing to both the pets consuming the product and the owners purchasing the product (Sprinkle, 2018). As pet food consumers embrace the humanization trend, it is important that product packages highlight key ingredients and nutritional benefits to inform consumers that the products are good enough for both them and their dogs to eat (Fuchs & Claudia, 2011).

2.3.2 *Distribution Channel*

Distribution channel access is a major constraint in the pet food industry market (Fuchs & Claudia, 2011). The most common channel for pet food distribution is store-based retailing. In 2017, store-based retailing represented 85.8% of the pet food distribution market share in the U.S. (Passport, 2018). The store-based retailing dominance has been accredited to the convenience of purchasing pet food in places where they already shop for everyday items (Passport, 2018). In 2016, grocery retailers comprised of 37.5% of all pet food sales in the U.S. However, in 2017 their pet food market share dropped to 36.1% as pet superstores, online

shopping, and home and garden specialist retailers were able to increase their share (Passport, 2018). Pet superstores ranked second highest in market share as they represented 22.9% of the pet food sales in 2017. According to Pet Food Industry Reports, many consumers prefer pet superstores as the staff is more knowledgeable of the pet food products than those of a grocery retailer, and they enjoy the freedom of taking their pets into the store with them (Phillips-Donaldson, 2017b). Online retailing displayed the highest shift in pet food purchasing as it more than doubled from 1.5% to 8.4% over the 5-year period (Passport, 2018). Pet food e-commerce is expected to continue growing as consumers can purchase the same specialty brands with the added convenience of home delivery and recurring order programs.

2.3.3 *Product Demand*

Dry pet food has been the most prominent dog food product purchased over the past decade. The dry pet food category is broken into three categories: economy dry, mid-priced dry and premium dry. The premium dry pet food was most popular pet food consumed in 2017. In the dog and cat food industry combined, dry food sales totaled $17.34 billion of the $29.7 billion in sales between the two industries (Passport, 2017b, 2017a). Of the recent premium trends, the natural and grain-free products have shown to be the most prominent as they both have shown significant growth over the past 5 years (Statista, 2017b; Wall, 2017); as shown by the figure below. As the demand for natural products continues to rise, the grain-free trend is expected to decline. Researchers accredit the decline to increased demand for specialized grain products such as ancient grains (Aldrich, 2017).

3. Literature Review

There have been several studies conducted on both product positioning and online consumer review analysis (Clemons, Gao, & Hitt, 2006; Dellarocas, Awad, & Zhang, 2003; Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004; Zhu & Zhang, 2010). As companies seek to gain competitive advantage and increase market share, it is important to understand the concept of product positioning (Choi, Desarbo, & Harker, 1990; DeSarbo & Rao, 1986; Hunt & Morgan, 1995). Consumer perceptions is an important factor in understanding product positioning as it allows companies to align their products with the demand of the consumer (DeSarbo & Rao, 1986). In doing so, they will have the opportunity to gain competitive advantage over other companies operating the industry. Gaining of competitive advantage is of high importance in competitive markets as it can be the primary tool keeping a company in business (Hunt & Morgan, 1995; Thomadsen, 2007). As companies aim to gain and hold competitive advantage in the market, they must understand how to analyze consumer perceptions in the market. The literature review below will first discuss the brief evolution of consumer review analysis, followed by examination of studies on both qualitative and quantitative online consumer review analyses displaying how the reviews were used and remaining gaps in this area of research. Identification of the importance and benefits of this study will follow the online consumer review analysis section.

Traditionally, researchers analyze consumer perceptions by way of surveys (Cicia, Giudice, & Scarpa, 2002; Hughner et al., 2007; Verbeke & Viaene, 1999). Technological advancements of

the internet have provided a new way of analyzing consumer perceptions and purchasing behavior through online consumer review analysis of products such as cameras, movies, restaurants and gaming consoles. Many studies have found consumer reviews to be a major influence on online purchasing behaviors (Cui, Lui, & Guo, 2012; Dellarocas et al., 2003; Floyd, Freling, Alhoqail, Cho, & Freling, 2014; Zhu & Zhang, 2010). Researchers such as Clemmons, Chevalier, and Zhu has analyzed the positive relationship between quantitative aspects of consumer review (volume, ranking, etc.) and product sales (Chevalier & Mayzlin, 2006; Clemons et al., 2006; Dellarocas et al., 2003). Although these studies examines consumer perception of products by way of product rankings, some studies consider the rankings to be misleading as they may not necessarily reveal the consumers true thoughts of the product (Davis & Khazanchi, 2008; Hu, Liu, & Sambamurthy, 2011; Hu, Pavlou, & Zhang, 2006). Költringer & Dickinger decided to take online consumer review analysis a step further and examine the qualitative information of consumer reviews to identify the effect of the content in the reviews on purchasing, as well as compare and contrast marketed information and consumer-produced information (Költringer & Dickinger, 2015). They found that the brand image amongst consumers varied by online source. They also found that the online reviews had the highest amount of influence on customers as it provided the most diverse source of information(Költringer & Dickinger, 2015). Content analysis of this sort provides great benefit as it addresses the need for identifying product strengths and weaknesses in the eyes of consumers (Ivory, 2006; Vitouladiti, 2014; Ye, Law, Gu, & Chen, 2011). Combination of the understanding of product positioning, online consumer review analysis, and user-generated review content analysis provides a great way to analyze the alignment of consumer perceptions and company marketing strategies. Below I will address the Költringer & Dickinger 2015 and the Yan, Wang, & Chau, 2015 and they are very similar in the type of online consumer review analysis conducted in this paper.

3.2.9 *Költringer & Dickinger 2015*

Költringer & Dickinger 2015 conducted a study on the alignment of marketed and branded travel information offered by destination marketing organizations and media outlets, and image perceptions by travelers (Költringer & Dickinger, 2015). The data sample included 11 international online travel communities and social travel guides, 162 Anglo-American news media websites, 165 destination management organizations websites. An automated content analysis was used to extract meaningful keywords from the large raw textual data. Co-occurrence analysis was used to identify meaningful words based on the relative frequency of appearance. Sentiment detection was used to determine the context of the keywords used. Keywords were then grouped into specified categories and conducting correspondence analysis to identify similarities and differences of the reviews from the information sources. The results displayed that brand image representation differs among distinct online information sources (Költringer & Dickinger, 2015). User-generated content provides the richest and most diverse source of online information. When traveling, user-generated content may have the highest influence on travelers due to the detailed information of experiences, affective, conative and cognitive dimensions. The primary limitations of the paper were the potentially missed context as automated web content mining doesn't capture the accurate context of word use as sentiment analysis approach would.

Overall, this paper provided meaningful insight into both areas of content/keyword analysis of consumer reviews and the testing of the alignment of consumer perception and marketing strategies.

3.2.1 *Yan, Wang, & Chau, 2015*

Yan, Wang, & Chau, 2015 combined regression and content analysis to analyze the relationship between consumer satisfaction, restaurant type, and restaurant revisit intention using online consumer ratings and reviews. The study analyzed restaurants in Harbin China. Online review data was collected from Koubei website. 10136 reviews from 194 restaurants over a period from October 2006 to April 2010 were analyzed. Regression analysis was used to analyze quantitative online review information. Text mining was used to analyze review content to identify significant influencing factors. The analysis consisted of two phases. The hypotheses testing phase tested the relationship between revisiting intention and satisfaction dimensions. Consumer satisfaction was evaluated using four of DINESERV dimensions from Kim et al. 2009.: food quality, service quality, atmosphere, and price and value. During phase 2, content analysis by way of text mining was utilized to analyze consumer review content to identify the number of evaluation indicators in each dimension based on results of hypothesis testing. The results found that all four dimensions have a positive relationship with consumer revisit intentions and consumer satisfaction. Of the four, service quality was the strongest influencing factor. Implications suggested that many consumers eat in a restaurant not only to fill the desire for a meal but to meet the desire for entertainment. To improve satisfaction, restaurant facilities should be consistent with their atmosphere. The primary limitation of the study was the researchers based the study on the assumption that Harbin restaurants of customers are a good representation of China. Although this was a small assumption, the research provided beneficial insight into regression analysis of online reviews for revisit intentions and proper use of the DINESERV dimensions(Yan et al., 2015).

4. Data

4.1 *Data Description*

The two products analyzed for this study was “Purina Beyond Simply 9 White Meat Chicken & Whole Barley Recipe Dry Dog Food” and “IAMS Healthy Naturals Adult Chicken and Barley Recipe Dry Dog Food”. These products were chosen as they both ranked in the top ten brand shares in the dog food sector in 2016. In addition, these two brands are produced by the top two companies in the pet food industry, Nestle Purina and Mars Inc. Online consumer reviews were utilized in this study to identify the attribute characteristics which pet food consumers valued most. A total of 8,301 reviews were analyzed for this study. The review body was used to determine which keywords consumers highlighted the most to determine their most valued characteristics. Review ratings (ranging from 1-5 star) was used to determine the consumers’ satisfaction with the product post purchase. Reviews containing 1-star and 2-star ratings were considered to be unsatisfied consumers, while 4-star and 5-star consumers were considered to be satisfied with their purchase. 3-star review ratings were removed from the study as they are

considered to be indifferent with their purchase. The distribution of reviews was heavily unbalanced as many of the consumers rated the products as either 4 or 5-star rating.

4.2 Collection Technique

The reviews were collected from website such as Amazon.com, Petco.com, and Walmart.com, as these were the top three online pet product retailers in the U.S. in 2017(Statista, 2018). The body content of the reviews was extracted from the online sites using the R statistical software. To ensure extraction of only consumer reviews, the CSS code of the consumer reviews were incorporated into my coding. Extraction from the Amazon and company websites was fairly simple as I was able to alter an example text mining code used to extract online restaurant reviews from Yelp. The primary R-packages utilized in this extraction and mining codes were the "rvest" package and the "xm12" packages. For these websites, I was able to incorporate the loop function to read multiple pages of the product reviews as each page had a similar yet different URL. For example, a product on the Amazon website may contain 8 pages of reviews with URL's containing the exact same content except for the number at the end of the URL denoting the product review page. By utilizing the loop function in R, I wrote a code to read the URL with a loop from 1 to 8 at the end of the URL. By doing this, the software will read the same URL 8 times only varying the last digit of the URL from one to 8. Collection of data from Walmart and Petco, on the other hand, posed a greater level of difficulty. Due to the use of javascript on the Walmart website, I was forced to utilize the "rJava", "rvest", and "RSelenium" packages to extract the review data. Unlike the multiple pages of product reviews on Amazon and the other sites, the multiple pages of the Walmart reviews contained the exact same URL. Meaning, if the product review page was changed, the URL remained constant. Because of this, I was unable to alter the code used for the other websites as only the first page of the Walmart site was the only page which R was able to read. The "RSelenium" and "rJava" packages in R, I was able to manually construct R to change the product review page, allowing it to read each page before changing to the next. For organizational purposes, all extraction codes were written to group each product review by product name, product rating, and the site from which the review was retrieved.

5. Methods

5.1 Data Cleaning Technique

After extraction of the data, a text mining function which broke each review into individual word (raw text data) was incorporated into the code. Within the mining function, numbers, punctuation, spaces, pronouns and other meaningless words were removed from the raw text. I define meaningless words as word which are not characteristics of the attributes. Although words such as "good", "great", and "like" shows that the consumer is happy with certain attributes, they were deemed meaningless as they do not tell us why the consumer likes the products. Verb tense endings were removed, and common words were combined to one word to provide an accurate frequency count of the words used. For example, words such as bak and bake were combined into bake, as bak is the result of the ed ending being removed from baked. A code grouping meaningful combination words was incorporated to group words such as "grain" and "free"

together when they are side by side in that order within the review to output “grain-free”. Finally, an automated word frequency count was applied to the raw data and placed in descending order.

5.2 Keyword Analysis

Once the data was cleaned, a seven-step analysis plan was implemented to analyze the data for comparison between the used of product attribute characteristics. Since previous research failed to provide a standard way on analyzing raw keyword data, I developed the seven-step analysis plan as it was easy to implement and provided valuable insight into the information I was searching for. First, I identified five primary product attribute characteristic base categories. The categories consisted of: Ingredient, Function, Production, Packaging, and Sensory. The purpose of these base categories is to identify what type of characteristics of a product attribute are consumers valuing and companies marketing the most. In the second step, all words were placed into the five categories. In step 3, a percentage breakdown by category was conducted on the consumers as a whole, each company, each product review rating group, and customer satisfaction group. This step provided valuable insight into the general breakdown of the most valued and marketed characteristics. Step 4 consisted of further breaking of the base categories into subcategories. The Ingredient category was broken into processing and input to identify if consumers mostly discussed the ingredients used, or the processing practices of the product. Words such as “natural and grain-free” would be placed in the ingredient processing subcategory, whereas “calcium”, and “chicken” would fall under the input ingredient subcategory. The function was broken into internal and external to identify which type of functional characteristics consumers associate with the products. An internal function consists of any words describing internal organs and other internal functions of the animal, whereas words such as “skin”, “fur” and other external organs are placed into the external function subcategory. The sensory category is broken into three of the five senses: texture, taste, and smell. The packaging category consists of type and other. The other subcategory is made up of words describing size, font, and brand. By placing the data into subcategories (Step 5), I was able to get a better understanding of the most valued and marketed characteristic subcategories of the product attributes. Step 6 closely resembles step 3 as the same process was conducted for the subcategories. The final step consisted of the overall analysis of the previous six steps, comparing the breakdowns between both companies, combined company vs combined consumer, review rating vs review rating, and satisfied vs. unsatisfied.

5.3 Three Circle Analysis

To clearly visualize the comparison between the keywords used by the consumers and the two companies, a three-circle analysis was conducted. The first circle represents the first company’s offerings, or the marketed words of the company. The second circle represents the customer’s preference, or the keywords used by the consumers. The overlap of the first and second circles shows what characteristics the first company is marketing in which the consumers are considered to value. This is considered to be a positive section at which the company is successfully marketing the characteristics most valued by the consumers, displaying their point of differentiation (Urbany & Davis, 2007). The words outside of the overlap are the words which differ between the consumers and the first company. The third circle represents the second

company's offerings, or marketed characteristics. Keywords falling in the overlap section of all three circles are words which both companies are marketing in which consumers' value. Words in the overlap of the circles two and three only are words marketed only by company two in which consumers' value. This section is great for company two as it gives them competitive advantage over company one. The words in the overlap section of circle one and three only are words which are offered by both companies which are not valued most by consumers. This section is the most wasteful section as the companies are competing for characteristics which consumers do not value (Urbany & Davis, 2007). The marketing efforts for this category should be placed elsewhere to help the companies increase their competitive advantages. The primary goal of the companies should be to increase the overlap of their respective circles and the circle which consumers' value as this will increase their competitive advantage allowing them to increase their market share.

5. Results

5.1 *Most Frequently Used Word*

Consumer Frequency Results				
Rank	**Word**	**Frequency**	**Base Cat.**	**Sub-cat.**
1	Ingredient	956	Ingredient	Input
2	Health	932	Ingredient	Processing
3	Bag	754	Packaging	Type
4	Chicken	543	Ingredient	Input
5	Natural	513	Ingredient	Processing
6	Can	476	Packaging	Type
7	Dried	427	Sensory	Texture
8	Flavor	421	Sensory	Taste
9	Taste	385	Sensory	Taste
10	Brand	374	Packaging	Other

Unsatisfied Consumer				
Rank	**Word**	**Frequency**	**Base Cat.**	**Sub-cat.**
1	Vitamin	54	Ingredient	Input
2	Dried	29	Sensory	Texture
3	Source	27	Production	Origin
4	Supplement	27	Ingredient	Processing
5	Health	27	Ingredient	Processing
6	Chicken	26	Ingredient	Input
7	Natural	26	Ingredient	Processing
8	Sulfate	19	Ingredient	Input
9	Meal	15	Ingredient	Input
10	Calcium	14	Ingredient	Input

5.1.1 Consumer

After completion of the seven step analysis, the results indicated that ingredient is the primary characteristic valued by consumers as it was the most frequently used word amongst all consumers. I expected ingredient to be the most valued characteristic due to the increase in health conscious consumers. As the premiumization trend continues to expand, consumers are searching for healthier ingredients in their pet food products to accommodate their own dietary patterns (Pet Food Industry, 2015; Phillips-Donaldson, 2017c). Because of this, we see terms such as ingredient, health, and natural in the most frequently used results as I suspected. However, I was surprised to see packaging terms such as bag and can in the top tier of the results. I suspected these two terms to land in the middle portion of the frequency results as I assumed many consumers would place more emphasis highlighting the ingredients on the bag instead of the bag itself. Some consumers did however discuss the information and visuals on the

packaging which could be a sign of success of the companies in the repackaging schemes to catch the attention of both the pet and the pet owner.

The subcategory breakdown of the consumers shows that consumers primarily value the input ingredients over any of the other subcategories. Implying that consumers value characteristics such as chicken, barley, grains, etc. over ingredient processing characteristics such as natural, fresh, grain-free, etc. This shows that the humanization trend is not only driven by the consumer's desire for natural and grain-free products, but the input ingredients associated with those products. The second major point shown by the subcategory results is the fact that consumers value external and internal function characteristic equally. This implies that consumers equally care about their pet's stomach aching or pain and care of other internal organs as they do for external characteristics such as skin, fur, and legs. In addition to this, the results show that consumer care more for characteristic describing the product form was the main driver of the sensory category frequencies. Meaning, consumers care more for dry and wet characteristics than they do for the smell and visual characteristics of the products.

5.1.2 *Satisfied vs Unsatisfied*

The satisfied consumer results for the most frequently used attribute characteristics were identical to the overall consumer rankings. This is primarily due to the high concentration of satisfied consumers as opposed to unsatisfied. Satisfied consumers primarily value ingredients, health, and bagged of the products they purchase. I feel that it is also safe to imply that satisfied consumers purchased the products due to the chicken, natural, and packaging characteristics of the products. This is implied by their high ranking of the characteristics, as well as their high frequency of expression of these characteristics in their comments. The most frequently used characteristic amongst unsatisfied consumers was the smell characteristic. This is primarily due to the combination of one and two star consumers expressing their dissatisfaction for the smell of the two products. Ingredient and chicken ranked second and third on the unsatisfied consumer results. The primary reasoning for these characteristics being placed in these ranking positions is due to the high frequency of use amongst the two-star rating consumers.

5.1.2 Company

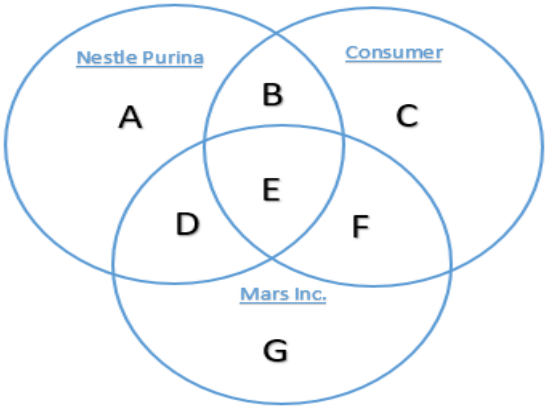
Both companies seemed to market many of the same characteristics of their products to consumers. Mars's most frequently marketed attribute characteristic was vitamin. I suspected this to be to be due to the various amount of vitamins in their products. Mars's secondly most used word was source. Although it was not amongst the top frequently used words in any of the consumer rankings, Mars has made a point to highlight the sourcing of their products. Nestle Purina's most frequently marketed term on their product packaging was the term dried. I suspect this to be Nestle Purina taking advantage of their control of the dry dog food sector. If so, this is a great differentiation point for the company as they are able to incorporate their reputation for being the top dry dog food supplier into their packaging scheme, while also appealing to the high demand for dry dog food amongst consumers. Following their frequent use of Nestle Purina frequently uses the terms "vitamin" and "ingredient" on their packaging as they placed second and third respectively. Like Mars, I suspect their high frequency use of these terms and the high

frequency use amongst consumers to display their success in appealing to the demand and preference of the consumers.

The results of the categorical breakdown show that both companies primarily market input ingredients characteristics to the consumers. This aligns with the consumer's primary value of input ingredients over all other subcategories. However, the major discrepancies between the two companies lies within the percentage ratios of subcategory focus. As shown above, while Mars places more than ¾ of their focus on input ingredients and 16% of their focus on ingredient processing characteristics, Purina elects to take a more balanced approach. The results imply that they place slightly under 60% of their focus on input ingredients and 25% of their focus on ingredient processing characteristics. This allows them to ensure they are emphasizing each of the remaining categories. As a result of their well balanced approach, I feel Purina is in a better position to capture accommodate the preferences of consumers. Which is shown by through their primary control of the dog food market share(Passport, 2017b).

5.2 *Three-Circle Analysis Results*

A	B	C				D	E	F	G
bisulfit	bag	activ	duck	leg	realchicken	acid	barley	antioxid	acet
china	balanc	allerg	dull	local	ricebarley	biotin	blend	artifici	appl
crude	beef	allergi	dye	locat	scent	brewer	carrot	color	ascorb
ferrous	brand	american	ear	made	scratch	calcium	chicken	fish	beet
fiber	can	appeal	energi	meatbypr	seal	carbon	egg	grain	dlmethionin
folic	canola	appear	eye	meatricec	sensit	chlorid	flavor	ground	enhanc
iodat	content	aroma	farm	moist	shape	cholin	ingredi	healthi	extract
menadion	diet	australiar	feet	mouth	shed	copper	preserv	mix	farmgrown
metabol	fresh	bacon	finicki	muscl	shini	hydrochlo	rice	nocorn	farmrais
moistur	glucosamin	bacteri	flax	nasti	sick	manganes	vitamin	oil	fat
paint	grainfree	bazel	formul	naturalglu	skin	meal	natur	pea	ferrous sulfate
phosphor	health	benefil	formula	nocornwh	smartblend	niacin	protein	soy	folic acid
pumpkin	lamb	blood	fur	nocornwh	smell	pantothen	recip	tomato	fruit
purinacor	liver	blue	fussi	nose	snif	potassium	sourc	veget	includ
rais	meat	bowel	gas	nosoy	soft	pyridoxin	dri		inositol
ranch	meatchicken	broth	gastric	notgood	softer	riboflavin	barley		iodid
selenit	nutrient	butter	gluten	nowheat	soggi	salt	blend		mangan
selenium	nutrit	chees	glutenfre	oat	spoil	sulfat	carrot		miner
state	omega	chewabl	glycol	oatmeal	steak	supplemer	chicken		mononitr
thepacket	origin	chow	greasi	odor	steroid	thiamin	egg		monosodium
usa	real	chunk	hair	organ	stomach	zinc	flavor		oxid
	salmon	coat	hard	packag	stool		ingredi		phosphat
	sodium	congest	healthywe	paw	strength		preserv		pomac
	tuna	corn	heart	peanut	sugar		rice		pulp
	water	crunch	highqual	piec	sweet		vitamin		rosemari
	weight	crunchi	ill	poop	tail		natur		sorghum
	wet	dandruff	itch	potato	tast		protein		spinach
	wholebarley	dehydr	joint	poultri	teeth		recip		tocopherol
		delici	juic	pound	tender		sourc		
		diabet	jump	pounds	textur		dri		
		diarea	kibbl	premium	thyroid		mixedtocopherol		
		diarhea	labbeagl	process	tummi		byproduct		
		diarrhea	label	purpl	turkey				
		digest	lbs	raw	vision				
		wheatfre	yummi	white	vomit				
		yellow	yeast	wholesom	wheat				



The results from the three-circle analysis shows how the company's marketing efforts align with the consumer's preference. Section A shows the characteristics only offered by Purina which the consumers do not value. Many of these characteristics are input ingredient characteristics. If marketed correctly by Purina, they have potential to gain competitive advantage over Mars. Section B shows the characteristics marketed only by Purina which consumers due value. Compared to the number of characteristics in the F section which is only offered by Mars and yet valued by consumers, it seems that Purina currently has competitive advantage over Mars as they offer more characteristics valued by consumers. The characteristics in section B is primarily made of input processing characteristics. This backs up my previous assumption that Purina is able to capture a wider range of consumers through their balanced marketing approach. The characteristics in section E are the characteristics marketed by both companies which the consumer values. As suspected, the characteristics in this section are majority input ingredient characteristics. This reiterates my results from the previous analysis that input ingredients are the most valued and marketed characteristic in the pet food industry. The characteristics in section D are characteristics offered by both companies which the consumers do not value. Initially I suggested both companies disregard these characteristics as they are competing for characteristics which the consumers do not value. However, after further examination of these characteristics, I concluded that the companies cannot disregard these characteristics as it is mandated by the FDA that they display these characteristics be present on the packaging (FDA Center for Veterinary Medicine, 2017). The characteristics in section C are the characteristics valued by consumers which the companies are not marketing. Both companies have an opportunity to gain competitive advantage by incorporating these characteristics into their marketing strategies. In doing so, they will have the opportunity to increase their market share.

6. Conclusion

The primary objectives of this research were to identify the most prominent product attributes characteristics in pet food valued by consumers and marketed by pet companies. Use of online consumer review analysis was key in gather data to observe the characteristics. The three-circle and seven step analysis approaches were instrumental in interpreting the valuable information which lie within the raw text data.

7.1 *Key Results*

The primary results discovered by this research the findings on consumer preferences in pet food and the identification of the primary marketing strategies of the two companies. The results showed that consumers place the most value on ingredient characteristics. In fact, they place more value on input ingredient characteristics such as vitamins, meats used, and grains used than they do the ingredient processing characteristics such as natural, fresh, etc. This implies that the increase in demand for premium products, such as natural, healthy, and grain-free, not only caused by the increase in humanization trends, but it is also due an increase in consumer demand for the input ingredients used to make these products, not just the processing characteristics themselves. The results also revealed that both companies are primarily marketing the input ingredient characteristics to consumers. However, Nestle Purina currently has competitive advantage over Mars Inc., according to the three-circle and seven-step analysis results, as their marketing efforts are more balanced; as opposed to Mars Inc. who places their primary marketing efforts on the input ingredients instead of taking advantage of the other categorical opportunities to take advantage of consumer preferences. This is validated by Purina's dominance in the dog food market.

7.2 *Limitations*

The primary limitations of this research are the low number of unsatisfied reviews. Many of the results from the analysis suggested different characteristic values for unsatisfied consumers compared to the overall consumer results. This is primarily due to the large ration of satisfied reviews obtained to unsatisfied. Increasing the number of unsatisfied review will provide better validation of the results for the overall consumers and the unsatisfied consumers as well. The other limitation of this research is the assumption that the context in which the data was observed in raw text form is the context intended by the consumers. To mitigate some of this limitation, I was able to read through many of the reviews to observe how the words were used. However, I was unable to read through all the reviews which slightly increased the probability of word misuse.

7.3 *Further Research*

This research paper opened the door for many avenues for future research. As previously stated, there is a limited amount of economic research which has been conducted in the pet food industry. As the industry continues to grow, the demand for research in the industry will continue to increase as well. The limited knowledge of pet food research coupled with the limited knowledge of online consumer review text mining research provides many opportunities as we are currently unaware of the powers of this type of research. In addition to the consumer review analysis, this paper offers opportunity for improvement of the seven-step analysis in terms of why consumers value certain characteristics over others and many more ideas.

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