A STRATEGIC ANALYSIS OF BESTLINE LUBRICANTS' DIESEL ENGINE TREATMENT

by

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Abstract

BestLine International Research, Inc. has recently produced evidence suggesting their engine lubricant technology may be the solution to the Engine Lubricant Industry's challenge to find a substitute for the additive ZDDP as an anti-wear agent. In addition, BestLine has been able to validate, through third party testing, the superior performance of its aftermarket lubricants, in comparison to its direct competitors' products. BestLine has also protected its technology through several patents. Despite BestLine's superior technology, it has not been able to generate sufficient profits to pay out dividends to its shareholders. Furthermore, Bestline has not received sufficiently attractive offers to warrant selling or licensing their technology. This report presents a strategic analysis, within the context of the engine lubricant industry in North America, to assess BestLine's current strategy. The results of the analysis suggest that BestLine's current strategy is insufficient for it to fully leverage its intellectual property or the opportunity to replace ZDDP. Three alternative strategies have been proposed, and it has been determined that the most effective strategy is for BestLine to make heavy investments in marketing such that the brand is most quickly legitimized and BestLine's technology draws the most attention from potential buyers or licensers.

Dedication

I dedicate this to my wife for enduring this degree with me, and my friends and family whom I have neglected for the past two years.

Acknowledgements

I want to acknowledge Ron Sloan for his contributions to this project, as well as Elicia Maine for her guidance and support.

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Glossary

Additive constituent	A component of an additive
Additive Packages	A blend of additive constituents which is added to stock oil to make an engine lubricant
Aftermarket Additives	A product the consumer adds in small proportion to their fuel or motor oil
Commercial Fleet	Vehicles, typically heavy-duty trucks, used for transport of goods
Commercial Marine	Large marine vessels
Engine Lubricants	A blended lubricant intended to be used within a combustion engine
heavy-duty trucks	A truck with a payload exceeding 26,000 pounds
light-duty trucks	A truck-based vehicle with a payload less than 4,000 pounds
Medium duty trucks	A truck with a payload not exceeding 26,000 pounds
Motor Oil	A blended engine lubricant
Passenger vehicles	Vehicles used for the purpose of transporting passengers, not including buses
Pleasure Marine	Marine vessels used for pleasure

Abbreviations

ACC	American Chemical Council
AMAA	American Automotive Manufacturers of America
API	American Petroleum Institute
CAFE	Corporate Average Fuel Economy
DEOAP	Diesel Engine Oil Advisory Panel
DIY	Do It Yourself
EMA	Engine Manufacturers Association
EOLCS	Engine Oil Licensing and Certification System
EPA	Environmental Protection Agency
FTC	Federal Trade Commission
HDEO	Heavy Duty Engine Oil
ILMA	Independent Lubricant Manufacturers Association
IP	Intellectual Property
ISLAC	International Lubricant Specification Advisory Committee
NHTSA	National Highway Traffic Safety Administration
PAO	Polyalphaolefin

SAE	Society of Automotive Engineers
TMA	Truck Manufacturers Association
ULSD	Ultra Low Sulphur Diesel
USPTO	United States Patent and Trademark Office
ZDDP	Zinc dialkyldithiophosphates

1: Introduction

1.1 Introduction to BestLine Lubricants

BestLine Lubricants is a company founded by Ronald Sloan in 2005. This is his third company based on his proprietary lubricant additive technology. BestLine's primary products are engine and fuel treatments, for both gasoline and diesel engines. Other products include powertrain lubricant and various penetrants. BestLine has achieved its sales primarily through online channels for personal automotive applications. However, BestLine is actively promoting their products for industrial applications, including land and sea commercial transportation, through direct sales. BestLine is exploring other opportunities where lubrication is required, including: cement mixer release agent, gun barrel lubricant, and golf face cleaner. However, these products have generated little revenue and brand legitimacy for BestLine.

1.2 History of the Founder

Mr. Sloan has been working with the foundations of this formula since 1984, with the founding of Protec. In 1987, Mr. Sloan founded Prolong International Lubricants and with increased sales moved the company to California to take advantage of the more favourable market and industry cluster (access to reputable test facilities, marketing companies, stronger racing community). At Prolong, Mr. Sloan filed his first patent for an aftermarket engine additive blend. Although Prolong experienced considerable growth in the 90's, Mr. Sloan severed ties with Prolong in 2000 retaining full rights to the core additive formulas. With perceived new opportunities generated by stricter emissions restrictions and oil additive restrictions, and no major innovations in the engine oil additive development, Mr. Sloan founded BestLine Lubricants to compete in the automotive aftermarket market.

1.3 What BestLine Offers

The opportunity of interest for BestLine, and this report, is BestLine's Engine and Diesel Treatment additive as a substitute for ZDDP. With less than $1 million in annual sales, BestLine has invested heavily into third party testing to confirm the performance of its products. BestLine has reports

from internationally recognized testing facilities, including Southwest Research Institute, EG&G Automotive Research Inc. and Perkin Elmer. The results consistently show that the use of BestLine Engine Treatments will provide significant increased performance, including increased fuel efficiency and reduction in engine wear when added to common motor oil. Furthermore, the tribology department of the Swiss Federal Institute of Technology Lausanne is publishing results suggesting BestLine Engine and Diesel Treatment has unique properties that make it a lubricant superior to anything else tested by the institute and provides anti-wear characteristics superior to ZDDP (R. Sloan, phone interview, June 4, 2015). Such supportive data would suggest BestLine Lubricants has a legitimate competitive advantage over the incumbent additive products. Furthermore, the data suggests BestLine has an opportunity to replace the former global demand for ZDDP.

1.4 What are BestLine's Short-term Business Goals?

As founder, and president of BestLine, Mr. Sloan has sufficient experience, supporting data, and investor support to believe that the technology BestLine owns is valuable. Furthermore, he believes that with an effective strategy and execution, the market will have a significant willingness to pay for its technology. Both Mr. Sloan and the shareholders of BestLine desire to see the value of the company exceed that of the larger incumbents, namely STP and Slick 50. (Sloan, phone interview, June 6, 2015). Mr. Sloan is, however, at an age where growing a company into a world-class engine lubricant producer is maybe not attainable under his leadership. Rather, he would prefer to expedite the increase of BestLine's value and reduce his involvement in the day-to-day activities.

1.5 BestLine's Strategic Dilemma

BestLine has been able to validate its products superior performance through a range of third party tests (Sloan, phone interview, June 6, 2015). Furthermore, BestLine's technology is well protected by several patents in North America and several other countries. BestLine has intentionally focused their investments into validating and protecting their technology, at the expense of neglecting the marketing of their products. BestLine has chosen this approach, as the board members believe that this is the most expedient and cost effective strategy to grow the value of its technology. Despite BestLine's attributes, its sales growth has been disappointing. They have not been able to generate sufficient profits to be able to pay out dividends, nor have they been able to attract suitable offers for licensing or buying their

technology. With investors looking for returns on their investments in BestLine's technology, BestLine must reflect on its present strategy and decide whether they should continue to focus on validating and protecting, or change their focus to marketing or other alternatives.

1.6 Report Purpose and Structure

This report analyses the North American engine lubricant industry and assesses whether BestLine's present strategy is appropriate for them to achieve their short and long-term goals. The analysis and assessments are done in consideration of the desire for BestLine's Diesel Engine Treatment to become a substitute for ZDDP.

The analysis begins in Section 2 with a description of the elements of the perceived opportunity. Section 3 describes the industry environment, including a description of the various customers and market segments, the industry supply chain, the strategic groups within the supply chain, and the industry structure. Section 4 provides an internal analysis assessing BestLine's competitive advantages, and value chain. Section 5 describes BestLine's strategy as well as their targeted customers. Section 6 assesses the effectiveness of BestLine's present strategy to meet its goals within the engine lubricant industry by describing evident challenges BestLine will face. Section 7 presents three strategic alternatives, which are assessed and compared to identify the most suitable strategy for BestLine to adopt. The report concludes with Section 8, which provides conclusions and final recommendations.

2: **Industry, Trends and Opportunities**

2.1 Introduction to Motor Oils and Additives

Unlike motor oils used when combustion engine driven vehicles first became a household item, motor oils today are complicated blends of chemicals, which have evolved over nearly 100 years. Motor oil's primary purpose is to create separation between moving parts. The most important characteristic of a motor oil is its viscosity, which is core to this required separation. As combustion engines have evolved, the increased stress, and the expected range of operating conditions, imposed on the lubricants has increased significantly. To sustain the stability of engine lubricants, additives are required to address all the stresses generated by a running engine. The viscosity of a motor oil is defined by a standard developed by the Society of Automotive Engineers (SAE). In the past motor oils were typically single grade, which means they had very limited range of operating temperature. Today, motor oils are almost exclusively multi-grade and are defined by the SAE index "10W-30", which indicates that an oil has a viscosity of 30 at normal operating temperatures and behaves like an oil that has a viscosity of 10 at cold temperatures.

To maintain a stable oil viscosity, additives defined as viscosity stabilizers are used. These are typically polymer based and prevent oils from over thinning at higher temperatures and over-thickening at lower temperatures. Other additives are used to protect the base oil from all the destructive activities within a combustion engine. When fuel is combusted, the products are acidic and migrate to the oil. Detergents are required to neutralize such products to prevent various reactions that either degrade oil or generate undesirable solids in the oil and on the surfaces of an engine, typically referred to as sludge. Antiwear agents are used to coat surfaces within an engine that are more susceptible to friction. Such coatings protect critical surfaces from premature wear. Friction reducers, as the name suggests, are used to reduce friction between moving parts, typically where high pressure is created, such as cam lobes and valve stems. Antioxidants are necessary to extend the life of the oil. Dispersants are needed to keep solids in suspension such that the oil filter can capture them. Additives are also used to prevent corrosion within an engine, and to protect the oil from impurities, such as water, air and waxes (Caines, 2004).

2.2 History of Additives

Oil additives have been an accepted necessity since WWII, as mineral oils were found to be insufficient for the demands of the military (Kinker, 2009). Post war saw the explosion of automotive racing and performance high horsepower vehicles. Additives were developed to increase the life of the engine oils, expand the range of operating temperatures, as well as reduce the wear of the metal-to-metal friction surfaces to increase the life of the engines and the horsepower transmitted to the wheels.

Additives have developed significantly since the emergence of these products. Initial additives were simply different types of hydrocarbons or natural oils (Caines, 2004). Mineral oil and whale oil were common additives. As synthesizing of plastics and polymers evolved, polymer based additives developed a viscosity stabilizer, which significantly improved the lifetime of motor oils as they became more resilient to higher temperatures. ZDDP emerged as an anti-wear agent in 1943 developed by Lubrizol (Spikes, 2004). This was a revolutionary additive as it significantly reduced wear at high-pressure friction points; specifically camshaft lobes and lifters. As the knowledge of engines developed and the causes of lubricant degradation were uncovered, other additives, such as detergents and defoaming agents, were developed, tested and incorporated in engine lubricants.

Although there is presently a wide variety of effective additives and the science of lubricant formulating is well developed, there is significant effort to better understand how proven additives actually function (Spikes, 2004). Furthermore, the number of patents related to developing new additive constituents and additive package formulas would indicate there are significant investments being made to develop new or improved lubricant additives (refer to Table 5 and Table 7).

2.3 Aftermarket Additive as Standalone Products

Aftermarket additive, as standalone products, have been available as early as the 1920's (Marvel Mystery Oil® History, Retrieved May 20, 2015). Early uses were to address side effects of lead added to gasoline, in particular, clogging of carburettors. Post WWII saw the emergence of hot-rods and amateur racing and there was a growing interest in modifying engines or pushing the limits of stock engines Subsequently, a market for products to increase the performance of these vehicles developed and grew. Their application grew to address many other perceived deficiencies of motor oils, including detergents, anti-oxidant agents, viscosity stabilizers, seal swelling, friction modifiers, and many others. The market for such additives has been strongly based on the promoted perception that motor oils are insufficient for the needs of the common car or truck (FTC Charges Motor Oil Additive Marketers, 1999). Because there

has never been automotive and engine industry standard to qualify such products, they have developed a reputation as being "snake oil."

2.4 False Advertising Suits

In the 1990's a wave of new aftermarket additive companies emerged and touted performance that exceeded what available motor oils could offer. Companies like Dura Lube, Prolong, Motor-Up, Valvoline, STP, ZMax and Slick50 made various claims suggesting they could either reduce engine wear by as much as 50%, or reduce emissions, or reduce the risk of major engine damage (FTC Charges Motor Oil Additive Marketers, 1999; FTC Sues Speedway Motorsports and Oil-Chem Subsidiary, 2001; STP Corporation, 1995). Some of these companies, namely Dura Lube and Prolong, went as far as creating television promotional campaigns showing cars having their oil pans removed and driven hundreds of miles without damage to the engines. The Federal Trade Commission (FTC) investigated these claims and found these companies to be guilty of having insufficient proof of such claims. Most notably, Slick 50 was charged $2 million for making unsupported claims it would reduce engine wear by 50% during start-up (Quaker State Subsidiaries Settle FTC Charges, 1997). These were not the first attacks the FTC made on aftermarket additive companies. The FTC fined STP $500,000 in 1978 for falsely claiming that motor oil insufficiently protected automotive engines (STP Corporation, 1995). With these fines, the FTC also forced these companies to admit to making such false claims in automotive magazines and to refund customers their money. Although these rulings stained the image of aftermarket additives, most of these companies still sell products in major retail chains and there are presently products from over a dozen aftermarket additive companies that can be purchased from Amazon.com with reviews claiming the products provide excellent results (Automotive: Oils and Fluids: Additives: Engine & Oils, viewed May 18, 2015).

2.5 Recent Trends Related to Diesel Engines

In 2006 the U.S. Environmental Protection Agency (EPA) began enforcing a 97% reduction of Sulphur in diesel fuel, defined as Ultra Low Sulphur Diesel (ULSD), as a means of reducing Sulphur Oxides (SOx) emissions from combustion engines (U.S. Environmental Protection Agency, 2006). Although these efforts have reduced emissions of SOx, diesel has been stripped of a key lubricating agent (Muñoz, 2011). Fuel additives, as well as engine lubricants, have been explored to compensate for these

changes; however, they have been unable to fully compensate for this loss. Fuel efficiency has seen a decrease and diesel engines have experienced accelerated wear (Sloan, personal interview, May 16, 2015).

The EPA has also demanded increases in the lifetime of catalytic converters and placed the onus on the engine and automotive manufacturers to ensure catalytic converters are not compromised (U.S. EPA, 2000). Zinc dialkyldithiophosphates, or more commonly known as ZDDP, has been a ubiquitous additive in engine oils for over 60 years and has been an effective extreme pressure lubricant, as well as an anti-oxidation agent preventing the corrosion of the internal surfaces of an engine (Spikes, 2004). As phosphorus de-activate catalytic sites in the catalytic converters, and since ZDDP is the primary sources of phosphorus in motor oils, the amount of ZDDP in engine oils has been reduced by over 40% since the SH oil standard (API, 2012). Although engineering advances in new gasoline engines have reduced the need for extreme pressure lubricants, diesel engines, particularly heavy-duty diesel engines, still require an extreme pressure additive to prevent the wear that would otherwise occur without such an additive (Mourhatch, 2008).

As ZDDP is still a ubiquitous additive the chemical mechanisms that enable it to be such an effective additive are yet to be fully understood (Spikes, 2004). Furthermore, with the planned increased reductions of its use there is increased research being conducted to better understand how it works such that substitutes can be developed (Mourhatch, 2008). Finally, over 100 patents have been filed by various engine oil and additive producers recognizing the need to replace ZDDP as an additive and claiming they have developed substitutes (refer to Table 5, Table 6, Table 7, and Table 8). This suggests that although innovation in engine design may be reducing the demand for ZDDP as a wear agent, there is still significant demand for a substitute.

2.6 BestLine's Opportunity to Replace ZDDP in Engine Lubricants

Over 250 million vehicles were registered in the U.S. in 2012 ("Number of vehicles registered", 2015), including passenger vehicles and transport trucks. Over 17 million new vehicles were sold in the U.S. in 2014 (U.S. Department of Commerce, 2015). The average registered U.S. driver drives 13,000 miles each year ("Average Annual Miles per Driver by Age Group", 2015). In 2012 there were over 210 million registered drivers in the U.S. (U.S. Department of Transportation, 2014), it can be estimated that over 2.5 trillion miles (or 4 trillion km) are driven every year. With oil changes recommended for every 5,000 miles, and assuming the average vehicle requires 6.0 litres of oil, the annual demand for motor oil in the U.S. can be estimated at over 3 billion litres. Since motor oil is typically 15% additives (California

Environmental Protection Agency, 2003), the annual demand for additives in motor oil can be estimated at 450 million liters. Although the additives are the smallest component of the motor oil, as can be deduced from Table 1, additives are the most costly component. Since BestLine sells a more concentrated lubricant, as compared to a typical motor oil, they are able to demand much higher margins on their sales. As far as aftermarket automotive products go, there was over $300 billion in sales in 2013 in the U.S. alone. Whether BestLine continues to focus on aftermarket products, or to move into motor oil production, the market opportunity is significant.

Table 1. Cost of Motor Oil vs. Cost of Aftermarket Motor Oil, Including Comparison of Gross Profit.

	Motor oil (Conventional)	**Motor Oil (Synthetic blend)**	**Motor Oil (Fully Synthetic)**	**Aftermarket oil additive**
COGS (per litre)	$2.80/L	$3.30/L	$4.75/L	$4.40/L
Retail Price (per litre)	$4.95/L	$7.95/L	$9.95/L	$39.90/L

Source: Adapted from communication with R. Sloan (email, July 22, 2015)

In 2001, Spikes (2004) estimated the annual U.S. demand for ZDDP to be 30,000,000 lbs. It is well known that the use of ZDDP in engine lubricants results in an ash generated during fuel combustion. This ash, primarily due to the phosphorous, can de-activate the catalyst in catalytic converters, which reduces the lifetime and effectiveness of catalytic converters (Spikes, 2004). Since catalytic converters are essential to removing unburnt hydrocarbons, as well as other undesirable emissions, the lifetime of catalytic converters has been a concern to U.S. environmental agencies; namely the U.S. EPA, and the California Air Resource Board (U.S. Environmental Protection Agency, 2000; California Environmental Protection Agency, 2005). One approach to mitigation has been to reduce the allowable amount of ZDDP in motor oils.

With the pressure from the EPA to extend the life of catalytic converters, API has reduced the ZDDP limits as a means of reducing the phosphorus content in motor oil (API, 2012). Although reports generated by the Society of Automotive Engineers suggest the imposed ZDDP reductions would have negligible effect on the performance of engines (Burrows et al, 1985; Culley, McDonnell, 1995), Lubrizol suggests reductions in ZDDP will negatively affect fuel efficiency (U.S. Patent No. 8,722,599). The

demand for a ZDDP replacement is evident by the numerous patents filed since 1995 that claim to be a substitute for ZDDP. This suggests there is a considerable opportunity to find such a replacement (refer to Table 5, Table 6, Table 7, and Table 8).

With evidence that BestLine's Engine and Diesel Treatment effectively act as a substitute for ZDDP, BestLine has a significant opportunity to provide a superior engine lubricant to the final consumer, or a superior additive package to motor oil producers.

3: **External Analysis**

BestLine competes within an industry that has five primary stages of processing until a product reaches the consumer. Some firms act only in one of the stages and others are vertically integrated and act in multiple stages. Consumers can be categorized in two primary groups: passenger vehicle owners and industrial engine owners. This section first presents an analysis of the engine lubricant industry in North America. This section then describes the different process stages in this industry and how firms in each of the stages position themselves. This section also describes the different market segments and the perceived likelihood of consumers to purchase the various engine lubricant products available. This section concludes with a Porter's Augmented Five Forces analysis, which describes the perceived attractiveness of the engine lubricant industry.

3.1 Engine Lubricant Standards

It is worth going into some detail to describe engine lubricant standards as they have significant influence on the additive constituents used in motor oil. The American Petroleum Institute, or API, and the International Lubricants Standardization and Approval Committee, or ILSAC, developed the Engine Oil Licensing and Certification System, or EOLCS. These organizations define standards to which motor oils should be certified. Some vehicle manufacturers and engine manufacturers have also defined their own standards, which exceed the standards of API and ILSAC. Due to the inherent differences in operating conditions of gasoline and diesel engines, standards differ between the engine types. In general, engine lubricants for diesel engines are more demanding than those for gasoline engines. Although none of these standards are mandatory, in that motor oil producers are not legally required to certify their motor oils for them to sell their products, it is a widely accepted mechanism for which motor oil producers can prove to the consumer that they meet certain requirements. The discussion to follow will focus on API and ILSAC standards.

The API has defined engine lubricant standards since the 1930s ("Some Engine Oils", 2013), and as the industry and engine technologies have evolved, API has released new standards. The standards qualify lubricants by using standardized mechanical and chemical tests that are defined by the American Society for Testing and Materials, or ASTM, where the tests must be conducted by certified third party

testing facilities (API, 2012). As this is a voluntary program, the lubricant producer intending to label their product as certified must submit evidence that their lubricant has passed all necessary tests. Once approved a lubricant producer is allowed to mark their products according to the two API license types: the donut symbol, if certified according to the API Service standard, or the starburst symbol, if certified according to the ILSAC standard (API, 2012). The ILSAC certification license meets the requirements of the equivalent API Service standard, as well as a "conservation" requirement. Diesel engine oils are differentiated from gasoline engine oils by the alphanumeric symbols "C." The most current diesel engine oil is CJ-4.

The API and ILSAC performance requirements for engine lubricants are defined by several member stakeholders, including: major vehicle manufacturers (Ford, Chrysler, General Motors); the Japanese Automobile Manufacturers Association, or JAMA; the Engine Manufacturers Association, or EMA, which is represented by Cummins, Caterpillar, and Briggs & Stratton, to name a few; ASTM and the Society of American Engineers, or SAE (API, 2012). The API, the American Chemical Council, or ACC, and the Independent Lubricant Manufacturers Association, or ILMA, with its representing members, are responsible for confirming that the performance requirements are feasible with the available technologies.

Development of new standards emerges because of various initiatives, including: new government regulations, demands from consumers, demands from engine manufacturers or problems found in the present standard (API, 2012). Interestingly, there is no mention of new lubricant technologies driving changes in standards. Changes in performance requirements can be requested by any of the members and the requests are evaluated to assess the legitimacy of the request. If a request is approved, tests are developed by ASTM, in partnership with the vehicle manufacturers and the EMA, to qualify the defined requirements. With the approval of the tests, the API Lubricants Group must then review and approve of the tests.

3.2 Engine Lubricant Industry Supply Chain

This section describes the transformation process stages required to produce the final lubricant products and how they reach the customers. It also generalizes the strategies of the different strategic groups. Figure 1 visually describes different stages and the key activities within each of the stages. Figure 1 also describes the interactions of the different actors conducting these activities. Strategic groups competing within the industry are identified by the author and their strategies are summarized in Table 4.

The supply chain for engine lubricants reaching the final consumer can be described with five stages. The first stage is where crude oil is refined. From the refining of crude oil various hydrocarbons are separated, including gasoline, diesel, and various stock oils. Depending on the refining process used, different qualities of stock oil can be produced. API distinguishes between five groups of stock oils (API, Annex E, 2012), where the first three are crude oil based and increasingly refined with fewer impurities from Group I to Group III. Group IV oils are synthesized oils, which have no impurities, and can be produced from elements or from crude oil, and have a chemical name Polyalphaolefins, or PAOs. Group V oils are oils that do not fall into the first four groups.

Group I to Group III stock oils are produced by oil refineries. The U.S. alone has over 70 independent oil refining companies (U.S. Energy Information Administration, 2015). Although the technology and processes to produce Group IV stock oils have been available since 1951 (Kramer, et al., p. 32, 2000), the production of synthetic oils is not as common and requires more specialization than Groups I to III oils. For this reason, and the higher complexity of production, the cost of synthetic oil is significantly higher than refined stock oils.

The second stage to produce an engine lubricant is the production of additive constituents. As additives need to serve several functions the chemical make-up of the different additives vary considerably. For instance, viscosity stabilizers, necessary for engine lubricants to maintain sufficient viscosity at a range of temperatures, are polymer plastic based, where detergents, used to neutralize acidic combustion products, are typically salt based. Additives also vary considerably in complexity. Although some additives are commodities (e.g. Molybdenum Disulphide) requiring readily available process equipment, others require more complex equipment and specialized knowledge to produce, and others are recently developed proprietary chemicals protected by patents (U.S. Patent No. 8,722,599). In general, additive constituents are not readily available to the final consumer. Rather they are sold individually to motor oil producers and aftermarket additive producers, who create their own formulas, or they are sold as additive packages to motor oil producers.

The third stage in producing engine lubricants is the formulating of the lubricant. As the previous paragraph suggests, final engine lubricant producers can purchase the different additive constituents individually to develop their own formulas, or they can purchase pre-defined packages that simply need to be blended with a base stock to the prescribed proportions. For the former, the engine lubricant producer is responsible for formulating the motor oil to meet any appropriate standards. Developing and producing additive constituents does not necessarily require specialized equipment, or basic chemistry knowledge. It does, however, require considerable understanding of the range of constituents that are available, the operating conditions of the application the lubricant is to be used in and how the different additives will

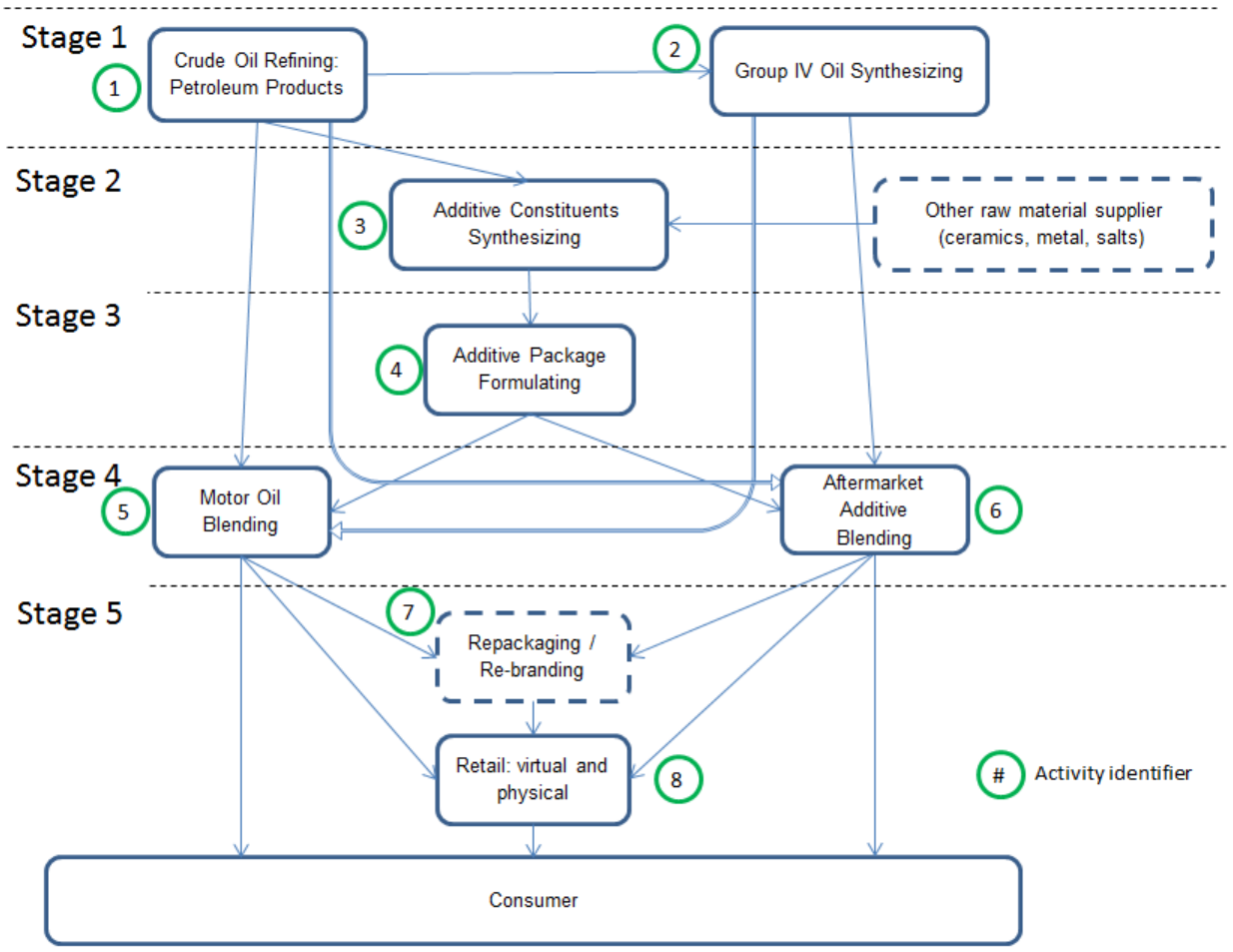
interact with each other while under changing conditions in a combustion engine. Furthermore, because of the wide scope of requirements defined by the API and engine manufacturers for oils to be certified, the formula developer must understand how to achieve the performance requirements without exceeding the strict chemical content restrictions (API, 2012). Finally, motor oil producers are perceived to have a primary focus of cost reduction in producing their products. Therefore, developers of additive formulas are challenged to provide additive packages that meet the API and engine manufacturer standards at the lowest cost possible.

The fourth stage in producing engine lubricants, which is the least complex and value-added stage, is the blending of the additive package with the stock oil. As described in the previous paragraph, once the additive package formula is defined, the additive package is simply blended with a stock oil until the lubricant is fully homogenous. For both the case where an engine lubricant producer is using their own additive package formula or purchasing a pre-blended package, it is the responsibility of the final packager to have to the oil certified by API and the various engine manufacturers (API, 2012). This stage requires very simple production equipment and minimal specialized knowledge. Actors in this stage compete primarily on cost and by producing at the minimum efficient scale. As such, this stage is easily outsourced.

The fifth stage for engine lubricants reaching the final consumer is the selling of the products. Engine lubricants are sold through retail means, including stores and online, or direct sales. Reaching the final consumer is highly dependent on the product and the market segment. Private owners of passenger cars, marine pleasure crafts, transport trucks and industrial engines are more likely to purchase engine lubricants at retail stores, and increasingly through online retail. Industrial consumers, including commercial fleets and large firms with multiple engine driven machines, typically purchase engine lubricants from distributors or direct sales from custom lubricant producers.

With the different stages described, Figure 1 below attempts to describe the industry supply chain and the different transactions within the industry. This figure describes the industry by the different activities. These activities are numbered these activities to simplify referencing of these activities in the analysis to follow.

Figure 1. Engine Lubricant Industry Supply Chain, depicting Stages and Activities



Source: Adapted from interview with R. Sloan (email, June 8, 2015) [1]

3.3 Engine Lubricant Industry Competencies

The various distinct activities that are necessary to produce a final engine lubricant product have different competency requirements. It is therefore useful to differentiate between the levels of complexity of the competencies within the industry, as perceived by the author. As Figure 1 describes, the production of engine lubricant are distinguished by four stages based on the different chemical manipulations necessary to produce an engine lubricant. However, the author believes that only the first three competencies are complex and worth discussing in detail. These are summarized in Table 2.

[1] Activity 7 is included in this diagram as it is common for motor oil producers and aftermarket additive producers to have their products re-packaged and branded under a retails stores brand.

The most complex activity is perceived to be Additive Constituent Synthesizing. This activity requires highly specialized chemists to both develop and create such components, although many of the additive constituents have become commodities. Furthermore, the equipment required to produce such components is also specialized and requires considerable investment. The complexity of the development and the equipment used make the additive constituents the most valuable components to an engine lubricant. As such, new additive constituents discoveries are often patented (refer to Table 7 for evidence of patents generated by such firms).

The second most complex competency is perceived to be the stock oil refining. Although the processes have been well established for several decades, there is considerable specialization and tacit knowledge required for the design and operation of oil refineries. Furthermore, the pressure to reduce costs of goods sold demands continuous innovation and benchmarking of such plants. Refineries are also the most capital intensive to reach minimum economic scale. As shown in Table 5, there have been considerable amounts of patents filed regarding base stock refining processes. There is also increased pressure to transition from Group II to Group III stock oils for engine lubricants, as Group III stock oils have fewer impurities and other desirable characteristics (Van Rensselar, 2004). There is also increasing pressure from the engine lubricant industry to move towards Group IV oils, which are more complex than Group II and III stock oils, and considerably more expensive.

Although additive formulating and blending may be complex to optimize (cost versus performance), the founder of BestLine has suggested that there is little complexity in developing an additive package and blending an engine lubricant (Sloan, R., phone interview, Jun 4, 2015). As there is no mandatory minimum requirement for engine lubricants, it is very simple for individuals to purchase various additive constituents and stock oil and, with a little research, blend functional motor oil. The challenge in formulating and blending motor oil is creating an additive package that is the longest lasting, the highest performing, and the lowest in cost, while meeting the relevant standards. For aftermarket additives, however, none of these criteria apply as aftermarket additives are not tested against any standard. Furthermore, aftermarket additives do not need to be made at the lowest cost as they are a specialty good and their sales are primarily dependent on the consumers perception of their benefit.

Blending the final products is a necessary process in the industry; however it is not considered a core competency, as it is not unique to this industry. This activity requires little to no specialized knowledge and equipment is readily available and easy to operate. Minimum efficient scale can be achieved with the least capital investment. As such, companies that are involved in this activity compete on cost of production. Furthermore, as there is little added value in this activity, this activity is often outsourced (R. Sloan, phone interview, June 4, 2015).

Table 2. Definition of Competency Groups of Each Step in Engine Lubricant Production

Additive Constituent Development: Synthesizing complex chemicals from stock chemicals.
• These are essential chemicals for engine lubricants that are combined to make additive packages and constituents. They are differentiated by their effectiveness and cost per volume of final engine lubricant. • Development of such chemicals requires specialized equipment and knowledge. Development of new chemicals is frequent and companies actively developing such chemicals invest heavily in patents, suggesting they have IP strategies. • Companies producing such chemicals are typically large vertically integrated oil companies or large chemical companies. Although there are several companies that sell additives, only a few aggressively produce patents.
Stock Oil Production: Refining of crude oil into discrete hydrocarbon products.
• Variations of stock oils are limited and they are available from several suppliers. As such, differentiation is only on cost. • The technology and knowledge required to refine crude oil is well understood and it is readily available. Patents for new chemicals or processes are comparatively rare. The capital investment for such refining is by far the most significant of the three. • There are over 70 independent refining companies in the U.S.
Additive Formulating and Blending: Blending of stock oil and additives into a final additive package.
• With the variety of motor oil standards and niche motor oil applications, there are several additive packages available to engine lubricant producers, as well as aftermarket additives products. Additive packages are available from several suppliers such that engine lubricant producers can simply order pre-blended additive packages and blend it with a stock oil. • The actual process of blending lubricants requires little expertise; however the development of formulas requires an intimate understanding of engine requirements, the functions of the different additive constituents and the compatibility of the different constituents in all operating conditions. • Most additive developers and producers sell discrete additives. Less than five were found to provide complete additive packages designed to meet the various motor oil standards. Based on patent numbers, most engine lubricant producers do not develop their own additive packages.

3.4 Strategic Groups within the Engine Lubricant Industry

This section describes the different perceived strategic groups within the engine lubricant industry. Although producing and selling motor oil is not within BestLine's present strategy, it is not obvious that such products are beyond its capabilities and they could move into producing motor oil in some scenarios. Furthermore, there are scenarios where it could be most profitable for BestLine to sell its additive to motor oil producers, or to license its additive technologies to motor oil producers. Therefore, it is worth considering strategies of motor oil firms and including companies that produce additives for the motor oil firms in this discussion.

Drawing on Figure 1 prominent companies in the engine lubricant industry were reviewed to identify companies that are involved in the same activities. This was accomplished by reviewing company websites, as well as their subsidiaries' websites. Companies that share the same activities are grouped together as they are perceived to have distinct core strategies. As a result, six different strategic groups are identified and are presented in Table 3.

These groups can be further distinguished by generalizing their core strategies. As the different activities require different levels of competency to compete, it is perceived that companies that are involved in more complex activities are able to differentiate through innovation, whereas companies that are involved in less complex activities compete primarily on cost. It is also perceived that the companies that are selling to the final consumer are focused heavily on marketing. Table 4 describes each of the perceived strategic groups by their activities and the perceived value chain activities where they attempt to differentiate themselves. The table also identifies which strategic group's products are sold to the consumer.

Table 3. Engine Lubricant Production Companies Categorized by Their Perceived Strategic Group

Strategic Groups	**Companies**
Vertically Integrated A *Activities 1-2-5-8*	• BP Castrol • Suncor/Petro Canada • CITGO • Marathon Petroleum Corporation (no retail) • Conoco Phillips / Kendall • American Refining Company / Brad Penn
Vertically Integrated B *Activities 1-2-3-4-8*	• ExxonMobil / Infineum • Chevron Onorite
Vertically Integrated C *Activities 1-5-6-8*	• Royal Dutch (Shell oil, Quaker State, Pennzoil, Slick50)
Additive Developers *Activities 3 and 4*	• Lubrizol • BASF • Afton
Aftermarket motor oil blenders *Activity 4-5*	• Lucas Oil • Valvoline • Redline • Amsoil • Royal Purple • Maryn International • PEAK Performance Oil
Aftermarket additive blenders *Activity 4-6*	• BestLine • STP • Slick50 • Zmax • Cerma • Motorkote • Rislone • Marvel Mystery Oil • Bardahl • Lucas Oil* • Valvoline* • Redline* • Amsoil* • Royal Purple* • Maryn International

*only fuel additives

Table 4. Summary of Strategic Groups and the Perceived Value Chain Activities where they Attempt to Differentiate Themselves

Strategic Groups	**Description**	**Strategies**
Vertically Integrated A *Activities 1-2-5-8*	• Stock Oil Producer • Motor Oil Blender for retail • Gas Station chain	• reduce costs (operations and in/out logistics) • marketing and sales
Vertically Integrated B *Activities 1-2-3-4-8*	• Stock Oil Producer • Additive Producer • Motor Oil Blender for retail • Gas Station Chain	• reduce costs (operations and in/out logistics) • marketing and sales • create added value through additive innovation… they have IP strategy
Vertically Integrated C *Activities 1-5-6-8*	• Stock oil producer • Motor Oil, and Aftermarket Additive Blender for retail	• reduce costs (operations and in/out logistics) • marketing and sales
Additive Developers *Activities 3 and 4*	• Additive Producer and Blender • B2B sales	• create added value through additive innovation… they have IP strategy • brand legitimized by patents generated • reduce costs (operations and in/out logistics)
Aftermarket motor oil blenders *Activity 4-5*	• Motor Oil Blenders for retailer	• marketing and sales • create added value through additive innovations • reduce costs (operations and in/out logistics)
Aftermarket additive blenders *Activity 4-6*	• Aftermarket Additive Blenders for retail or direct sale	• marketing and sales • reduce costs (operations and in/out logistics) • create added value through additive innovations

Table 3 reveals that, although more than 70 independent oil-refining companies in the U.S., only nine are found to produce engine lubricants for retail. Of these nine, eight have their own chains of gas stations through which they can sell their engine lubricant brands.

3.5 Industry Patents

As the previous section describes, engine lubricant producers have varying perceived strategies. As BestLine has chosen to invest heavily into intellectual property, or IP, it is relevant to consider which firms have invested in intellectual property as well. Using the U.S. Patent and Trademark Office, or USPTO, website, Tables 5 through 8 are generated. The patent search is intended to identify which firms use IP to protect their assets, which knowledge areas they perceive to give them competitive advantage and which knowledge areas are their core competencies. The lists of companies chosen are not necessarily comprehensive.

Engine lubricants were identified by visiting local retail stores, including Walmart and Canadian Tire, and reviewing websites of American retailers, including AutoZone and NAPA Parts, as well as Amazon.com. To validate the legitimacy of engine lubricant products for this study, reports posted by incumbents comparing their products to their competition were reviewed (AMSOIL, 2012), as were online videos of independent tests of consumer products conducted by aftermarket automotive enthusiasts (ChrisFix, 2015).

Although the numbers of patent filings by each company has been collected through a crude search, it provides insight regarding which companies value IP and which companies have IP strategies. In particular, Strategic Group A have very limited interest in IP, and the little interest they have is in stock oil production. This suggests they either license an additive package formula, or purchase the additive packages from other suppliers. Furthermore, it suggests such firms are not reliant on proprietary lubricant technologies to differentiate themselves. Rather, they more likely focus on cost reduction, as well as marketing and sales. Strategic Group B are heavily invested in patenting motor oil blending formulas, additives and stock oil production. This suggests they produce all components of their engine lubricants, and are attempting to differentiate themselves through their lubricant technologies. Strategic Group C, which is limited to Royal Dutch Shell, has few engine lubricant blending patents, and invests heavily in stock oil production IP. This suggests they licence or purchase additive packages, similar to Strategic Group A, and attempt to differentiate themselves through cost reduction, and marketing and sales.

Additive developers and additive package developers clearly value IP for blending products and processes as well as additive development. Similar to Strategic Group B, these firms attempt to use IP to differentiate themselves. As such, companies like Lubrizol, Oronite and Infineum, are likely the most capable of leveraging new IP related additives, and they are likely the most threatened by others generating competing IP. Conversely, as only one other aftermarket additive producer was found to have patents related to additive blending, it appears that BestLine's direct competitors do not value IP

generation, which implies they do not have novel technologies that qualify to be patented, or they do not perceive there is a threat of their technology being copied.

Table 5. Number of Patents by Strategic Groups Vertically Integrated A through D

	Blending Process	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Additive Constituent**	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Stock oil**
Assignee name	Search Code 1	Search Code 2	Search Code 3	Search Code 4	Search Code 5	Search Code 6	Search Code 7
Castrol or BP or "British Petroleum"	18	0	0	0	0	0	18
“Petro Canada” or suncor	0	0	0	0	0	0	5
CITGO or "PDV America"	0	0	0	0	0	0	0
"Marathon Petroleum"	0	0	0	0	0	0	0
Kendall or Conoco or Phillips	0	0	0	0	0	0	78
"Brad Penn" or "American Refining"	0	0	0	0	0	0	0
Exxon$ or Mobil1 or Infineum	229	168	120	101	68	47	327
Halvoline or Chevron or Oronite	109	89	59	59	47	39	166
Shell or "Quaker State" or Pennzoil	13	5	4	0	0	0	294

Source: Data retrieved from the U.S. Patent and Trademark Office. Search Code statement described in Appendices.

Table 6. Number of Patents by Motor Oil Blenders

	Blending Process	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Additive Constituent**	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Stock oil**
Assignee name	Search Code 1	Search Code 2	Search Code 3	Search Code 4	Search Code 5	Search Code 6	Search Code 7
"Lucas Oil"	0	0	0	0	0	0	0
Valvoline or Ashland	0	0	0	5	5	5	0
Redline	0	0	0	0	0	0	0
"Royal Purple"	0	0	0	0	0	0	0
Amsoil	0	0	0	0	0	0	0
“Maryn International”	0	0	0	0	0	0	0

Source: Data retrieved from the U.S. Patent and Trademark Office. Search Code statement described in Appendices.

Table 7. Number of Patents by Additive Developers

	Blending Process	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Additive Constituent**	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Stock oil**
Assignee name	Search Code 1	Search Code 2	Search Code 3	Search Code 4	Search Code 5	Search Code 6	Search Code 7
Lubrizol	112	80	63	77	57	45	0
BASF	2	2	2	10	4	3	38
Afton	35	25	17	43	29	29	0

Source: Data retrieved from the U.S. Patent and Trademark Office. Search Code statement described in Appendices.

Table 8. Number of Patents by Aftermarket Additive Producers

	Blending Process	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Additive Constituent**	**Reference to Zinc**	**Reference to Zinc and Diesel**	**Stock oil**
Assignee name	Search Code 1	Search Code 2	Search Code 3	Search Code 4	Search Code 5	Search Code 6	Search Code 7
BestLine (1 being filed)	6	1	0	3	3	3	0
STP	0	0	0	0	0	0	0
Slick50	0	0	0	0	0	0	0
Zmax	0	0	0	0	0	0	0
Cerma	0	0	0	0	0	0	0
Motorkote	0	0	0	0	0	0	0
Rislone	0	0	0	0	0	0	0
Marvel (Mystery Oil)	0	0	0	0	0	0	0
Lubrilon	0	0	0	0	0	0	0
"PEAK Performance"	0	0	0	0	0	0	0
Bardahl	1	1	1	0	0	0	0

Source: Data retrieved from the U.S. Patent and Trademark Office. Search Code statement described in Appendices.

3.6 Market Segments

Although the focus of this analysis is on BestLine's Diesel Engine Treatment, it is relevant to consider a wider scope of customers. This analysis considers all consumers of engine lubricants for both gasoline and diesel powered engines. Table 9 below summarizes the customer types and the engine lubricants offered. Furthermore, it generalizes the likelihood of the different customer types purchasing and consuming the various lubricants available. This table is helpful to identify which customer types are most likely to purchase products from BestLine's product line, and into which products BestLine should consider moving.

Table 9. Summary of Relevant Engine Lubricant Consumers and their Likelihood to Value the Various Products

Likely / Possibly / Unlikely	BestLine Automotive Products					Motor Oil (Certified latest standard)	Motor Oil (non certified)
	Diesel Engine Treatment	Diesel Fuel Treatment	Gasoline Engine Treatment	Gasoline Conditioner	Power Train Treatment		
New Passenger Vehicle							
Old passenger vehicles (>10 years old)							
Performance/ Utility vehicles							
Vintage/ Classic vehicle							
Commercial Transport							
Heavy Duty industrial / energy							
Marine Commercial							
Marine Pleasure							

Source: Adapted from interview with R. Sloan (email, June 8, 2015).

As shown in Table 9, new passenger vehicle owners are likely to use certified motor oils, as are owners of commercial transport truck fleets, heavy-duty engine owners, and commercial marine engine owners. This implies these customers value engine lubricant certification. Performance, utility and vintage vehicle owners, however, do not necessarily value certified engine lubricants as engine oils that

meet current standards may be incompatible with older engines, high performance engines or modified engines.

The list of customers can be categorized even further. For individual passenger vehicle owners some are actively trying to improve their engine's performance or engine's lifetime (Active Owners). Other owners are passively operating their vehicles (Passive Owners). Active Owners are more likely to be particular about the lubricants they use in their vehicle, whereas Passive Owners are more likely to purchase the cheapest product or use whatever product is provided by an oil change service centre. For commercial engine owners, there are fleet owners or organizations that own several engine driven machines (mines or shipyards), and there are individual owners of heavy-duty engines. Fleet owners and larger organizations are more likely to have strong relationships with distributors and have companywide maintenance procedures and policies and are likely not willing to risk voiding warranties by using non-certified engine lubricants. Private owners are more likely to experiment with alternative lubricants, including aftermarket additives, to extend the oil drain cycle and to improve fuel economy.

It is worth mentioning the influence of the engine lubricant standards described in Section 3.1. Awareness of such standards is likely low for passenger vehicle customers, and much higher for industrial customers. Regarding passenger vehicle owners, even if they are aware of the existence of these standards they must be sufficiently informed of the meaning of this standard to know which products meet which standards. API provides a donut, or a starburst for ILSAC certification, with the standard to which the oil meets and the grade of the oil, according to SAE standards. Unless a passenger vehicle owner thoroughly follows the manufacturer's instructions and chooses the recommended motor oil, it is very easy for a consumer to use inappropriate oil in their engine. Furthermore, it is unlikely a consumer would understand the implications of using an aftermarket additive in their vehicle. Therefore, although the intention of the engine lubricant standard may be to inform the consumer of the appropriate oil, it is perceived that it has very limited influence on how passenger vehicle owners purchase engine lubricants.

3.7 Industry Competitiveness: Porter Augmented Five Forces

This section provides an analysis of the Engine Lubricant industry and assesses the attractiveness of the industry by applying Porter's Five Forces (Porter, 2007). This analysis begins with an assessment of the threat of entry into the industry by considering the barriers to entry. The powers of suppliers and customers are explored to identify which actors in the supply chain have the most bargaining power. The threat of substitutes of engine lubricants is then briefly considered. Finally, rivalry among competitors is explored to assess how the actors in the industry differentiate themselves from the competition. Since

complementary products, technology and government policy are perceived to have influence on the industry, they are considered as well. Although markets and regulators in the EU and Japan have influence on this industry, the scope of this analysis is limited to the engine lubricant industry in North America only. For each of the forces, a ranking is provided to identify which forces are perceived to have the most significant influence within the industry.

3.7.1 Threat of Entry (Motor Oil: Low, Aftermarket Additives: Medium/High)

Supply-side Economies of Scale

For firms to enter into the business of chemical refining and producing complex chemicals (Activities 1, 2 and 3 in Figure 1) there is significant capital investment to begin production and to reach minimum efficient scale. Blending of chemicals into lubricant packages, however, requires very little capital, as there is little complexity in equipment requirements and operation knowledge. Furthermore, blending plants can be easily expanded, or blending can be outsourced, to meet increases in demand.

Motor oil producers must bear the cost of certifying each of the oil grades according to the various standards, whereas aftermarket additives are not regulated, which is a fixed cost aftermarket additives do not need to bear. Motor oils also have lower profit margins than aftermarket additives, and therefore require more unit sales to achieve the equivalent profits (refer to Table 1). Furthermore, motor oils have a lower sales price to volume ratio, therefore cost of shipping and inventory are higher than aftermarket additives.

Customer switching costs

For retail consumers switching costs are low for the customer to change motor oils or aftermarket additives. With respect to motor oils, the purpose of the API and SAE standards is to simplify the consumers' decision process when looking for the appropriate motor oil for their vehicle, or machine. The owner will want to be assured that the oil will function properly as prescribed in the owner's manual. As there are more than ten motor oil producers offering full ranges of motor oil grades with very little differentiation in quality, customers will typically purchase based on price. Customer switching costs for aftermarket additives are even less as they are not required and there are no standards to which aftermarket additives can be compared. Rather it is up to the consumer to decide whether aftermarket additives are beneficial to an engine.

Industrial customers are more likely to have established supplier relationships or contracts. Such customers likely require more incentive to switch to a new product, through significant discounts, significant sales attention or evidence of reductions in operating costs. As motor oils are certified according to the various standards, industrial consumers are most likely interested in the cost of motor oils. As aftermarket additives are not regulated and not recommended by engine manufacturers (Caterpillar, 2013; Cummins Inc., 2007), industrial customers that use aftermarket additives likely perceive that such products can provide a benefit for the added cost and are likely willing to entertain other products that demonstrate performance improvements. Such customers have low switching costs.

With over 70 independent oil refineries in the U.S., stock oils are heavily commoditized and prices are dependent on global crude oil prices. The only switching cost may be due to established contracts and corporate relationships. Therefore, there is little pressure for engine lubricant producers to use only one stock oil supplier.

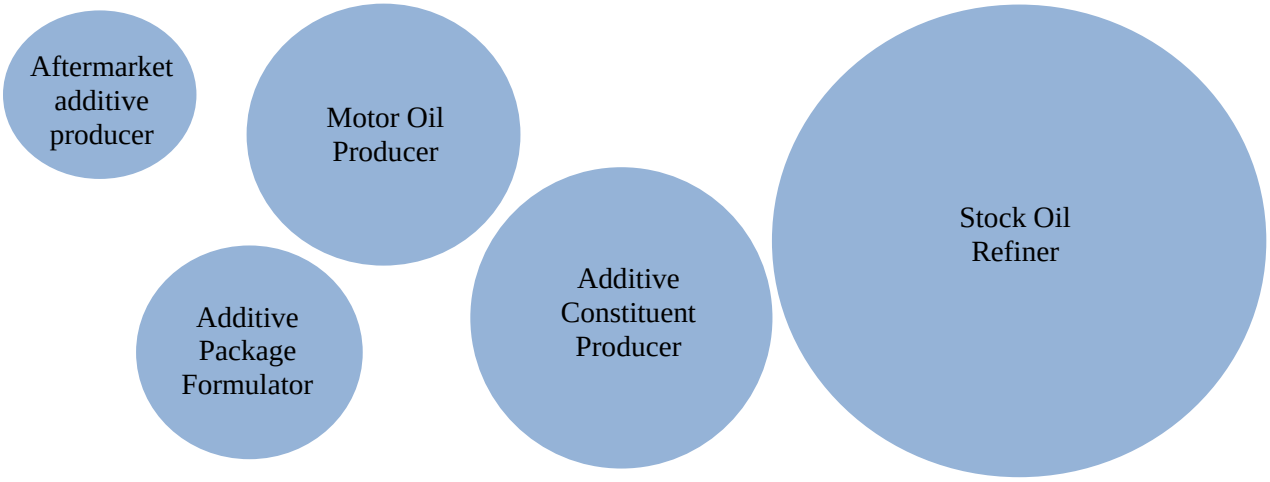
Although many of the additive constituents are commodity chemicals, there is a large list of proprietary additive constituents which have limited suppliers (R. Sloan, phone interview, July 2, 2015). Similarly, there are very few companies found to provide additive packages designed to meet the various motor oil standards when mixed with stock oil. As a result, such suppliers can demand higher margins on their products.

Capital requirements

As previously described, there are three perceived competency groups that require differing equipment and different capacities to reach minimum efficient scale. Oil refining is the most capital intensive and significantly more than additive constituent development and production. Blending and additive package formulating requires the least capital investment to reach minimum efficient scale. The cost of certifying a motor oil can be relatively expensive to a company that only blends and packages engine lubricants, and this is to the larger producers advantage as it is a fixed cost for all motor oil producers who decide to have their motor oils certified. As the cost of such testing is relatively small for a large firm, they are able to use this as an entry barrier to smaller firms. The cost of certifying a single oil grade according to the API standards can exceed $300,000 (R. Sloan, email, June 27, 2015). This is for the API standard alone. If a motor oil producer desires to produce ten different grades (Amsoil and Castrol have over 20 grades each) it would need to conduct ten different series of tests, which could exceed $3 million. If a motor oil producer wants its products to be certified by the automakers, or any of the heavy-duty diesel engine manufacturers, they must have each grade tested according the automakers

and engine makers' standard as well. Of course, if a motor oil producer chooses to certify their products there is considerable incentive to pass the first time; at least for firms with smaller expected sale revenues. Larger motor oil producers are supposedly willing to conduct some of the tests several times so they can pass the tests as narrowly as possible (R. Sloan, phone interview, June 22, 2015). This is not entirely surprising as the additive package is the most costly component of motor oil, and the ability to reduce the additive package requirements can result in significant future savings in production costs. To add to small producers challenges, the standards change over time, and therefore motor oils meeting current standards will need to be retested to be certified for future standards. In fact, API standards have been updated five times in the past 30 years ("Some Engine Oils", 2013). Therefore, regarding capital requirements, producing an aftermarket additive lubricant is the cheapest entry point, followed by developing and producing additive packages, then producing motor oils, developing and producing additive constituents and finally stock oil refining (refer to Figure 2).

Figure 2. Relative Capital Cost from Lowest to Highest (not to scale)



Source: interview R. Sloan (phone interview, June 22, 2015) and author's interpretation.

Incumbency Advantages Independent of Size

With respect to sales to passenger vehicles, motor oils and aftermarket additives are perceived to be primarily differentiated by marketing and the brand that companies have created and maintained. The major motor oil brands, including Castrol, Shell, Mobil1, Valvoline and Quaker State, have all existed for more than 50 years ("Who we are," 2015; "Our History," 2015; "Celebrating four decades," 2015; "Our History," 2015; "Quaker State History," 2015). Aftermarket Additive producers, such as STP and

Slick50, have also maintained market dominance for the past 35 years ("STP® History," 2015; "Our History," 2015). Aftermarket Additive producers, such as Marvel Mystery Oil and Rislone, have been established brands for over 80 years ("Marvel Mystery Oil® History," 2015; "History," 2015). Additive developers and producers also have the advantage of long histories. Lubrizol, Afton and BASF have been established chemical companies for over 60 years ("A Brief History," 2015; "Our History," 2015; "Our History," 2015). Table 10 shows a list of brands that have existed for 50 years, or more. These brands benefit from having long-term relationships with the major retail stores and with automakers as well as the final consumers. Sustaining these brands is not only the concern of the oil producers, but the retailers as well. Since retail firms, such as WalMart and Canadian Tire, have strategies that focus on reducing inventory turnover ratio, it is essential they stock brands that are recognized and trusted (Webster Jr., 2000; Porter 2007). Brands, including Castrol, Quaker State, Pennzoil, and Mobil1, have been integrated into the dominant oil refining companies: namely BP, Shell (Royal Dutch), Shell (Royal Dutch), and Exxon respectively. Valvoline and STP Oil are other engine lubricant brands that have been purchased by larger firms for their brand ("History of Castrol," 2015; "Shell Acquires Pennzoil-Quaker State," 2002; "Exxon, Mobil", 1998). Companies with such long histories will certainly benefit from years of customer interaction and tacit knowledge related to marketing and production. The large incumbent motor oil producers are also the preferred suppliers for automakers. Without the capacity to provide the large demand, and the brand reputation, it is likely very difficult to become a preferred supplier to an automaker unless the replacement is of equal size and has equal brand recognition. Furthermore, automakers choice of supplier will also be heavily influenced by price and only the firms that provide motor oil at the lowest cost can compete.

Table 10. Age of Incumbent Brands

Company	Age of Brand	Product Group
Quaker State	1859	Motor oil
Valvoline	1873	Motor oil
Shell	1897	Motor oil
Castrol	1899	Motor oil
Mobil1	1974	Motor oil
BASF	1865	Additives
Chevron	1879	Motor Oil and Additives
Lubrizol	1928	Additives
Marvel Mystery oil	1920	Aftermarket Additive
STP	1965	Aftermarket Additive

Sources: "Quaker State History," 2015; "Our History," 2015; "Our History," 2015; "History of Castrol," 2015; "About us," 2015; "History," 2015; "Company History," 2015; "Our History," 2015; "A Brief History," 2015; ;"Marvel Mystery Oil® History," 2015; "STP® History," 2015.

Unequal access to distribution channels

Engine lubricants for passenger vehicles face the largest barriers to distribution channels. Sales through retail stores, particularly those that have significant purchasing power, can be capital intensive as these retail stores may require large quantities for their chain of stores (R. Sloan, personal interview, June 6, 2015). Firms with little capital available must consider the opportunity costs of investing in inventory, rather than in direct sales, marketing or testing for certification. Such conditions have made it difficult for BestLine Lubricants to work with retail stores and they have subsequently chosen to drive sales through direct sales representatives, and online sales and retail (R. Sloan, personal interview, June 6, 2015). It should also be noted that several of the large motor oil producers are vertically integrated with gas

stations and sell their oil products through their subsidiaries. This allows such companies to increase the visibility of their products. Table 11 reveals the motor oil producers that are affiliated with gas station chains.

Table 11. Motor Oil Producers Affiliated with Gas Stations

Motor Oil Brand	Gas Station Retailer
Castrol	BP
Kendall	76 and Phillips 66
Chevron	Chevron
Shell, Quaker State, Pennzoil	Shell
CITGO	CITGO
ExxonMobil	Valero

Since sales to industrial customers are primarily through direct sales, access to such customers is through word of mouth, brand recognition, established relations and other means of legitimating ones product. Industrial customers, however, will typically demand lubricants that are certified by API and by the appropriate engine manufacturer, and, therefore, will be less likely to entertain any sales attempts from aftermarket additive producers. Since aftermarket additives are not recognized by API or engine manufacturers, aftermarket additive producers will likely be limited to the attention of smaller fleets and individual engine owners that value potential savings of fuel consumption or reductions in engine wear over the risks of engine manufacturers voiding their warranty for using uncertified lubricants.

3.7.2 Power of Suppliers (Crude oil: Low, Additives: Medium)

Although the petrochemical suppliers are large there is little supplier power enforced on the engine lubricant producers. This is because of the strong competition within the chemical industry. As Section 3.3 identifies, there are over 70 independent oil refineries offering various stock oils. In contrast to oil refineries, there are less than ten additive developers in North America, who are the suppliers of the additive packages with defined amounts to meet the various standards. Developers commonly generate patents to protect their innovative additive constituents and additive package formulas. However, motor

oils that pass API and SAE standards do not necessarily use or need proprietary additive constituents. Although these standards define the allowable limits of certain elements in motor oil, most additive constituents are commodity chemicals (R. Sloan, phone interview, July 2, 2015). As a result, although the options for additive constituents are less than those for stock oils, there are minimal switching costs between stock oil suppliers and additive constituent suppliers.

3.7.3 Customer Power (Medium/High)

In regards to engine lubricants sold through retail, retail stores can have substantial customer power. Retail stores, such as Wal-Mart and Canadian Tire, offer the potential for significant sales volume and can demand high margins for shelf space. Final consumers are unlikely to organize themselves to negotiate lower prices; however, they are likely to choose the lowest price oils when options are provided. Furthermore, they have low switching costs as previous use of an engine lubricant brand does not force a consumer to use the same brand in the future.

Oil change service centers are large engine lubricant customers. Some are owned by large oil companies (eg. Jiffy Lube is owned by Royal Dutch Shell), which promote primarily their own brands, where others provide an assortment of brands. Because of the volume of sales of such retailers, the large selection of oils and relative indifference of their customers' brand preferences, such oil change service centers will likely use the cheapest available motor oil, which can promote rivalry among the competitors.

Large commercial buyers (marine or trucking) and industrial buyers consume large quantities of lubricants. Furthermore, there are several available engine lubricants that are certified to the required standards. Therefore, such buyers are able to negotiate for the lowest cost option. As the differentiation in cost of producing engine lubricants, by one firm to another, is highly dependent on the cost of production, larger firms with lower operating costs will be able to offer lower priced engine lubricants. For a supplier with little power, buyers will negotiate for more favorable terms to give the smaller firms the opportunity to build their customer portfolio and their brand. This is consistent with BestLine's experience as commercial fleets have requested shares in BestLine Lubricants during past supply negotiations (R. Sloan, phone interview, June 4, 2015).

3.7.4 Threat of Substitutes (Low)

All engines (within the scope of this study) require a lubricant and there are no direct substitutes for lubricants. Therefore, the threat of substitutes is low in this industry.

3.7.5 Rivalry among Existing Competitors (Motor Oil: High, Aftermarket Additive: Low/Medium)

Since there is little differentiation in product quality and performance, it is perceived that motor oil producers compete primarily on cost. To increase profit margins motor oil producers must develop the lowest cost products, while meeting certification requirements. For motor oil producers to be competitive they must be producing at the minimum efficient scale, which requires high sales volumes. As shown in **Error! Reference source not found.**, typical profit margins are near 50%, which are likely consumed by retail stores, and cost of distribution.

Similar to retailers, large industrial consumers will use the lowest cost oil that meets their engines' requirements. For motor oil producers to compete for industrial customers they must offer attractive pricing to their customers, and therefore producers are forced to compete on cost of goods sold. Therefore, competition among motor oil producers for industrial consumers is high.

Aftermarket additives are not regulated engine lubricants and are not certified by API, or by other standards. For consumers to purchase an aftermarket additive they must first develop the perception that their engine will benefit from such an additive, and that available motor oils are insufficient for their engine. It is perceived that customers are more likely to be brand particular to aftermarket additives as customers have little information to differentiate the quality of the different products available and cannot predict the effect of such products. Therefore, aftermarket additives are specialty goods and they can demand much higher margins (80-90%) than motor oils (R. Sloan, email, July 22, 2015), and there is less incentive to compete through discounting prices. Aftermarket additive producers tend to use specific demonstrations that favour their product to compare their product to others. As the average consumer is unfamiliar with the range of functions an engine lubricant serves and the rigorous series of tests API uses to certify motor oils, such specific demonstrations can easily mislead consumers. Aftermarket additive producers have attempted to make exaggerated claims of the performance of their products; however, as Section 2.4 describes, aftermarket additive producers have been fined and ordered to stop making unsupported claims in their advertising.

Rivalry among additive constituent developers is more visible in the technology they develop. As described in previous sections, engine lubricant producers, which are the consumers of additives, are primarily interested in reducing the cost of goods sold, while meeting the minimum requirements of the various standards. For new additives technologies to be attractive to engine lubricant producers the additives must help engine lubricant producers in their primary goal. For additive developers to protect themselves from competitors they invest heavily in patents, as Table 7 reveals, which enables them to demand higher rents on their additives. With the recent imposed restrictions in ZDDP in motor oil, there is evidence that these companies are investing heavily in research to find cost effective substitutes, as Table 12 reveals.

Table 12. Firms Generating Patents as Claims to ZDDP Substitutes

Company	**Number of patents related to ZDDP**
Infineum	236
Oronite	137
Lubrizol	137
BASF	6
Afton	54

As industrial consumers are more hesitant to using unregulated lubricants, they are likely more resistant to the use of aftermarket additives than are passenger vehicle owners. Therefore, aftermarket additive producers are more likely to face the challenge of legitimating aftermarket additives rather than convincing prospective customers that their products are superior to the competition. As BestLine has experienced, once an industrial customer is willing to consider aftermarket additives as a solution, the customer will typically demand a test to demonstrate the effects of such products (R. Sloan, phone interview June 22, 2015). Therefore, because of the lack of regulation, competition among aftermarket additive rivals is low and less likely to result in price discounting.

3.7.6 Influence of Government (Medium/High)

In North America, the influence of government is not applied directly to the engine lubricant producers, nor do they enforce any regulations directly on the consumer. The U.S. EPA, however, enforces emissions restrictions on the automakers and engine makers (API, 2012; U.S. EPA, 2000; U.S. EPA, 2012) and the U.S. Department of Transportation (DOT), through the National Highway Traffic Safety Administration (NHTSA), has enforced fuel economy requirements through the Corporate Average Fuel Economy (CAFE) initiative since 1975 ("Corporate Average Fuel Economy," 2014). Furthermore, the EPA restricts certain substances in the fuels: most notably sulphur in diesel fuel, as well as zinc and phosphate compounds in oil. These policies have cascaded down to the motor oil producers as the API, automakers and engine makers have defined motor oil content and performance standards necessary for their engines to comply with the EPA regulations. Although these standards are voluntary, automakers and engine makers warn vehicle and engine owners that their warranties may become void if there is evidence a non-certified lubricant has been added. Engine owners subsequently enforce these standards by demanding certified lubricants. Figure 3 describes the cascading influence of these policies onto the engine lubricant producers.

As suggested by the EPA (U.S. EPA, 2012), the NAHTSA has attempted to develop a fuel economy improvement program that allows the relevant stakeholders enough time for the automakers to achieve the enforced targets at reasonable rates. For motor oils and fuels, similar progressive targets have been directly enforced: namely the reductions in sulphur, zinc and phosphates. Aftermarket additives are not influenced by such government regulations, as there are no standards to which they must meet. The pressures applied by the government are intended to encourage exploration and innovation of lubricants within the industry. Increased restrictions of certain elements in motor oil and fuel, however, will legitimize the need for aftermarket additives and increase the attractiveness of developing new additive constituents and additive packages as these restrictions may negatively affect the performance of motor oils. Additive constituent exploration is occurring as motor oil producers, additive constituent developers and additive package formulators have been actively looking for new technologies to address these restrictions (refer to Table 5, Table 6, Table 7, and Table 8). Such influence by the government is likely to attract new entrants to take advantage of the subsequent new opportunities.

Governments also create incentives for engine owners to dispose of older engines that are likely to have higher emissions or poorer fuel economy by offering rebates. The California Bureau of Automotive Repair (BAR) provides such incentives that encourage vehicle owners to purchase a newer vehicle, or to find a substitute to a combustion engine vehicle ("Consumer Assistance Program," 2015). Such incentives discourage the use of engine lubricants that are designed to improve the fuel economy

and reduce the emissions of older vehicles. However, they do not necessarily encourage the reduction in motor oil consumption.

Since 1970, the EPA has made efforts to control the emissions of vehicles (U.S. EPA, 1994). Catalytic converters were first introduced in 1975 as a technology to combust unburnt hydrocarbons and the reduce SOx and NOx emissions. The EPA has since enforced the use of emission control sensors that must be warranted by the automakers and engine makers (U.S. EPA, 2000). They have also demanded that catalytic converters have a minimum lifetime of 80,000 miles. With these requirements, the API, with the council of SAE, EMA and the AMA, has progressively restricted the use of phosphorus, among other elements and compounds, in motor oil as they are known to deactivate catalytic converters (API, 2012).

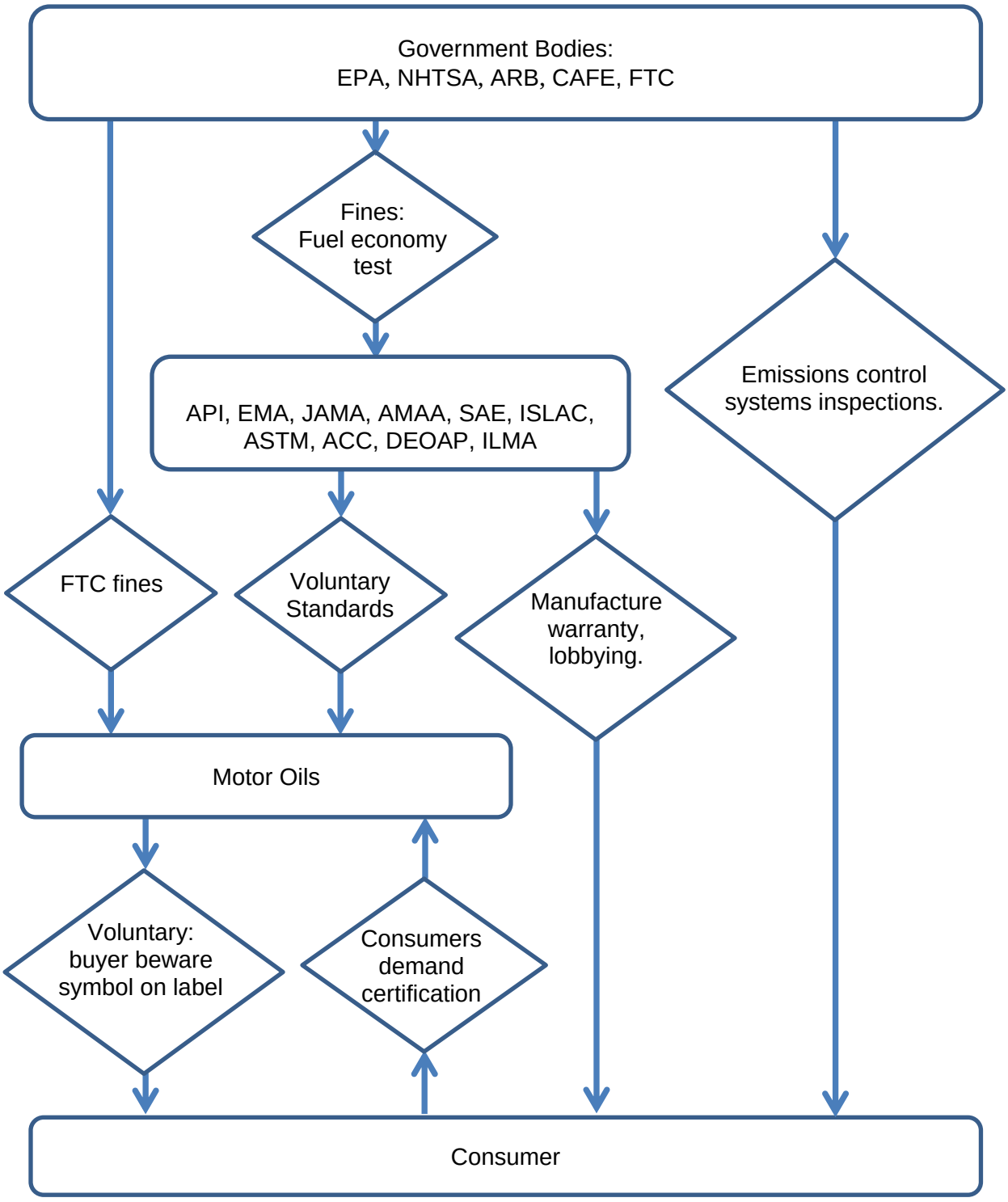
Figure 3 shows the chain of influence from the government to the consumer, as well as the mechanisms the influencers use. Essentially, the EPA mandates minimum requirements for emission control on the design of vehicles and the NHTSA mandates the fuel economy requirements of new vehicles. Non-compliance of these regulations results in fines to the automakers and engine makers. For automakers and engine makers to comply with these regulations, the various associations and manufacturers co-operate to create motor oil standards that will satisfy the engine requirements. Some automakers and engine makers define their own standards to which engine lubricant producers can choose to be certified. As the automakers and engine makers standards are typically more demanding than the API standards, API standards may not be sufficient for an engine lubricant to be recommended. As shown in the figure below, vehicle and engine owners are not obligated to use appropriately certified engine lubricants. Not using the appropriate engine lubricant, typically defined in an owner's manual, is a risk as their warranty could be deemed void if an engine component failure occurs and the automaker can prove that improper engine lubricants were used.

Aftermarket Additives do not fit well within Figure 3. Neither fuel nor engine aftermarket additives have regulated standards to which producers can be compared. Therefore, consumers who choose to use aftermarket additives do so based on their perception of the validity of the claims on the products labels or website. As with motor oils, if an owner of a vehicle under warranty uses aftermarket additives with components that could invalidate the API certification of the motor oil used, the automaker may be able void the owner's warranty.

The EPA has similar regulations for industrial engine makers, such as Caterpillar and Cummins. New engine designs must meet emissions control system standards and the engine manufacturer must guarantee serviced engines have operational emissions control systems. Although the EPA regulations do apply to the end engine users (U.S. EPA, 2000), the engine makers remove liability by enforcing warranty

limitations on their engines by certifying the allowable engine lubricants that can be used in their engines (Caterpillar, 2013; Cummins Inc., 2007).

Figure 3. Order of Influence from Government to Customer, and Mechanisms Influencers Use



Source: Adapted from API (2012), U.S. EPA (2000), U.S. EPA (2012), California EPA (2005), Cummins Inc (2007), Caterpillar (2013), and authors interpretation.

False Claims

Although the available standards for motor oils define the minimum requirements for a motor oil, there is no standard to which lubricant producers can prove how much their products exceed the minimum standards. Therefore, it is up to the motor oil producer to convince the consumer that their oil is of higher quality than the minimum standard. This is applicable to all aftermarket additives as there are no standards for aftermarket additives.

The Federal Trade Commission (FTC) mandate is to protect consumers from false advertising and it has the authority to punish companies that falsely promote their products ("About FTC," 2015). In regards to engine lubricants, there have been several cases where engine lubricant producers have made claims in advertisements and when challenged to provide supportive data they were unable to do so. The most recent was in 2001 ("FTC Sues Speedway Motorsports," 2001) and the first ruling was in 1976 against STP ("STP Corporation," 2015). The late 1990's experienced several cases against aftermarket engine additives, which effectively forced two popular product companies to shut down. Although these firms were found guilty, they have since been able to sell their products in retail stores. Aftermarket additives were not alone in the convictions, as Castrol's Duralex and Shell Vektron 3000 motor oil were found to make false claims as well ("Shell and Castrol Settle FTC Charges," 1999).

3.7.7 Role of Complementary Products and Services

Engine lubricants have no value in themselves. Rather, they are a necessary complement to engines and machinery. Therefore, added engine sales, and the sustaining of engines purchased in the past, generate more sales for engine lubricants. Unlike motor oils, aftermarket additives are not mandatory for operating an engine. Aftermarket additives are, however, more likely to be used on older engines, as described in Table 9. In general, owners of older engines will be more likely to be concerned about taking action to sustain the life of their engines. For passenger vehicle owners, this typically implies having to purchase aftermarket components which requires visiting websites or retail stores that promote a full range of aftermarket parts, including additives. Furthermore, older engines are more likely prone to reductions in performance due to wear or failure of critical components, which could compromise the condition of the motor oil. As aftermarket additives are often marketed as products that extend the life of engines, consumers may be more inclined to purchase aftermarket additives in such conditions where sustaining older engines is attractive to the consumer. Therefore, market conditions where consumers are more likely to sustain an engine, rather than purchase a new engine, may make the engine lubricant

industry more attractive for aftermarket additive producers and increase the threat of entrants. The opposite is likely true, as well.

4: **Internal Analysis**

This chapter reviews BestLine's existing, and potential, competitive advantages and assesses how sustainable they are. To accomplish this a VRIN (Value, Rareness, Imitability, Non-substitutability) analysis (Barney, 1995) is conducted to answer four questions regarding BestLine's competitive advantages:

1. Are they valuable?
2. Are they rare?
3. Are they imitable?
4. Are they substitutable?

BestLine's primary competitive advantage is that it has an engine lubricant technology that has proven to perform better than the competition. Through rigorous third party testing and recent academic tests, BestLine's Diesel Engine additive has shown to exceed the performance of ZDDP as an anti-wear and anti-oxidant additive (Cao, Mischler, 2014). To protect this asset BestLine has filed patents for its engine treatments to document that its application can be an effective substitute for ZDDP in motor oils. Although the focus of this study is on BestLine's Diesel Engine Treatment as a legitimate substitute for ZDDP, BestLine has multiple patents protecting its portfolio of lubricant products, including their penetrant products, their gasoline fuel conditioner, and their diesel fuel treatment.

4.1 Valuable

The unique value BestLine Lubricants holds is primarily their proprietary lubricant formulas. Of specific interest is BestLine's Diesel engine Treatment that is a blend of Group IV stock oil and additive constituents. BestLine has chosen to protect and legitimize this formula by filing a patent for the product, recipe and method of blending (R. Sloan, email, July 22, 2015), and claiming that it is a substitute for ZDDP and compliant to API standards. BestLine is able to support these claims through certified third party test facilities and through controlled experiments completed by the University of Lausanne (R. Sloan, email, May 18, 2015). The test results show that BestLine's proprietary formula significantly

reduces wear on a steel surface when it is added to an API certified synthetic motor oil. BestLine has patents protecting other products within its portfolio for various applications.

BestLine's value is also with its founder and president, Mr. Sloan. Although all formulas of the products are documented and can be easily reproduced, Mr. Sloan retains considerable tacit knowledge that would not be easily transferred. With Mr. Sloan's experience, he has developed considerable intuition for how to adjust the formula for present applications, as well as new applications. With this reputation, BestLine has been approached to provide solutions beyond engine lubrication, including friction reduction in the barrel of firearms and release agents for cement mixers and manure spreaders. Mr. Sloan also has considerable experience interacting with members of the EPA, FTC, USPTO and various third party test facilities. And with over 30 years of experience operating Aftermarket Additive companies, he has an intimate knowledge of the industry. Therefore, Mr. Sloan is a considerable asset to BestLine Lubricants.

4.2 Rare

Although BestLine's technology is protected with several patents, there is a long list of diesel engine treatment products available that make very similar claims of improved performance, improved efficiency or fuel economy, and reduced wear. Unfortunately aftermarket additives are not regulated by any governing body and therefore there are no standards to which such products must be evaluated. Therefore, although there may be significant differences in performance of the different products, and BestLine's technology may be rare, it is difficult for the consumer to differentiate between the options without thoroughly testing each of the products.

BestLine has attempted to distinguish itself, and protect the rarity of its products by patenting its various formulas. BestLine is unique as it is the only aftermarket additive producer found to have patents protecting its technology (refer to Table 8). BestLine also has received written letters and anecdotal evidence from representatives at Southwest Research Institute and the EPA that its products far exceed the performance of the well-known brand motor oils and the competing aftermarket additives (R. Sloan, personal interview, July 22, 2015, May 16, 2015).

Mr. Sloan's value to BestLine may not be rare. The engine lubrication industry is large and the incumbents have been established for decades, suggesting that there are others with similar knowledge and experience to Mr. Sloan with the abilities to manipulate BestLine's formulas to be optimized for

different applications. Therefore, although Mr. Sloan is a critical component to BestLine's present growth, BestLine's success is not necessarily dependent on Mr. Sloan's involvement.

4.3 Substitutable

As ZDDP was widely used for several decades as an anti-wear and anti-oxidation additive constituent, the restrictions made by the API on the use of ZDDP have left a gap in the additive package (Spikes, 2004). This is evident by list of patents that have been filed since reductions in ZDDP were first enforced by the API in 1996 with the SJ standard (refer to Table 5, Table 6, and Table 7).

Each of the prominent additive constituent developers (Infineum, Oronite, Lubrizol, Afton) have filed patents stating similar problems with ZDDP and claiming they have developed substitutes for ZDDP. Even the inventor of ZDDP, Lubrizol, suggests that ZDDP is an inferior constituent and they claim they have a substitute for ZDDP (U.S. Patent No. 8,722,599).

4.4 Imitable

BestLine has chosen to patent the formulas of its products for the various applications it perceives will make its products valuable or differentiable from the competition. Legally, this prevents other firms from producing and selling products produced from the same formula for the same applications prescribed by BestLine. BestLine considers having patents is a credible threat, even though they may not have the reserve funds to cover the legal fees to defend its patents (R. Sloan, personal interview, June 6, 2015). Although there may not be an imminent concern of competitors copying their technology, the patents will prevent competitors from infringing in the future, if BestLine's technology is ever widely legitimized.

4.5 BestLine's Value Chain

To further describe how BestLine has chosen to differentiate itself, a Value Chain analysis is presented to identify the activities with which BestLine attempts to add value to their product (Porter, 1998). BestLine has focused on outsourcing most of its activities, while building the legitimacy of its products through customer engagement and strengthening the protection of its technology. In general,

BestLine has chosen to minimize the cost of most of its activities while relying on its technology to differentiate itself from competitors and build its brand.

BestLine perceives that its supply chain should be outsourced because it has insufficient sales to achieve minimum efficient scale. Fortunately, there are several options from which BestLine can choose to outsource their supply chain and therefore they are able to achieve low supply chain costs with minimal fixed costs. Since the profit margins of BestLine's products, and other aftermarket additives, are significantly higher than those of motor oils (refer to Table 1), while sales volumes are generally lower, BestLine has chosen to minimize its fixed cost by making the cost of its activities dependent on sales.

The conflicting activities for BestLine have been marketing and technology development. Because BestLine perceives they have a superior product, compared to its competitors, they have chosen to focus its resources on R&D, primarily in the form of patent filings, rather than in marketing and sales. BestLine perceives that building a strong strategic patent portfolio is a more expedient approach to increasing their valuation than growing their cash flow through costly marketing campaigns. Furthermore, they perceive that protecting their technology after the brand has been legitimized through heavy marketing would be more difficult and they would be more at risk of competitors copying their formulas and potentially beating BestLine to patent filing.

Although BestLine has been invited to sell their products at several retail stores and chains, BestLine has limited its distribution channels to direct sales, online retail and online direct sales. BestLine has chosen not to sell their products in chain retail stores yet as they perceive they have insufficient cash flow to cover the costs of inventory and accounts receivable without needing to dilute company shares or taking on debt. Although retail stores provide the most visibility to the consumer, investing in such distribution is a considerable risk, as BestLine perceives they have insufficient brand legitimacy to guarantee the sales to achieve profits (R. Sloan, phone interview, June 22, 2015).

To develop BestLine's brand, they have focused on engaging with customers such that prospective customers are thoroughly educated of the benefits of BestLine's products. BestLine has chosen to focus on industrial consumers as they are perceived to be the most sensitive customers to performance changes, and therefore are most likely to recognize the full value of BestLine's technology. BestLine has also invested in after sales engagement. To stimulate return customers, BestLine is actively engaging with past customers through their direct salesforce and post online sales calls. BestLine's value chain is summarized in Table 13 and Table 14.

It is also worth discussing the structure of the company, in particular the investors and their role in the company. Table 15 below describes the primary shareholders, their influence in the company, their

profession and their strategic contribution to BestLine. As shown, BestLine has several members that have access to capital networks. In addition, BestLine's CEO has extensive experience in financial markets and is on the board of several other corporations. BestLine also has access to the transport trucking industry and NASCAR racing. The board members are investors and six of the nine listed investors are heavily involved in the operations and business development of the company, none of which take a salary. Instead, terms have been defined for active investors such that they receive defined bonuses before any dividends are distributed.

There are a few implications in BestLine's structure. Firstly, the board members have significant shares of the company and will have differing specific objectives and tolerances. Younger, more financially stable investors may be more willing to wait longer for the value of BestLine to increase, whereas the founder may be more interested in a buyout at a lower valuation. Others may desire BestLine to grow their cash flow and to pay out regular dividends until an Initial Public Offering (IPO) occurs. Such differences may create conflict in the vision and strategy of BestLine.

Table 13. Summary BestLine's Secondary Value Chain Activities

Firm Infrastructure	BestLine has focused on outsourcing as many activities as possible (accounting, IP management, production and packaging, direct sales, marketing). The investors that are involved in the company provide strategic value (valuable networks, self-sufficient through other income sources, relevant expertise). Refer to Table 15 for a summary of the shareholders and their contribution to BestLine. Investor specializations: Legal, financial sector, professional motorsports (automotive racing), commercial trucking, marine shipping The company is split into four discrete companies: • The U.S. retail marketing company is a Delaware company. • The IP Company is a Wyoming Company • The Independent Distributor company is a Nevada Company • The Canadian Company is registered in Victoria, B.C.
Human Resources Management	BestLine Lubricants has chosen to minimize the need for staff as a means of reducing SG&A. Instead, many of the company contributors are investors and are not dependent on BestLine for a salary. Rather, shareholder contracts have been structured such that those who actively contribute to BestLine's growth will be compensated prior to dividends being paid out. This approach reduces operating costs, however, as BestLine has limited full time staff, but many decision makers, activities and decisions may not be conducted as efficiently as a typical business with full time employees.
Technology	BestLine is very dependent on its proprietary lubricant formulas. Most of its capital is directed to protecting its technology through patents. As described in Section 5.1, BestLine perceives the majority of its added value is represented in its IP.
Procurement	BestLine is focused on lowest cost options, by minimizing inventories and fixed costs. Due to BestLine's size, it has very little buying power. Although they are dependent on one supplier for one of their inputs, they are presently small enough for there to be little risk of supplier holdup. BestLine is trying to maintain low inventory, and since BestLine still produces low quantities, they buy from suppliers that offer low volume, and short delivery times.

Source: (R. Sloan, email, June 8, 2015) adapted from Porter (1998, p. 37).

Table 14. Summary BestLine's Primary Value Chain Activities

Inbound Logistics	As BestLine sales are insufficient to produce at minimum efficient scale, BestLine outsources as much of its supply chain management. 3rd party blending and packaging companies are numerous and compete against each other for business.
Operations	Similar to Inbound Logistics, BestLine looks to large 3rd party blending, packaging and logistics companies to minimize capital investments and inventories. • Presently, two firms do blending and packaging. • Blenders ship to a logistics center in New Jersey. • BestLine limits its product line to high margin products, and lower relative stocking and distribution costs.
Outbound Logistics	Again, BestLine attempts to minimize costs by outsourcing as much of the supply chain BestLine's sale are not large enough to achieve minimum efficient scale.
Marketing and Sales	BestLine has attempted to minimize the cost of marketing by selling through the following channels: • Direct Sales to commercial customers: Industrial and retail representatives. • Distributor network and sales representatives. • Direct sales through their website. • Online retail sales (Amazon). Distribution through chain retail stores has been avoided due to unfavourable customer power.
Services	BestLine attempts to differentiate itself by engaging with customers after sales to stimulate return customers. • Direct salesforce solicit feedback. • After-sale online customer engagement. BestLine collects any contact info possible. This has been successful for repeat sales.

Source: (R. Sloan, email, June 8, 2015) adapted from Porter (1998, p. 37).

Table 15. BestLine's Shareholder and Board Member Structure

% shareholder	Board member (y/n?)	Age	Position or profession outside of BestLine	Strategic Value to BestLine (experience, networks, etc.)
33%	Y	69	BestLine Founder and President	Founder, 30 years of experience in the business of aftermarket engine lubricants, IP Management, engine lubricant formulating,
5%	tentatively	67	Realtor	
5%	Y	58	Attorney	Legal
5%	Y	74	Massive real-estate holdings	Business, network (access to capital)
5%	Y	72	Massive real-estate holdings	Business, network (access to capital)
4%	y	63	Management at PACCAR trucking	Business consulting, trucking industry
4%	tentatively	54	Manages BestLine sales deliveries, and builds, sells and races race cars	Former NASCAR/team owner
2% with option to 10%	CEO	44	CEO, Board member of multiple large corporations	Business, Finance, network (access to capital), reputation provides credibility and legitimacy
1%	tentatively	77	CEO of Cardio Mag	Scientist

Source: (R. Sloan, email, June 8, 2015).

5: **BestLine's Present Strategy**

When BestLine was founded, they were under the council of an investor that advised the founder to grow the company's value based on its intellectual property. The founder's objective was to increase the valuation as quickly as possible to be able to cash out as quickly as possible. Raising the valuation of the company by building a patent portfolio was decided as a more expedient approach as compared to building a marketing company and increasing the valuation based on expected future cash flows. Prior to BestLine Mr. Sloan had founded a company called Prolong International Lubricants. As the sole possessor of the additive formula, Mr. Sloan was able to file patents on the formulas he retained. The most recent patent filed has been for BestLine's Gasoline and Diesel Engine Treatment that claims to be an effective substitute for ZDDP (R. Sloan, email, July 22, 2015). Building a brand and building sales have been secondary to building the IP portfolio. Sales and marketing have been intended to only legitimize the claims made in BestLine's patents and increase the value of the IP assets. Furthermore, BestLine has chosen to focus more heavily on direct sales for industrial applications rather than marketing for consumer goods sales. BestLine perceives that the value of their IP assets will be demonstrated by the growth of sales relative to the funds injected. While generating profit and eventually paying out dividends is BestLine's obligation, the primary shareholders are not looking to sustain a long-term company. Rather, BestLine's focus is to create brand legitimacy to be able to expedite one of four options:

1. License their technology.
2. Negotiate buyout.
3. Collaborate with a large firm that will take over the marketing and distribution of BestLine products.
4. Take BestLine public.

5.1 IP Strategy

BestLine has sixteen patents filed in the U.S. for its various products as of May 1, 2014 (R. Sloan, email, July 22, 2015). As BestLine is a blender of aftermarket additives, and not a developer of additive constituents, its patents reveal each of the constituents in its additive packages as well as the recommended relative amounts needed for top performance. There are two challenges for BestLine regarding patent filing. The first is to decide when to invest in patent applications where there is sufficient opportunity for growth and risk of competitors copying. As patent filing is a relatively costly process for a small company, the opportunity costs of such applications must be considered. The second is the scope of the claims in the patent. The objective has been to be sufficiently detailed that they can protect their formula in the applications defined, but wide enough in scope to create a robust patent wall around their technology and to simplify potential future continuances (R. Sloan, phone interview, June 4, 2015).

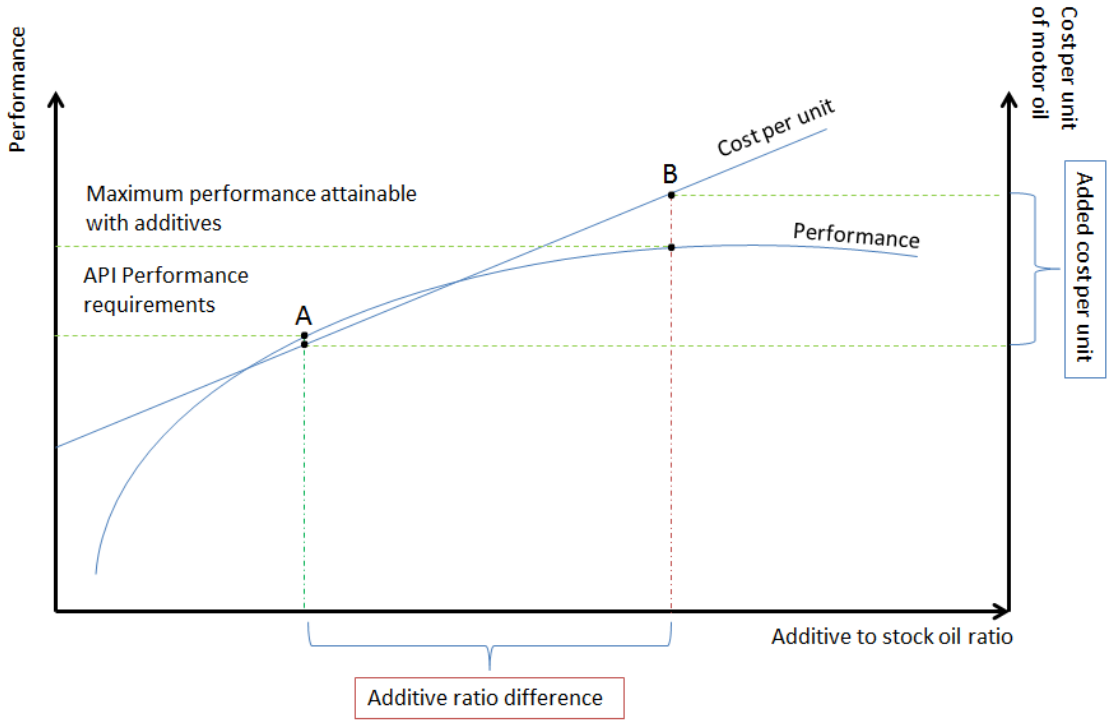
Besides protection from competitors, BestLine's IP strategy is also intended to allow them to sell the rights of each of the patented products independently. For the case of the Diesel Engine Treatment, if there were to be an interested buyer that only needed this particular product to strengthen their product line, BestLine could sell the rights of the one product and retain the rights to their other products. Therefore, patents for each of its products secure its formulas as assets.

5.2 Differentiation

BestLine relies on its proven superior performance to differentiate itself from the competition. BestLine has proven this primarily through third party standard lubricant tests, which motor oils must pass for API certification, to provide evidence that its products have been independently qualified (R. Sloan, email, July 22, 2015). These tests include but are not limited to ASTM tests: CRC L-38 (ASTM D5119), Sequence VIII (ASTM D6709), and Sequence VIB (ASTM D6837), as required by the American Petroleum Institute (API, 2012). BestLine believes that results from these tests provide a competitive advantage as they legitimize their technology as valuable. Furthermore, they believe the disclosure of such information is rare, as such information is, for the most part, not available from other aftermarket additive producers. It further differentiates itself as the only aftermarket additive producer that has patents exposing the

formulas of its products and taking action to protect them from infringing competitors. In general, as described in Figure 4, BestLine has focused on exceeding the minimum performance defined by the API, rather than attempting to demonstrate that their technology, as an additive package, provides the lowest cost solution. In Figure 4, "B" represents the unit cost of BestLine's lubricant and "A" represents the unit cost of a lubricant meeting the minimum API requirements. Specifically, BestLine intends to exploit the recent evidence that their technology is a substitute for ZDDP.

Figure 4.BestLine's additive formula strategy



Source: Adapted from interview with R. Sloan (Phone interview, July 11, 2015)

5.3 Customer-product Targeting

BestLine is focused on building its community of return costumers (R. Sloan, phone interview, June 22, 2015). BestLine believes that to build their brand they must sell their products through distribution channels where they can most easily engage with the customer after the sale,

and to customers that are most likely to be able to confirm and benefit from the quality of BestLine's products. Hence, BestLine has expanded its industrial distribution channels and gives preference to prospective customers that are willing to validate the product as they see fit.

In regards to commercial sales, BestLine has primarily focused on direct sales in commercial fleets, heavy duty industrial diesel engines (including diesel generators) and commercial marine applications (freighters, ferries, tugs). BestLine perceives that these customers are more aware of changes in performance and more sensitive to the cost savings due to changes in performance (R. Sloan, phone interview, June 22, 2015) and, therefore, more able to identify the benefits of a superior lubricant. BestLine also perceives that fleets are more likely to develop into long-term customers with the least amount of marketing and sales representative interaction. Again, BestLine believes this approach to be the most cost effective approach for establishing stable sales, and legitimating their technology with credible customer performance data.

Unfortunately, building sales with such customers may not always be easy or favourable. Such customers likely have higher switching costs as they may have significant sales contracts with other suppliers. BestLine presently only sells aftermarket additives; therefore, their products should not displace the customer's motor oil. Such customers are likely more risk averse to using non-certified engine lubricants as they may have concerns an uncertified lubricant may void their warranty. Finally, such customers are able to impose their purchasing power and make significant demands for extended sales contracts.

Due to the number of incumbents and their established brands in large retail chains and American motorsports, and the capital investment required to stock product in such retailers, BestLine has been hesitant to sell their product through these channels. Furthermore, as BestLine is highly dependent on the superior performance of its product, rather than brand, it is difficult for the consumer to identify which products are actually of superior quality in a retail store as the consumer is limited to the information available on the container. BestLine perceives that online customers have easier access to competing products information and they are more likely willing to provide reviews of their experiences with the product and to provide their personal information to BestLine's after sales engagement program. As a result, BestLine has chosen, for the time being, to distribute their consumer products through online retail stores and directly through their website.

6: **Fulcrum Analysis**

This chapter summarizes BestLine's present strategy and performance within the engine lubricant market. In addition, it will address the challenges BestLine is currently facing, and will face in the future. Assessing BestLine's goals with respect to the external environment, their competitive advantage and their present strategy, suggests there are six key issues to address. First, BestLine has invested heavily in IP that is unusual for its product segment. Since BestLine is trying to attract larger engine lubricant firms to either license their technology or buy the rights to its technology, BestLine should understand who values IP. Second, BestLine has focused on industrial consumers as a primary target to build brand legitimacy and awareness. Although BestLine has seen growth through these channels, it is struggling to grow through passenger vehicle owners, which were identified as the largest market. Since aftermarket additives are neither essential nor easily differentiated to the consumer, BestLine's challenge will be to clearly differentiate its products from the competition and educate the average, likely uninformed, consumer why their engine treatments should be added to certified motor oils. Third, although BestLine is focusing on industrial sales and intends to continue focus on industrial sales, even though it is the most engaged and astute customer segment, they are likely the most risk averse to using uncertified engine lubricants and the most sceptical of aftermarket additives in general. BestLine will need to address these barriers to be able to build legitimacy and gain industry acceptance. Fourth, as BestLine has differentiated itself as having a superior additive package and competition is based primarily on packaging and brand, they provide little transparency to prospective technology buyers or licensers as to their costs of production. As such prospective customers are mostly interested in reducing cost producing motor oils, while meeting the minimum standards, BestLine must be able to show that their technology provides a solution to meet the motor oil standards at the lowest cost. Fifth, BestLine perceives firms producing, or selling, complementary products and services as desirable future partners. For BestLine to capture as much value from such a partnership, it must understand how it should be positioned to attract favourable relationships with such partners. Sixth, as an aftermarket additive, BestLine exists under a label that is not well legitimized and therefore may battle against the general consumer scepticisms and the industry dissuasion against any engine lubricants that are not certified.

Therefore, BestLine must reflect on whether it should continue as an aftermarket additive or whether it should consider a path towards motor oil production.

6.1 BestLine's Value Based on IP

With the resources available, BestLine has been aggressively generating IP to legitimize its formulas and to protect themselves from the risk of future infringements. The challenge is in determining who values IP. There are a few categories of firms that file patents regularly and therefore have an IP strategy and value IP. The firms that do value IP the most are either large motor oil producers, or they are strongly linked to motor oil producers, therefore, the firms that value IP the most are also the firms that are focused on reducing the cost of goods sold, rather than outperforming the competition. It is also worth noting that BestLine is the only aftermarket additive company with filed patents. This is an indicator that BestLine's competitors either license their product, or their products are not at risk of infringement, which can be further interpreted as not having a superior product, or they have decided they are unlikely to lose revenue from a competitor infringing on their formula. This could further re-enforce the generalisation that aftermarket additives are more dependent on their marketing capabilities and their brand equity than on their technology.

6.2 Building Sales through Passenger Vehicle Owners

BestLine's primary customer target is passenger vehicle owners and their product is aftermarket additives that are all unregulated products. BestLine claims in its advertising that its products will increase fuel economy, extend motor oil lifetime, and reduce maintenance costs. Unfortunately, it is difficult for the average consumers to differentiate between BestLine and competing products. The customer must develop their own conclusions through their own method of research and vetting. As customers are often loyal to brands, or are influenced by others' brand loyalty, their decision process is difficult to influence. Even if an aftermarket additive producer provides supportive data and access to patents, a consumer must first decide to look for such information and understand the implications of such information. As BestLine presently lacks the marketing channels and available funds, for BestLine to excel in this space it must do more than attempt to benchmark their marketing methods to the competition. It must be able to build their

brand through innovative marketing mechanisms. Regardless of whether BestLine has a technology that out performs the competition, without strong marketing it will not emerge as a leading product.

As described in Section 2.4, aftermarket additives have had a shaken reputation and the perceived legitimacy of such products has reduced. BestLine branding uses the term “Micro Lubricant Technology” (R. Sloan, personal interview, July 18, 2015) to differentiate its technology. However, although trademarked, other brands use similar language to describe their product (ZMax, 2015). If BestLine is a far superior product to its competition, such similar description will only confuse the consumer and give the perception to aftermarket sceptics that BestLine is the same as the incumbents and has no benefit, or that all products are as effective as BestLine. Therefore, it is essential that BestLine differentiates itself from the incumbent aftermarket additives and prevents the competition from convincing the consumer the products are the same.

6.3 Reducing Barriers to Industrial Customers

As described previously, industrial customers are likely the most sensitive customers to changes in performance and the most likely to observe the effects of BestLine’s superior products. Furthermore, they are particularly sensitive to products that are ZDDP substitutes. Industrial customers are, however, the most hesitant to use an uncertified engine lubricant, as well as the most sceptical of aftermarket additives. Therefore, BestLine must either find a way to certify products for this customer segment, or continue to have to prove themselves to each prospective customer until their engine treatments are widely legitimized. Increased legitimacy will come with increased attention. This could lead to increased positive attention from prospective technology buyers and licensers. Alternatively, this could attract negative attention from the stakeholders that are trying to maintain the legitimacy of engine lubricant standards and certification.

6.4 Attracting Large Motor Oil Producers

As described in previous sections, large motor oil producers have little incentive to produce a product that surpasses the established minimum standards. Such oil producers are

concerned only about pricing and cost of goods sold. Although some motor oils are promoted as being higher performance, and priced accordingly, it is for the consumer to decide the validity of such claims. Such a producer does not need a higher performance additive to promote a product as being higher performance. BestLine, however, has focused on showing that their product outperforms the leading aftermarket additive competitors, and is a solution to the motor oils reduction in ZDDP allowances. Since aftermarket additive products are specialty goods, rather than a commodity like motor oil, there are very few signals from their aftermarket additive sales to suggest to prospective motor oil producers that BestLine's additive package could reduce their input costs. Furthermore, since BestLine does not have a dominant brand, a large motor oil company would not benefit from licensing and packaging their product as having BestLine formula. Therefore, for BestLine to attract such a buyer, BestLine must be able to convince such companies that their products will reduce their cost of goods sold.

6.5 BestLine Buyout to Marketing Company

With few aftermarket additive developers holding patents on their formulas, a history of additive brands growing rapidly with aggressive marketing campaigns, and two prominent engine lubricant companies purchased by large marketing companies, BestLine considers themselves to offer attractive assets for a marketing firm to use to build a profitable brand. Companies emerged in the 1990's with infomercials demonstrating cars driving without oil (FTC Charges Motor Oil, 1999). Since 1975, the FTC has attacked at least eight engine lubricant producers for making unsubstantiated claims, for which none could provide supportive data to their claims. Despite the reprimanding of these aftermarket additive producers, many of these additive producers are still selling their products in retail stores and online.

Unfortunately, as revealed by the IP analysis (refer to Table 8), only one of the investigated aftermarket additive producers hold patents, which suggests that a potential interested marketing firm may not value BestLine's IP as much as other firms. As evident by the history of aftermarket additive producers making false claims of their products, their lack of patents, and the fact that there are no standards to which they must meet, the success of aftermarket additives is often only slightly dependent on the result it will provide, and much more dependent on controlling the perception of the consumer. With so few entry barriers to the aftermarket additive market, and so many aftermarket additive producers already in North

America, for BestLine to grow comparably is not trivial. BestLine will require contribution from other added-value activities, namely marketing and sales.

6.6 BestLine Buyout by a Firm Seeking an Aftermarket Additive as a Complementary Product to their Established Business

With over $300 billion in global sales of automotive aftermarket products in 2013 (Auto Care™ Association, 2014), there is legitimate opportunity in this market for aftermarket additives. Moreover, as part of the "do it yourself" (DIY) automotive aftermarket market, aftermarket auto parts are definite complementors to aftermarket additives. Customers of aftermarket auto parts are likely trying to extend the life of their vehicle, to improve the fuel economy of their vehicle, or to increase the power output of their vehicle. Auto parts retailers are also legitimized as automotive experts; therefore, customers are willing to trust their advice. Unlike large retail stores with wide ranges of consumer goods, automotive focused retailers are likely more able to provide customers with access to more information of the different products and more credible recommendations. Horizontally integrating with an already defined product would enable such retailers to acquire more of the aftermarket additive rents without requiring significant added expertise to manage the new product line. Moreover, if customers in their stores purchase aftermarket additives with little regard to the brand, stocking their own brand would have minimal opportunity costs. As retailers focus on product turnover, BestLine's experience has been that such retailers will not entertain stocking products that have not proven they will sell. Therefore, such a retailer may only collaborate with BestLine once they have demonstrated strong enough sales and growth.

6.7 Is BestLine Most Valuable as an Aftermarket Additive?

BestLine has chosen to sell its technology in the form of an aftermarket additive because of the numerous challenges there are to build a motor oil product; namely cost of certification, rivalry among competitors and much higher capital costs to minimum efficient scale. Unfortunately, due to many environmental effects, even with the growing automotive aftermarket market, the legitimacy of aftermarket additives is not as strong as it once was. Entering the engine lubricants market through aftermarket additives seems the most logical as it has the lowest entry barriers and rivalry among competitors. However, with an unregulated performance and quality

standard, BestLine must overcome the consumer's scepticism and risk aversion to using aftermarket additives.

7: Solution Analysis

Based on the issues Section 6 presents, strategic alternatives have been proposed to address the gaps between BestLine's present strategy and the goals they desire to achieve. These alternatives have been evaluated by weighing the importance of each of the identified goals and then judging them on their perceived effectiveness to achieve these goals (Boardman 2004). The results of this evaluation provide insights as to which strategies are most likely to achieve BestLine's goals.

7.1 Strategic Alternatives

This section will propose and discuss three strategic alternatives. They have been developed based on the challenges Section 6 identifies. The present strategy and the three strategic alternatives are assessed independently by their perceived short and long term implications. This is while considering their cost to implement, the risks of implementation and the perceived resulting value of BestLine's IP. The following strategic alternatives are proposed:

- aggressively pursue industrial consumers by developing a heavy duty engine oil product as a key strategic product for market penetration and BestLine brand legitimation;
- aggressive marketing campaign to retail consumers with current product line; and
- aggressively attract buyers or licensers.

7.1.1 Status Quo

As Section 5 describes, BestLine has chosen a strategy which focuses on strengthening their technology by protecting their formulas with patents. Furthermore, BestLine has focused on industrial customers as their primary target as they are perceived to be the most sensitive to improvement in lubricants and will be reputable advocates for BestLine's products. Finally, BestLine has chosen to operate the business as lean as possible by outsourcing most of their

activities, which minimizes their fixed costs, and avoiding taking on debt and diluting the share value. Table 16 summarizes the perceived implications of BestLine continuing with the present strategy.

Table 16. Implications of the Status Quo Strategy

	Action	**Effects**
Short Term	Grow with conservative spending. Continue investments in IP to strengthen protection of BestLine Technology	Grow with industrial customers that are willing to take a risk with uncertified lubricants, but unable to attract the average customer that purchases primarily on cost.
Long Term	Begin conservative marketing campaign. Consider diversifying into motor oils.	Slow market growth. Limited interest by large motor oil and additive package incumbents.
Cost	Shareholders maintain percentage of company, but share value grows slowly. Growth will be slow and founder may need exit before value of IP is realized.	
Risk	Substitute for ZDDP is developed. Value of BestLine grows slowly.	
Value of IP	Value of BestLine's IP is not realized because aftermarket additives are an inadequate product segment to reveal the advantages for which motor oil producers and additive package developers are searching.	

7.1.2 Aggressively Pursue Industrial Consumers with a Line of Certified Motor Oils

Since industrial customers are BestLine's primary focus BestLine must address both their skepticism of aftermarket additives and their risk aversion to uncertified oils. BestLine can accomplish this by diversifying into certified motor oils for industrial diesel engine applications. To minimize cost, BestLine could develop a small number of oil grades that are most common

and have the oils certified according to the most relevant engine manufacturer's standards. Since BestLine has found customers that are willing to pay the added cost of the aftermarket additive over the base oil they already require, it seems reasonable for such a customer to be willing to pay the combined present cost. Unfortunately, BestLine's profit margins would be significantly reduced as they would be unable to produce the motor oil at the same cost as the larger producers. The challenge for BestLine would then be to maintain the differentiation of its motor oil to the competition such that it is not dragged into the rivalry among the incumbent competitors and forced to compete on price. Although this may not provide immediate returns, it is likely the best approach to legitimize BestLine's technology as a substitute for ZDDP. Once the major manufacturers are aware of BestLine's performance it is conceivable that such engine manufacturers could demand changes to the API oil standard to force other motor oil producers to meet BestLine's performance. This would either force competitors to license the technology from BestLine, or use more expensive additive packages to compete with BestLine. Table 17 summarizes the perceived implications of BestLine aggressively pursuing industrial consumers with a line of certified motor oils.

Table 17. Implications of Aggressively Pursuing Industrial Consumers

	Action	**Effects**
Short Term	Develop a popular HDEO and have it certified for industrial consumers, while deferring further patenting. Develop oil with similar to status quo strategy, focusing on performance, rather than reducing cost.	Increase market share of industrial motor oil. Customers will prefer BestLine's motor oil over their additives, and BestLine will lose its high margin product. BestLine will have to focus on reducing cost of goods sold. This approach will publicly legitimize BestLine's technology as a ZDDP replacement. With the support of large EMA members, they could demand a change to the API standard. BestLine would need to be able to influence the API Lubricants Group to confirm that BestLine has a legitimize technology.
Long Term	With brand legitimacy, aggressively market campaign to passenger vehicle customers.	BestLine's substitute for ZDDP will be legitimized. EMA will demand BestLine's technology, or equivalent, in future API oil standard. Attractiveness for buyout or licensing will increase.
Cost	The cost of developing and selling a motor oil will be capital intensive and BestLine will need to dilute share value or take on debt.	
Risk	• The time to release motor oil may be extensive. Since API is between standards, it may be too late for BestLine to develop a motor oil before the next standard is defined. • This strategy will potentially result in BestLine competing against large incumbents as a commodity, rather than specialty goods. If BestLine has a solution to ZDDP reductions, there will be increased rivalry. • In general, this strategy requires increased financial risk.	
Value of IP	BestLine is protected from rivals and value of IP, as an asset, would increase. BestLine can demonstrate the value of their technology to large motor oil producer incumbents.	

7.1.3 Aggressively Market to Passenger Vehicle Owners with Present Product Line

To build retail sales BestLine must significantly increase investment in marketing and retail sales as it has very little brand recognition. The most common marketing campaigns for such products have been motorsport sponsorships, television advertising campaigns through infomercials and high visibility in retail stores. But, as described earlier, the incumbents have been recognized brands for many years and BestLine will need to move aggressively to compete in the already crowded space. BestLine sponsors a NASCAR driver; however, they do not have motorsports professionals with national recognition ("Automotive," 2015). BestLine has also produced a demonstration infomercial, available online, which is consistent with infomercials of similar products (Dura Lube), but they were unable to generate significant sales from this effort (R. Sloan, phone interview, June 22, 2015). BestLine has a website which demonstrates the quality of the product. However, it is possible to find other product's websites, or videos that demonstrate and advertise similar performance. Therefore, for BestLine to increase consumer retail sales, they must develop brand awareness. This approach could make BestLine more attractive to retail stores and give them increased supplier power. Creating a marketing campaign would be costly, and therefore, with present sales, funding of such campaigns would either require raising capital, taking on debt, or deferring other expenses, or a combination of the three.

To benchmark BestLine to other firms in this market, according to Sports News, Lucas Oil had sales of approximately 150 million USD and they contributed approximately 30 million USD to marketing of their products, 6 million USD was used to have their name on a sports stadium in Indiana ("Ex-trucker Forrest Lucas," 2012). With BestLine's projected marketing budget to be only 14% in the coming year, and 10% the following (R. Sloan, email, July 13, 2015), it seems reasonable that for BestLine to take market share from the incumbents it will need to allocate similar, if not more, to their marketing and sales activities. Table 18 summarizes the perceived implications of BestLine aggressively marketing to passenger vehicle owners with their present product line.

Table 18. Implications of Aggressively Marketing to Passenger Vehicle Owners.

	Action	**Effects**
Short Term	Aggressive marketing campaign for passenger vehicle owners. Delay further investment in IP.	Sales growth and company expansion. Increased sales and brand awareness will increase attractiveness to retailers, and increase rivalry from competition. This strategy will not likely improve BestLine's position to be bought out by a large motor oil company as there still would not be evidence of cost reduction.
Long Term	Diversify into motor oil product line.	With proof of technology, attractiveness to licensers increases. With increased sales and cash flow, an IPO could become a possibility.
Cost	To compete with the incumbents, the marketing campaign would require significant capital, which would need to be by dilution of shares, or by taking on more debt.	
Risk	Consumer retailers may not be responsive to marketing. Significant rivalry by competitors. Increased financial risk.	
Value of IP	BestLine is protected from rivals. Value of IP, as an asset, would increase.	

7.1.4 Focus on Building Attractiveness to Licensers and Technology Buyers

To build buyer or licenser interest the focus must be on catering to their positioning strategy, which is cost reduction. With trillions of litres of motor oil sold every year, if a major oil producer, with greater than 10% market share, can save 50 cents per litre a simple calculation will show that such a company could save more than $20 million in cost of goods sold. For BestLine to legitimize its technology to such customers it would need to have evidence that shows a motor

oil could be produced at a reduced cost while still passing all the necessary certification standards.

With the focus on diesel engine lubricants, BestLine could pursue certifying a diesel engine oil according to the API standard and the most relevant engine manufacturer standards. Then, it could file a patent disclosing the formula and the cost of production. This alternative would legitimize BestLine's technology as the most cost effective additive package, and allow BestLine to attract more industrial customers, rather than trying to pressure commercial fleet managers into putting a non-certified lubricant in their fleet and then risk voiding their warranty. With a legitimized motor oil, BestLine's other additive products would become legitimized or provide the momentum to transition from an aftermarket additive producer to a motor oil producer. Table 19 summarizes the perceived implications of BestLine focusing on building their attractiveness to licensers and technology buyers.

Table 19. Implications of Focusing on Building Attractiveness to Licensers and Technology Buyers.

	Action	**Effects**
Short Term	Enter lowest risk motor oil product line (HDEO) with optimized additive package to minimize cost of inputs. Price motor oil competitively and offer engine treatment as an aftermarket option. Patent the formula to reveal the cost to motor oil producers.	Increase market share of industrial motor oil and legitimize the brand. Increase legitimacy of BestLine's technology as a ZDDP substitute to prospective licensers or buyers.
Long Term	With brand legitimacy, develop aggressive marketing campaign to passenger vehicle customers. Diversify further with increased motor oil product line.	BestLine's substitute for ZDDP will be legitimized. Attractiveness for buyout or licensing will increase. Increased profits will lead to company expansion, shareholder dividends, and pressure for IPO.
Cost	Dilute shares or take on debt to develop, package and certify motor oil product line.	
Risk	• Time to release motor oil may be extensive, and more costly than a high performance motor oil as it requires optimization. Since API is between standards, it may be too late for BestLine to develop a motor oil before the next standard is defined. • BestLine oil may develop the perception as a commodity product, rather than a specialty good, and will need to compete on price against large incumbents. • If BestLine has solution to ZDDP reductions, there will be increased rivalry.	
Value of IP	BestLine is protected from rivals and value of IP, as an asset, increases. BestLine can demonstrate the value of their technology to large incumbent motor oil producers.	

7.2 Goals

To compare the proposed strategic alternatives it is necessary to define BestLine's goals. The following goals have been articulated by the founder. Weightings are provided in Table 20.

- Raise share value.
- Minimize share dilution and debt accumulation.
- Maximize profits.
- Make BestLine attractive to buyers.
- Make BestLine attractive to retailers and complementary product producers.
- Expedite founder's retirement.

Table 20. BestLine's Goals and Weighted Impact

Goals	**Weighted impact**
Raise share value	0.2
Minimize share dilution and debt accumulation	0.2
Maximize profits	0.2
Attract buyers and licensers	0.1
Attract retailers	0.1
Expedite founder's retirement	0.2

7.3 Evaluation

To qualify the proposed strategic alternatives in relation to the articulated goals, a valuation analysis matrix has been used. The analysis considers weight of each goal, as defined by BestLine, and values the impact of each alternative for each goal and computes weighted score for each alternative (Boardman, Vining, 2004).

Table 21 shows that although the status quo strategy is arguably the most suitable for the short term, alternative strategies are likely to be more appropriate in the long term. Based on this analysis, the most compelling alternative is to invest in aggressive marketing of BestLine's present product line to passenger vehicle owners as it is the most attractive for the long term, while also arguably more attractive than BestLine's present strategy. BestLine recognizes that it will need to pivot from its current strategy but the uncertainties and costs of changing now to

achieve its short term goals are sufficiently high to convince them to stay on track. As BestLine has suggested, the present focus is growing sales with as little overhead as possible and then expanding once cash flows are sufficiently high.

Moving towards a focus on marketing to passenger vehicle owners will likely dilute the value of their IP, when considering them as individual assets; however, their value will be realized as protection from future rivalry from competitors.

Table 21. Value Analysis

Goals	Strategic Alternatives			
	Status Quo	**Develop HDEO for industrial customers**	**Aggressive marketing to retail consumers**	**Build attractiveness to buyers and licensers**
Raise share value (wt = 0.2)				
1. Short Run	Low-med	Low	Med-high	Low
2. Long Run	Low-med	High	High	Med-high
Minimize share dilution and debt (wt = 0.2)				
1. Short Run	High	Med	Low	Low/med
2. Long Run	High	Med/High	Med	Med
Maximize profits (wt = 0.2)				
1. Short Run	Med	Low/med	Med	Low/med
2. Long Run	Low	Med/High	High	Med/High
Attract Buyers (wt = 0.1)				
1. Short Run	Low/Med	Low/Med	Med/High	Low/Med
2. Long Run	Low/Med	High	Med/High	High
Attract retailers (wt = 0.1)				
1. Short Run	Low/Med	Low/Med	Med/High	Low/Med
2. Long Run	Low/Med	Med/High	High	Med/High
Founder Retirement (wt = 0.2)				
1. Short Run	Low	Low	Med	Low
2. Long Run	Low	Med	Med/High	Med
1. Short Run	2.6	1.8	3	1.6
2. Long Run	2.2	4.1	4.3	3.7

Valuation: High = 5; Med/High = 4; Med = 3; Med/Low = 2; Low = 1.

8: **Conclusions and Recommendations**

The purpose of this analysis is to assess BestLine Lubricant's present strategy in the context of the perceived opportunity of their Diesel Engine Treatment as a solution to mandated ZDDP reductions in motor oil. This report presents an analysis of the engine lubricant industry in North America to identify the various core activities and competencies within the industry; to identify the different strategic groups within the industry and to identify how companies attempt to differentiate themselves; and to assess the attractiveness of the industry through an Augmented Porter's Five Forces analysis. An internal analysis of BestLine is presented to assess BestLine's current competitive advantages and their sustainability. An assessment of BestLine's present strategy to leverage its competitive advantage is also presented. Based on all the analysis, the author draws the following four key conclusions:

1. BestLine will have difficulties legitimizing its IP as an aftermarket additive producer.
2. For BestLine to strengthen its brand as an aftermarket additive producer, and increase the value of its IP, it must relax its efforts on patenting its technology and direct its investments into marketing and distribution.
3. For BestLine to expand throughout industrial consumers, it must be able to provide an engine lubricant that is approved by API, as well as the prominent engine manufacturers.
4. For BestLine to attract large motor oil producers as licensers, partners, or buyers, BestLine will need to prove that their additive package is more cost effective than the alternatives available today.

Even with this opportunity, as a small, relatively unknown lubricant producer, BestLine is in a difficult industry to take market share as the incumbents have a firm grip on this market. From the analysis in this report BestLine Lubricants current strategy may be appropriate for meeting their goals in the short term; however, to meet their long term goals BestLine will need to pivot and execute a new strategy. Based on the perceived challenges BestLine faces, three strategic alternatives are proposed:

1. aggressively pursue industrial consumers by developing heavy duty engine oil product as a key strategic product for market penetration and BestLine brand legitimation
2. aggressive marketing campaign to retail consumers with current product line,
3. aggressively attract buyers or licensers

Each of the strategies were assessed based on their implications in the short and long term, on the perceived cost of executing these strategies, on the perceived risks of the strategies and on the potential of exploiting BestLine's IP. The strategies were then evaluated by their relative effectiveness to achieve BestLine's goals in the short and long term.

From the analysis conducted, despite the costs and risks, aggressively marketing BestLine's present product line to passenger vehicle owners is the most promising strategy to achieve BestLine's goals, both in the short and the long term. As the present active shareholders BestLine have little expertise in marketing, they will need to finance the marketing campaign through the dilution of shares, or through taking on debt. As engine lubricant producers are investing as much as 20% of sales into marketing, BestLine will need to budget at least that proportion of their projected sales to marketing to build their brand. Furthermore, it is unlikely that executing this strategy will result in an increase in the value of their IP as discrete assets. Rather, BestLine's IP will function to protect BestLine from future rivalry of its competitors.

Appendices

Table 22. Search Code Statement Used to Conduct Patent Searches on the USPTO Website

Code 1	an/(FIRM NAME) and spec/(engine and oil and lubricant) and ttl/(lubrica$ andnot hydrocarbon$ andnot additive$ or "engine oil" or "engine oils" or composition andnot grease andnot "natural gas" andnot fuel andnot coal andnot situ andnot $situ andnot "base oil" andnot "base oils") and apd/$/$/1995->$/$/2015
Code 2	Code 1 + “spec/(engine and oil and lubricant and zinc)”
Code 3	Code 1 + “spec/(engine and oil and lubricant and zinc and diesel)”
Code 4	an/(FIRM NAME) and spec/(engine and oil and lubricant and additive) and ttl/((additive$ or agent or formulation or dispe$ or oxid$ or corr$ or friction$ or deter$) andnot hydrocarbon$ andnot grease andnot "natural gas" andnot fuel andnot coal andnot situ andnot $situ andnot "base oil" andnot "base oils") and apd/$/$/1995->$/$/2015
Code 5	Code 4 + “spec/(engine and oil and lubricant and zinc)”
Code 6	Code 4 + “spec/(engine and oil and lubricant and zinc and diesel)”
Code 7	an/(FIRM NAME) and spec/(oil) and ttl/(base or hydrocarbon or situ or $situ or "base oil" or "base oils" andnot fuel) and apd/$/$/1995->$/$/2015

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