

Filozofická fakulta Univerzity Palackého

*COMPETITIVE FACTORS IN THE BEARING INDUSTRY
POST WWII TO PRESENT
(bakalářská práce)*

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Martina Tomanová

*Filosofická fakulta Univerzity Palackého
Katedra anglistiky a amerikanistiky*

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Autor: Martina Tomanová, Angličtina se zaměřením na aplikovanou ekonomii

Vedoucí práce: Joseph James Ference, J.Dr

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I declare that I elaborated this paper independently and that I mentioned the absolute list of works cited.

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CONTENT

1	INTRODUCTION	3
1.1	<i>Thesis sentence</i>	3
1.2	<i>Methodology</i>	4
2	BEARING HISTORY	5
3	TYPES OF BEARING	5
4	THE GREATEST BEARING COMPETITORS	6
4.1	<i>The Timken Company</i>	6
4.2	<i>SKF (Svenska KullagerFabriken)</i>	8
5	COMPETITIVE FACTORS	11
5.1	<i>Product development</i>	12
5.11	<i>Material</i>	12
5.21	<i>Design</i>	15
5.2	<i>Pricing</i>	18
5.3	<i>Distribution</i>	20
5.4	<i>Promotion</i>	22
6	CONCLUSION.....	25
7	SUMMARY	27
8	ANNOTATION	31
9	WORKS CITED	33
10	NOTES	34

1 Introduction

Although we might not know about it we meet and use bearings in everyday life. You can find sophisticated inventions in cars, aircraft, air-condition, computers, robots and even in dental engines. Any segment of a machine that moves or rotates needs a bearing for a better and lasting performance. Thus, the bearing industry is one of the most important industrial branches in the world.

The aim of this paper is to make an analysis of competitive factors in the bearing industry. It deals in detail with four basic marketing criteria that are able to distinguish one bearing producer from another. The paper starts with a description of the historical development of the bearing. The next paragraphs describe various types of bearings and mention their inventors. The main part of the paper is divided into two sections. The first section is devoted to the introduction of the current greatest bearing competitors—Timken, an American family company, and SKF, a Swedish bearing producer. The second section describes particular criteria that define the competition within the bearing industry market. The marketing mix – product, price, distribution and promotion - was chosen as the most appropriate criteria for the competition analysis from Timken’s point of view.

The data used in this paper mainly refers to the bearing industry issues. All information used for the analysis was obtained mostly from companies’ websites and the biography of The Timken Company¹.

1.1 Thesis sentence

The bearing history dates back to the age of Pyramids in Giza, when Egyptian building engineers first used trees as rolling elements for transport of huge block stones. As mankind evolved the tools also developed and

¹ Pruitt, Bettye Hobbs, Timken: From Missouri to Mars – a Century of Leadership in Manufacturing (Harward Business Press, 1998).

evolved. It led to the formation of a large variety of bearings that differ by the design, the material, the utilization and the producer. This paper represents an analysis of competitive factors that distinguish products in the bearing industry. It deals especially with four marketing mix criteria – product, price, distribution and promotion. The results are demonstrated in two bearing producers – Timken and SKF.

1.2 Methodology

The aim of this paper is to make an analysis of competitive factors in the bearing industry. It should answer the question of how the bearing producers can influence their position in the market place by developing their marketing tools – product, place, distribution and promotion. The objective of this paper is to thoroughly examine and analyze two selected bearing producers and their approaches to the bearing competition. Attention is paid mostly to the main competitive factors within the Timken business policy. It focuses on the product development that is described by material and design development. It also further examines pricing policies, methods of distribution and promotion tools.

In order to be able to do a thorough analysis it was necessary to first conduct a literature search and find important information related to the given topic. The base of the information was acquired from the biography about the Timken Company. Further information was obtained mainly from Internet sources, which included official companies' websites. This was completed with definitions and articles from various journals, newspapers, magazines and reports related to the bearing industry issue, which was publicized on-line. The example companies were contacted via e-mail with a request for data dealing with the bearing competition. None of the asked parties provided the requested information, because they consider it to be their company's secret.

The literature was critically read with the aim to get the necessary information and to come to a conclusion.

2 Bearing history

A bearing is a technical appliance, which permits motion between two parts, typically by rotation or linear movement. It is required for many applications, from heavy-duty use in vehicle axles and machine shafts, to precision clock parts.

The first type of linear bearing was probably an arrangement of tree trunks, which were laid down under sleds. This technology may have its origin as far back as the construction of the Pyramids of Giza, though there is no definitive evidence. Some modern bearings use a similar principle; however, they sometimes use balls instead of rollers.

The first rolling elements of bearings were made from wood. Wooden bearings can still be seen in old water mills. The water plays the role of a coolant and a lubricant. Later, stone, glass and bronze were used as the rolling elements. Stone, for instance, was used in various forms. Remember your old granddad's jewelled pocket watch? The stones were used because of reduction of the frictional load and a smoother running process. At present, there are more sophisticated materials such as ceramic, steel and plastic (e.g., nylon and Teflon) inside of bearings.

3 Types of bearing

The **sleeve bearing** is the simplest rotary. It consists of a cylinder, which is inserted between the wheel and its axle. The sleeve bearing was later followed by the **roller bearing**. The difference between a sleeve bearing and a roller bearing is that a number of cylindrical rollers replace the sleeve. Each roller works as an individual wheel.

A similar type of roller bearing is the **ball bearing**, which uses spheres instead of rollers. An early example of this type of bearing dates back to 40AD. It was found in the Italian Lake Nemi. It used to be a part of a rotating table on a Roman ship. Leonardo da Vinci is said to have also designed a type of ball bearing around the year 1500. There is one problem with ball

bearings. They rub against each other and cause additional friction. Enclosing the balls in a cage, however, can avert this issue. Galileo originally described this solution in the 1600s. The assembling of bearings into a set was not accomplished for many years after that. In 1794 Philip Vaughan of Carmarthen registered the first patent for a ball race that improved bearing characteristics – to keep the ball in the right position. Later, at the end of 19th century, Friedrich Fisher formed the foundation of the independent bearing industry.

The modern design of ball bearings is attributed to Sven Wingquist. In 1907 he founded a company (SKF) producing a ball bearing that has a self-aligning function. An American innovator of carriage manufacturing, Henry Timken, patented the **tapered roller bearing** in 1898. The following year, he established a company (Timken) that produced his innovation. This type of bearing uses conical rollers that run on conical races. Due to a greater contact area they can carry higher loads than a ball bearing. Tapered roller bearings are used as the wheel bearings of most cars, trucks, buses, etc.

Another kind of roller bearing is the **spherical roller bearing**. The term spherical roller bearing means that this bearing uses rollers that are thicker in the middle and thinner at the ends. Spherical rollers are difficult to produce and thus expensive.

Needle roller bearings also use rollers, but they are very long and thin. Due to this fact, the outside diameter of the bearing is only slightly larger than the hole in the middle.

4 The greatest bearing competitors

4.1 The Timken Company

Henry Timken established the Timken Roller Bearing Axle Company in 1899. Due to his patent for tapered roller bearings, his company became well known. At the beginning, Timken was an ordinary carriage-maker although he held three patents for carriage springs. However, his patent for

tapered roller bearings allowed him to become a successful bearing manufacturer.

Tapered roller bearings were absolutely a new invention at the end of the 19th century, because bearings used in wheel axles had not changed much. The old bearings were friction bearings and depended on lubricants. Without the right lubrication these bearings used to fail due to the extreme heat caused by friction. Timken managed to reduce the friction on his bearings significantly. He used a cup-and-cone design incorporating tapered bearings, which rolled. This solution reduced the load placed on the bearings by spreading the weight and load across the cups, cones, and bearings.

As soon as the automobile industry started to overtake the carriage industry, the company moved to Canton, Ohio. It was there that the first steel plant of Timken was opened. This location was chosen due to its closeness to the developing American car manufacturing centres (Detroit in Michigan and Cleveland in Ohio). Furthermore, it was also close to the American steel-making centres of Pittsburgh, in Pennsylvania, and Cleveland. It was to their advantage during WWI when demands for steel were quite high. The reliable supply of steel was ensured to meet the WWI needs that were consuming most of American made steel.

In the 1920s, the company entered the New York Stock Exchange and Timken stock was publicly traded. At that time the company also expanded internationally through new subsidiaries in Canada and France. During WWII, Timken supplied bearings for different military applications. After the war, the company opened its first automated high-volume production-bearing factory in Bucyrus, Ohio. In the 1950s, the company expanded its worldwide manufacturing network and a plant in Benoni, South Africa was then opened. Ten years later, in 1961, the first European plant was opened in Colmar, France to strengthen its position in Europe. In 1966, Timken established a new centralized research and development facility in North Canton, Ohio.

The 1970s were a very successful period in the company's history. At first, Timken invested in automated mass production bearing operations in a newly opened plant in Gaffney, South Carolina. Later on, the company reached its first \$1 billion in sales and the company adopted a more elegant

form of its name - The Timken Company. In the 1980s, the company continued in investing in business development. It built its latest steel mill, named Faircrest, and the company's position in India was strengthened due to investing in a joint venture for bearing production in Jamshedpur, India. Since the 1990s, Timken started to slowly acquire competitive companies. In 1990, it expanded its portfolio by acquiring the miniature precision bearing of the MPB Corporation. Because the company reached \$2 billion in sales in 1995, it began to extend its influence on bearing manufacturing from 1996 to 1997. It obtained factories or established joint ventures in Western Europe (the UK, Italy, the Netherlands), in Eastern Europe (Poland, Romania), in China and in the USA, too. In 2003, Timken acquired The Torrington Company, which was a major bearing producer at that time, as well as the inventor and holder of three patents of needle bearings from 1933. In 2005, the company reached \$5 billion in sales and two years later expanded bearing manufacturing in Wuxi, China.

4.2 SKF (Svenska KullagerFabriken)

Sven Wingquist, a Swedish engineer and an inventor of the first self-aligning ball bearing, established Svenska Kullagerfabriken in 1907. In the beginning, his company employed only 15 people and was producing only hundreds of bearings. Nevertheless, the company started to prosper and a year later SKF opened new branch offices in France and in Germany. Also, new distributors were appointed in Denmark, Finland, Switzerland, Belgium, Austria and Australia. In those days the company had already 100 employees and the production amount was counted in the thousands. In 1908 SKF widened its range with a new product – a thrust ball bearing. The following year a subsidiary – SKF Ball Bearing Co. - was founded in New York and other new agents were allocated to Italy, Japan and Argentina. The company's bearing production doubled.

During the 1910s SKF continued its expansive politics. The company founded a factory in Luton in the United Kingdom, the first SKF factory outside of Sweden. At that time SKF had 32 overseas representative centres,

mainly in Europe, but also in Tokyo, Melbourne and Mexico. SKF opened its first research laboratory in Gothenburg in 1912 to extend the basic bearing range with a new product. The result of the laboratory's effort was the introduction of a new single row, deep groove, ball bearing with the filling slot, so-called Volvo bearing, in 1915. Demand for SKF products began to exceed supply so that the company had to deal with the progressive need of high quality bearing steel. The management decided, after careful evaluation of existing Swedish steel melting plants, to purchase the factory Hofors Bruk. At the end of the decade the company introduced a new product – the spherical roller bearing invented by Arvid Palmgren. This type of strong and self-aligning bearing was developed mainly for railway equipment.

After this very successful period SKF had 12 factories (in Denmark, Norway, Belgium, the Netherlands, Russia, South Africa, etc.), sales representatives in 100 countries all around the world, and approximately 12,000 employees. The product range included spherical, cylindrical and taper roller bearings. Their production achieved a new record of almost 6.5 million bearings per year.

Apart from the bearing production SKF was involved also in car production. In 1926 one of SKF subsidiaries AB Volvo began to produce cars experimentally. This project was so successful that AB Volvo became independent in 1935.

In the following years, SKF broadened its product range with new items. In 1934, production of a single and a double row angular contact ball bearing started. Four years later SKF began to manufacture the Hub Bearing Unit starts, a double row angular contact ball bearing for car wheels. In 1940, SKF engineers invented another new type of a self-aligning bearing designed for heavy axial loads– a spherical roller thrust bearing. The portfolio at that time was comprised of almost all rolling bearing types and accessories such as housings, sleeves, etc.

After WWII, SKF reached great success when its theory for calculating bearing life was confirmed as the ISO world standard. The company also opened two new factories in USA and restarted the production in Schweinfurt and Cannstatt, Germany. In 1957, SKF finished one of the

greatest building projects in its company's history. They opened a new advanced ball and roller factory in Gothenburg.

During the 1960s and 1970s the company strengthened its position as one of the greatest European and world bearing producers. New research centres were built in King of Prussia, USA and in Nieuwegein, the Netherlands. Another rolling bearing factory was established in Poona, India. The group RIV-SKF was founded when SKF purchased two thirds of the shares in the Italian bearing company RIV. The fact that the company consisted of 68 factories and employed 67 000 people forced the top management to establish a group headquarters in Gothenburg. This step enabled SKF to organize administration, increase international co-operation and to co-ordinate manufacturing. SKF further succeeded in strengthening its position as a supplier for the aerospace industry. The company acquired 66% of the shares in Société Anonyme de Recherches de Mécanique Appliquée (SARMA). At the end of the 1970s SKF introduced a new spherical roller bearing of CC design with self-guiding rollers that operate with lower friction than the previous model.

The eighties and the nineties were full of changes in SKF. The company acquired the American bearing producer MRC Bearings, the Austrian bearing company Steyr Wälzlager Ges.m.b.H and the British company, AMPEP plc. SKF also opened a new central warehouse in Tongeren, Belgium, that became a new SKF European Distribution Centre. The Swedish bearing producer entered the Asian continent and established a joint venture, Beijing Nankou SKF Railway Bearings Co Ltd, together with a subsidiary of China Railways. Furthermore, the company introduced the concept of Trouble-Free Operation (TFO) and a new environmental policy. Later on in 1997 the company was certified to ISO 14001, the international standard for environmental management. At that time, SKF launched a completely new rolling bearing - the toroidal roller bearing CARB®. The same success received a new generation of spherical roller bearings called the Explorer Series. At the end of the 1990s SKF launched an Internet based marketplace called Endorsia.com.

In the 21st century the company focused on the improvement of its customer services. This goal was reached by acquiring a Scottish

maintenance engineering consultancy company- Development Engineering International. This century is a time for globalization so, that means that SKF began cooperation with FAG and NN Ball & Roller Inc. They established a jointly owned, stand-alone company NN Euroball Aps- for the manufacture and sale of chrome steel balls. Furthermore, SKF, together with Timken, formed a joint venture in Brazil to produce forged and turned bearing rings. Another cooperation with its market competitors was the signing of an agreement with companies Sandvik, Rockwell Automation, INA and Timken, to share the ownership and use of the e-business market place Endorsia.com. In 2006 SKF, as the first of the major bearing manufacturers, was certified by the health and safety management standard OHSAS 18001. The company celebrated its 100th anniversary by opening three new factories in Asia, one in China and two in Korea. Also, a very important step in the Asian market was an acquisition of ABBA, a manufacturer of linear guides with its headquarters in Taiwan.

5 Competitive factors

Timken and SKF have been very successful companies operating on the international bearing marketplace. In the beginning both companies introduced unique products. Henry Timken entered the American market with a tapered roller bearing while Sven Wingquist introduced a double-row, self-aligning ball bearing in Europe. Two absolutely different products, two different ways of application – there was no room for competition. Timken’s and SKF’s business was very prosperous, however, both companies invested in further research and development of new types of bearings. This resulted in the patenting of a new SKF tapered roller bearing in Europe. Later on, Dr. Palmgren also invented spherical roller bearings. By the late 1920s SKF was manufacturing a variety of ball and roller bearings. Such a strategy was able to offer products that were alternatives to the heavy-duty applications, where Timken bearings typically excelled. Although it may seem to have been dangerous for Timken’s profit, SKF was still considerably smaller than the American producer. SKF’s annual output was only 25 million bearings

against that which Timken manufactured at about 40 million bearings per year, by 1929. Timken management was not worried about its firm's position in international markets, although there was an attempt to divide the bearing business between SKF and Timken.

On the basis of the competition development Timken naturally decided to emphasize its success on customers' needs. Without knowing the "theory of marketing mix" that was officially introduced by E.J. McCarthy in 1960² Timken focused on product development (design and material), pricing, distribution, network and product promotion.

5.1 Product development

The essential element of the whole concept of the marketing mix is the product itself. The definition says, "*Product is a tangible object or an intangible service that is mass produced or manufactured on a large scale with a specific volume of units.*"³

In the beginning Timken introduced a new, original product that was unique in the market place. Later on, when competitors appeared, it was pushed to improve this invention. It means that the company was forced to support development of tapered roller bearings. They focused on the design and the material from which the bearing is made.

5.11 Material

One time, Thomas Alva Edison visited Timken's booth at one of the car shows in Madison Square Garden. He was willing to see and learn about Timken Tapered Roller Bearing. He mentioned a very important thing that influenced further the company's steps of bearing production. "*The bearing is all right in principle and if made with good steel will give a satisfactory*

² McCarthy EJ, Basic Marketing: A Managerial Approach (Homewood IL: Irwin 1960).

³"Marketing mix." *Wikipedia, The Free Encyclopedia* (2 May 2009)

<http://en.wikipedia.org/w/index.php?title=Marketing_mix&oldid=286997152>.

account of itself."⁴ Good quality steel is one of the most important things in the bearing industry. In the beginning, the company purchased material from other steel producers; however, the quality was changing. That led to the decision to establish a program for inspection and metallurgist testing. The program ensured both the testing of supplied material and the experimental work aimed at improving bearing steel. This procedure was very successful and it contributed to the company's excellent credit among customers.

This worked until World War I affected the American industry. The demand for bearings rapidly increased and the company was forced to deal with this problem. Finally, they decided to take their first step in steel production and had a piercing mill built at the Canton plant. On 17 December 1915 the new facility launched its production of seamless tubing, which was necessary for bearing manufacture.

Nevertheless, the mill only partially solved the supply problem. At that time the new technology of electric-arc steel making was introduced, and was named after Paul Heroult, a French inventor. Material produced by this technology had better properties and quality— the steel was finer grained and had less porosity. All of these factors helped Timken management to fix the problem of unsatisfactory supplies of quality steel. In 1917 the four-electric-furnace facility, at that time the largest facility in the country, was opened. Timken became the only American bearing maker with its own supply.

In addition, with a metallurgical research project, the company was better able than ever before to pursue making material-related innovations in its product. It eventuated in experimenting with a new kind of molybdenum steel, the same alloy that the Ford Motor Company was also testing at that time. The Timken family possessed molybdenum mines in Arizona therefore; they were very interested in the investigation results. This alloy steel improved bearing properties so that Timken then adopted a nickel-molybdenum alloy as its basic bearing material.

Between 1926 and 1929 Timken expanded its manufacturing possibilities by four new Heroult furnaces, including one of 100 tons capacity, three open-hearth furnaces, new rolling mills and by supporting

⁴ Lewis, Eugene William, *Motor Memories, Saga of Whirling Gears* (Detroit: Alved, 1947).

facilities, i.e. new chemical and metallurgical laboratories. A new tube mill was built in Canton and a new bearing factory, steel-finishing plant and piercing mill were established in Gambrius, Ohio during 1928 and 1929. At that time Timken had capacity to produce 200 000 bearings per day and 30 000 tons of steel per month.

During the Depression decade Timken decreased financial support for its experimental and developmental programmes but, did not stop them. This resulted in the new and very important development of the Assel Mill. It was designed and pioneered by Walter Assel, chief engineer of Timken's steel division. This new type of tube mill improved and streamlined steel productions final product – seamless tubing – which was more concentric and straighter. After World War II it became the standard technology for making seamless tubing.

Another great turning point came in 1928 with the hiring of Martin Fleischmann, a German metallurgist, as the head of the metallographic laboratory and research program. His group contributed to alloy development. They successfully experimented with graphite alloys so that a new chromium-molybdenum alloy was introduced in 1931. During following years Fleischmann patented a nickel-chromium-molybdenum alloy that featured corrosion-resistant properties. His work became very significant in the early years of World War II. Producers of bomber and fighter planes were looking for alloy steel that could withstand the intense heat inside engines flying in high altitudes. They took advantage of Fleischmann's research and used his 16-25-6 (Super Steel) that completely met their requirements.

In the 1950s Timken already was an important producer of alloy steel with the production capacity of 600 000 tons of steel per year. The fact that practically all of the company's American competitors relied on Timken steel was testimony to the quality of Timken products. After the war there was established a concept of automated, high-volume bearing production, which was suggested by Albert Bergstrom, vice president of engineering. This concept was finally realized in Bucyrus, Ohio about 150km away from the main plant in Canton, Ohio. By this step, Timken became the first bearing

producer in the world who achieved a continuous process from green machining all the way up to the bearing assembly.

Practically every year from the late 1950's through the 1970's Timken put some major new piece of equipment into operation in its steel plants. The main driver for all that investment was the bearing business and the demand for the Timken steel, which gave the company a competitive advantage in the steel industry and opened up new markets for its supply. An example of one new technology is the vacuum-arc remelting that improved the quality of the steel. After installing a new vacuum-arc furnace Timken was able to produce cleaner and higher-strength steel. Finally, the process was considered too expensive for bearing production, but the new material was in demand by the aerospace industry. Later on Timken introduced its first vacuum-degassing unit that produced degassed steel. This product was also very successful and it found its target market. Another innovation in steel making was the continuous casting that was highly supported by Henry Timken himself. The ambitious targets that he had set for the company in continuous casting were not instantly successful, but they were proved attainable in the 1990's due to technical advances. Henry's initiative put Timken on the leading edge of one of the most significant 20th century manufacturing innovations.

5.21 Design

At the beginning there was a unique product design in the bearing market place that was intended for carriage and wagon axles. The use of tapered rollers instead of balls improved load distribution inside the bearing and extended its lifetime. After introducing the first Timken[®] Tapered Roller Bearing, Timken brothers, and later on their engineers, continued to develop and improve bearing properties. During the beginning of the 20th century Timken introduced several design improvements. Most of them were instantly patented. Comparing the first bearing with the one from 1924, and later types, we can see that the design has been significantly simplified as much as possible. Although the size has been reduced the load-carrying

capabilities have increased. It means that the smaller bearing can carry the same load as the larger bearing manufactured 70 years ago.

Another new product, the All-Purpose (APTM) bearing that was designed for rail freight cars, can be recognized as the most significant product of the 1950's. Its introduction permitted a simple conversion of existing railroad axles from plain bearings to tapered roller bearings. The AP bearing was so successful that it celebrated production of the one-millionth piece in 1963. The AP bearing was also in 1977 awarded for its contributions to railroad and industrial applications.

Continuing improvements in bearing life and capacity ratings contributed to making Timken bearings more competitive against other types than ever before. Foundation of a common standard was only the first step in keeping Timken's high quality bearing reputation. Each plant had to be equipped with the required checkout machines, tools and the gauges ensuring the unified level of quality. During this implementation the gauge department in Canton, Ohio developed a taper-measuring machine. It was so precise that it became the taper measuring means of the U.S. Bureau of Standards.

Design does not only represent the appearance of the product, however, it also includes the issue of dimensions. Originally Timken was using inch dimensions for the American market place. If the company wanted to succeed in the European market it had to consider the question of adopting the metric bearing dimensions that were standardized in Europe by the International Standard Organization (ISO). Unfortunately, this decision did not result in instant success at all. The company struggled with implementing the metric dimensions from the very beginning, because the ISO standards (bore and outer diameter size) were based on ball bearing dimensions. This system had general advantages that saved both manufacturers' and customers' expenses. (One type of bearing could be substituted for another without changing the machine design. The same checking tools and gauges could be used for all types of bearings.) Nevertheless, these standards created sub optimal designs for the Timken tapered roller bearing. Moreover the ISO standard did not allow the customer to optimise his design according to load requirements, which was a crucial aspect of Timken's approach to selling bearings. The company tried to offer such bearings, but it discontinued

making ISO bearings until it was convenient for both sides – Timken and its customers. Raymond Tuckey, a sales director, commented on this decision: *“We decided ...it was wrong for us to push bearings with bad characteristics which the ISO bearings have, due to their being designed to bores and O.D.s suitable for ball bearings.”*⁵ In 1960, the ISO acknowledged a mistake and recommended two standards for tapered roller bearings – one in inches and one in metric.

Since that time Timken had been making efforts to convince producers to use tapered roller bearings – to become “tapered roller bearing minded” – while they succeeded in the American industrial market. It was not easy at all because Timken had to compete with other producers (SKF, FAG, SNR) that already had great credit among European customers. The next step that Timken management agreed on was an introduction of the J-Line family of bearings. This new product line included a limited number of standardized bearings intended for high-volume production in sizes larger than automotive wheel bearings. Out of 281 existing bearings came 30 J-Line bearings that were universally acceptable. Later on a new ISO 355 for the metric tapered roller bearing was ratified on the basis of the 30 J-Line concept.

In 1967, Timken introduced a new product – the UNIT-BEARINGTM - suited for automobile rear wheels. The idea for it came out of discussions with automotive customers. Surprisingly the first sale of the UNIT-BEARING was not made in the USA, but in the most competitive place in Europe - in SKF’s Göteborg, Sweden. Volvo, the former SKF subsidiary, purchased the first set of UNIT-BEARINGS and it kept making orders for 30 years. The Rover also ordered the UNIT-BEARING for its Rover 3500 rear axle. This cooperation resulted in Timken becoming the sole supplier of tapered roller bearings to Rover in the 1980’s.

During the 1970’s, Timken introduced several new bearings for various applications. The Hydry-RibTM bearing was designed to improve control of low-level vibration in machine tools that can limit the precision. An important product in the automotive field was the introduction of the

⁵ Pruitt 265.

UNIPAC™ bearing. It could be installed quickly during the manufacturing process so that it reasonably reduced costs.

5.2 Pricing

*“The price is the amount a customer pays for the product. It is determined by a number of factors including market share, competition, material costs, product identity and the customer's perceived value of the product. The business may increase or decrease the price of product if other stores have the same product.”*⁶

One of the reasons why the tapered roller bearing was invented was cost saving. When you used a Timken bearing rather than a plain bearing you saved the energy of your horse, later on of your machine and also, the lifetime of a wagon or a carriage was extended. These benefits made Timken advantageous for the customers who were willing to pay a bit more for more efficient bearings.

In those times the company was producing large amounts of bearings; however, the price was not as competitive as Timken wished. The company could offer some discounts either for greater quantities ordered or for long-term customers. This changed as soon as the company reduced its production cost. The first step in the cost-cutting policy was to make its own steel and improve its machining processes so they would not produce so much scrap. Both goals were successfully accomplished during the 1930's and the company's management was satisfied for some time after that.

In the 1950's, Timken approached the second step of the cost-cutting policy. It was focused upon establishing a new plant in Bucyrus, Ohio. The new facility was designed as an automated production technology that would manufacture higher volumes of Timken bearing for lower production costs. It was an instant success for the company and in the 1960's Timken was stronger than ever in the domestic market. Sustained investments in manufacturing technologies, combined with the success of standardization in bearing applications across a number of industries (559 sizes), made it a low cost producer by a significant margin. Subsequently, Timken shocked the

⁶ "Marketing mix." *Wikipedia, The Free Encyclopedia.*

industry by lowering its prices by 2 to 8% on those high-volume sizes, despite the booming market at that time. Even with the price cuts the company's after-tax-profits were higher than any prior year in the post-World War II era.

After that Timken's strategy of high-volume and low-cost production was so successful in North America that the company decided to implement it in the other company's subsidiaries all around the world. At an Australian Timken company this concept functioned well, however, the established competitors - SKF and Japanese companies - were more prosperous. In Timken do Brazil the Bucyrus concept started to work as soon as political and economic conditions came under control. In South Africa there was primarily a demand for railroad bearings. Timken's strategy worked well until there appeared problems that Timken was not willing to solve. After hiring a young South African engineer, Kendal Brooke, that all changed. He knew the problem specific for Africa and he succeeded in solving it. By virtue of it, Timken founded a new factory in Benoni that enabled further expansion in Zimbabwe, Zambia and Mozambique.

Although Timken was able to offer advantageously priced bearings, it was hard for it to enter the European market. The first reasonably successful project was the Green Light front-wheel bearing designed mainly for the automotive industry. In the beginning Timken started to supply its front-wheel bearings to BMW and Volkswagen- thanks to its two former Timken employees. By the mid- 1960's it was supplying to the entire Germany automotive industry and it was able to supply Timken bearing from a French facility located in Colmar, which was based on the Bucyrus concept.

As soon as Timken fulfilled the Bucyrus strategy it naturally turned back to the policy with benefits that Timken bearings were and still are able to offer. The new types of Timken tapered roller bearings have had better properties that can reduce maintenance and installation costs.

5.3 Distribution

Distribution in marketing mix is defined as, *“the place that represents the location where a product can be purchased. It is often referred to as the distribution channel. It can include any physical store as well as virtual stores on the Internet.”*⁷

Since the establishment of the Timken Roller Bearing Axle Company bearings were distributed on the basis of personal contact with potential customers. This was the only way to convince carmakers to use its tapered roller bearings. They could also discuss customer requirements for specific applications. Timken’s first salesman, Eugene W. Lewis, was a perfect example of the personal customer approach. He visited all the major carmakers, as well as small ones, showing them a sample bearing that he carried in his pocket. He also took the company’s exhibit to the all-important exhibitions and car shows. As an excellent salesman he had the ability to explain the advantages of Timken bearings to both the technical and the general public. A similar policy has been performed during Timken history up to this day. It has been one of greatest advantages to keeping successful competition in the American as well as the world market place.

Only ten years after the company was founded Timken tapered roller bearings entered the British market. Timken granted exclusive rights to The Electric & Ordnance Accessories Company, Ltd. to produce and sell bearings in the United Kingdom, continental Europe and all of the British Empire, except Canada. The company gained a strong position in the American market. The European market was still resisting; however, it changed after World War I. French and German automotive manufacturers were impressed by the performance of Timken bearings under wartime conditions. It was the first step toward establishing Deutsche Timken GmbH in Berlin, Germany, British Timken Limited in the United Kingdom and toward granting a licence to a French manufacturer of ball bearings to produce Timken tapered roller bearings. Later, La Société Anonyme Francaise Timken was established in Paris, France.

⁷"Marketing mix." *Wikipedia, The Free Encyclopedia.*

During World War II Timken maintained the production at British Timken without any problems because there was huge demand. By contrast Timken France was weakened by the war and later occupation. Unfortunately the post-war recovery was not as quick as it was supposed to be due to a new political establishment.

In 1950's the company was a powerful presence in the bearing and steel industry in the USA. It was mainly due to the opening of the high-volume production bearing plant in Bucyrus, Ohio. At that time Timken performed almost miracles to deliver bearings to Ford. On the other hand the company could occasionally afford to stop shipment rather than to submit to Ford's demand for price reduction. The Bucyrus Distribution Centre, that was part of the new plant, enabled the company to meet the requirements of customers by coordinating Timken shipping dates with customers' production schedules. This was the first step of implementing just-in-time delivery policy.

Timken's post-war strategy aimed for international markets. The company opened new subsidiaries in Canada, Australia and Brazil and created a network of agents and distributors all around the world. In 1951 the company expanded its business in South Africa by establishing a new plant in Benoni. In 1961 Timken opened the second plant in France in the Alsatian city of Colmar and strengthened its position in France as well as in the whole of Europe. Until the 1980's Timken focused on extending its own facilities in the USA – in 1971 a new plant for automated mass bearing production was opened in Gaffney, South Carolina. In 1985 Timken invested \$500 million to build Faircrest, the most up-to-date steel mill.

At the end of the 1980's Timken entered the Indian market and invested in a joint venture for bearing production. In the 1990's the company expanded all around the world (the UK, Italy, The Netherlands, Poland, Romania, China and the USA) and thus increased its amount of acquisition and joint ventures. The most important acquisitions in Timken history were in 2003. The company acquired The Torrington Company, a major needle-bearing producer. This step significantly enlarged Timken's product range and expanded Timken's role in the global marketplace. The most recent

advancement in Timken's policy was the establishment of bearing manufacturing plants in Wuxi and Chendu, China and in Chennai, India.

5.4 Promotion⁸

Since the early beginning Henry Timken and his sons knew that one of the most important elements of any successful business is the promotion. They had a new product – the tapered roller bearing – that was able to reduce the load and to increase the speed of the vehicle in which it was installed. However almost no other vehicle producer knew about this invention.

The first step in promoting their product was newspaper advertisement. The early newspaper advertisements emphasized the Timken tapered roller bearing's ability to reduce the load and stress to horses while increasing the speed of a vehicle. There usually appeared horses telling why they prefer Timken bearing to others. (See ads below) These advertisements mainly appeared in popular national magazines (e.g. *The Saturday Evening Post*, *Harper's Weekly*) to affect as much of the general public as possible.

“IT MAKES A HORSE LAUGH to equip his vehicle with TIMKEN ROLLER BEARING AXLES because: His work is made easy. He can do double the work he could formerly. His lifetime is doubled. HIS OWNER LAUGHS EVEN MORE because: The draft on his vehicle is reduced over 50 percent. The earning capacity of his vehicle is doubled. He has the fastest vehicle if not the fastest horse. He has to oil his axles only twice a year.”

“I kick because the wagon I pull is not equipped with TIMKEN ROLLER BEARING AXLES. I have to pull from 3500 to 4000 lbs. And it is killing me.”⁹

⁸ “Promotion represents all of the communications that a marketer may use in the marketplace. Promotion has four distinct elements - advertising, public relations, word of mouth and point of sale.” “Marketing mix.” *Wikipedia, The Free Encyclopedia.*

⁹Pruitt 37.

Another possibility of Timken's product promotion was their taking advantage of industrial exhibitions where the efficiency of the bearing could be presented to the general public. One of those events was the Pan-American Exposition in Buffalo in 1901. There were two wagons loaded with 4,000 pounds of lead bars each and one of them was equipped with Timken axles. The demonstration proved that the Timken-equipped wagon needed only 8 pounds force to start whereas the wagon with ordinary axles required a force of 48 pounds. On the basis of this demonstration the Timken bearing took a gold medal at this exhibition.

In 1911 Timken brothers hired an in-house advertising specialist Edwin Walton to start a strong programme of advertising. Just the following year he launched a sociable, informative newsletter aimed at car dealers and car service men. It was named after the company - *Timken Magazine*. The impact of Timken's advertising cannot be measured precisely; however the Timken product awareness across the general and technical public had increased. It led to the hiring of Timken's own advertising manager and an increased budget for national promotion programme. Later on in 1926 Timken published the *Timken Engineering Journal* that provided technical information. It was intended for potential customers who were considering purchasing and adopting Timken bearings.

The use of magazine ads and the issuing of a company magazine proved to be a very good strategy and a clever investment. Nothing stood against their starting to publish an internal magazine called *The Timken Triangle*, which was followed by *The Trading Post* in 1942, *Timken* in 1960 and *Timken World* in 1993. Throughout Timken's history there also appeared company publications intended separately for American personnel; the magazine was named *Exchange*, and for European staff, *Contact*.

An interesting stage in Timken promotion was a public demonstration of power savings while using Timken tapered roller bearing in different applications. One of these demonstrations was performed in Chicago, Illinois in 1930. Timken wanted to convince railroad customers of its advances in steel technology as well as in tapered roller bearings. The company introduced its locomotive known as the Four Aces weighing more than 355

tons. During the power saving testing three young women wearing high heels had to pull that locomotive only with a rope – surprisingly they did it.

As a result of the Great Depression, Timken was forced to reduce its advertising department from fourteen to four people only. In contrast to the technical department the recovery of the promotion programme was very gradual. By 1936 the advertising staff comprised of ten people.

After recovery from the Great Depression and World War II period Timken refreshed the advertising department and started to promote Timken products once again. As soon as The Timken Company stepped in other markets in foreign countries it had to give more effort to get new customers although all of them knew Timken and its products. A new period of product promotion began. All producers started to offer more than just a product itself but they began to provide more complex customer services. Moreover in the age of the Internet Timken entered the e-marketplace with a website named Endorsia.com; thereby it opened new possibilities for purchasing its products and getting information about them.

At present Timken focuses on a so-called “green” product policy. The company explains that the usage of Timken bearings can save energy and that they do not generate redundant heat. This green programme is evident in Timken’s latest advertising short film named “*Green desert*”.¹⁰

¹⁰ “Green Desert.” *YouTube Broadcast Yourself™* (2 May 2009)
<<http://www.youtube.com/watch?v=32cKjeAOypc>>.

6 Conclusion

The analysis of the competitive factors in the bearing industry has proven that the marketing mix can be considered a company tool for achieving the competitiveness in the bearing marketplace. The chosen object of The Timken Company demonstrated that it was consciously and in some case unconsciously taking advantage of the marketing mix theory. The essentials of business as well as marketing mix are product, price, place and promotion. For the needs of the business analysis a place was substituted with distribution.

The first item of marketing mix is a product that was analyzed from the aspect of product development. One of the most important issues for a competitive product is the material chosen. For bearing production, it is a necessary high quality steel alloy source. In the beginning Timken was buying steel, however, it correctly decided to produce its own material. The other very important part of a good product is the design. In Timken's case it was a unique and innovative design of the tapered roller bearing. So, it may appear that design is the guarantee for successful competitiveness. Unfortunately, it does not work that way. If there is something new, but unique, you have to convince people of its benefits anyway, because people do not like to change anything without a good reason.

The second part of a prosperous marketing strategy is a pricing policy. Apart from product properties a price or subsequent cost saving can persuade potential customers to buy an offered product. Timken was aware of this knowledge and from the very beginning promoted the bearings as energy and cost saving products. Later on when mass production was adopted the real low-cost policy was implemented in pricing.

Another key part of a good competitive strategy is product distribution. The kind of sale the company chose in the beginning of Timken's history was very important. Timken was selling an industrial and highly sophisticated product, the tapered roller bearing, and they chose personal contact for the first step of the sale. The customer was informed about the product personally so that there was instant feedback, which led to

further discussion. On this principle the whole distribution was built up, a network that has been operating up to this day.

The last, but still very important, point in marketing strategy is the kind of product promotion. Such advertising action includes different stages and various expenses. The Timken Company as a bearing industry newcomer made an account for all reasonable ways of tapered roller bearing promotion. In the beginning it put advertisements into national magazines. Later on it started to issue its own company magazines intended for both personnel and its customers. Another successful kind of promotion was presenting the company at industrial exhibitions and car shows. This action is still very prosperous all around the world, because people like to watch and touch displayed products. After the television and the Internet were invented, Timken aimed its promotion programme mainly at these mass media.

The aim of the analysis - to describe the competitive factors in the bearing industry during and after a war period - was reached; however, all of the resources used were not able to characterize the given period thoroughly. It would take more time and require successful cooperation from companies to obtain data, which would fill the gaps.

It is obvious that the Timken brand has been a successful competitor in the bearing marketplace since The Timken Company was established. They managed to survive the Great Depression in 1930 as well as World War II. In my opinion company's success is based on Timken family and their male members that devoted all their lives to the family business. I think this is the most important competitive advantage apart from the marketing mix criteria that were analysed in this paper.

7 Summary

Ačkoliv si to nikdo z nás neuvědomuje, ložiska jsou nedílnou součástí každodenního života moderní společnosti. Buďte si jisti, že všechno co se točí nebo se nějak hýbe má v sobě uloženo ložisko, které zajišťuje dlouhodobě hladký pohyb v dané aplikaci. Pro vaši lepší představu ložiska můžete nalézt na nápravě automobilu, na hřídeli jízdního kola, v pračce, v počítači a dokonce i v zubařské vrtačce.

Cílem této práce je analyzovat konkurenční faktory v průmyslovém sektoru výroby ložisek. Detailně se zabývá čtyřmi základními marketingovými kritérii, která mohou odlišit od sebe jednotlivé výrobce ložisek. V první části této práce je popsán historický vývoj ložisek. Dále jsou uvedeny různé druhy ložisek a jejich vynálezci. Hlavní část této studie je rozdělena do dvou oddílů. První oddíl se zabývá největšími současnými výrobci ložisek, kterými jsou americká rodinná společnost Timken a švédský výrobce ložisek SKF. Druhý oddíl popisuje jednotlivá kritéria, která definují konkurenci na trhu výrobců ložisek. Jako nejvhodnějším kritériem analýzy konkurenceschopnosti byl zvolen tzv. marketingový mix, který zahrnuje výrobek, cenu, prodej a propagaci. Tato kritéria byla definována z pohledu analýzy společnosti Timken.

Údaje, které byly použity v této práci se především týkají otázek průmyslové výroby ložisek. Všechny informace potřebné pro úplnou analýzu byly získány z internetových stránek obou výrobců ložisek a z biografie společnosti Timken.¹¹

Historie ložisek se datuje již od doby, kdy se začaly stavět pyramidy v Gíze. Stavební inženýři zde poprvé využili valivých elementů (kúlů stromů) pro transport obrovských kamenných kvádrů. Postupně s vývojem lidstva se zdokonalovali i nástroje, které lidé používali. To vedlo ke vzniku velké spousty ložisek, která se liší použitým materiálem, aplikací pro niž jsou

¹¹ Pruitt, Bettye Hobbs, Timken: From Missouri to Mars – a Century of Leadership in Manufacturing.

určeny a samozřejmě výrobcem. Tato práce představuje analýzu konkurenčních faktorů, které odlišují jednotlivá průmyslově vyráběná ložiska. Jako kritéria této analýzy byl zvolen tzv. marketingový mix, který se skládá z výrobku, ceny, prodeje a propagace. Výsledky analýzy jsou popsány pomocí předních výrobců ložisek, především firmy Timken a SKF.

Analýza konkurenčních faktorů, které ovlivňují průmyslovou výrobu ložisek potvrdila, že marketingový mix může být považován za důležitý firemní nástroj pro dosažení a udržení konkurenceschopnosti na trhu. Vybraný výrobce, společnost Timken, ukázal, že vědomě i nevědomě využíval a stále využívá teorie marketingového mixu po celou dobu svého působení na trhu s ložisky. Základem úspěšného obchodu a stejně tak i marketingového mixu jsou čtyři prvky: výrobek, cena, místo prodeje a propagace. Pro potřeby obchodní analýzy bylo místo prodeje eliminováno pouze na způsob prodeje.

Prvním prvkem marketingového mixu je výrobek, který byl analyzován z pohledu produktového vývoje. Jednou z nejdůležitějších otázek konkurenceschopného výrobku je vybraný materiál. Pro výrobu ložisek je důležitá velmi kvalitní slitina oceli a tudíž i zdroj odkud je získávána. Zpočátku společnost Timken ocel nakupovala. Na základě opakujících se problémů s kvalitou dodávaného materiálu se výrobce rozhodl vyrábět si svou vlastní ocel. Toto rozhodnutí se později ukázalo jako velmi úspěšné. Dalším důležitým prvkem úspěšného výrobku je design. V případě společnosti Timken se jedná o jedinečný a revoluční design kuželíkového ložiska. Jak se může na první pohled zdát, to samo o sobě je zárukou úspěšné konkurence na trhu. Bohužel to tak v reálném životě nefunguje. Jestliže se na trhu objeví něco nového a jedinečného, musíte nejprve ostatní přesvědčit o výhodách, které plynou z použití tohoto výrobku, protože lidé neradi cokoliv mění bez udání pádného důvodu. To platí i pro ložiska.

Druhou částí úspěšné marketingové strategie je cenová politika. Pomineme-li vlastnosti daného výrobku je jeho cena nebo následná úspora nákladů důležitým faktorem v rozhodování potenciálního zákazníka, zda si

nabízený výrobek koupí a nebo ne. Firma Timken si byla vědoma této skutečnosti a již od začátku kladla důraz na úsporu energie a nákladů při propagaci svých unikátních kuželíkových ložisek. Později, když byla zavedena masová výroba ložisek, mohla společnost zavést skutečnou a fungující nízkonákladovou cenovou politiku v oceňování svých výrobků.

Dalším klíčovým prvkem dobré konkurenční strategie je samotný prodej výrobku. Už od počátků firemní historie bylo důležité, jaký druh prodeje ložisek si společnost Timken zvolí. Protože firma prodává průmyslové a vysoce sofistikované produkty, kuželíková ložiska, vybrala si na začátku prodej na základě přímého kontaktu. Zákazník byl osobně informován o vybraném výrobku. Výhodou tohoto přístupu byla okamžitá zpětná vazba na prodejce a případná diskuse týkající se problému aplikace, v níž mělo být dané ložisko instalováno. Na tomto principu byla vybudována celá distribuční síť společnosti Timken, která funguje až do dnešní doby.

Posledním, ale velmi důležitým, bodem marketingové strategie je propagace výrobku samotného. Správná propagační činnost zahrnuje různě nákladné druhy reklamy. Společnost Timken, jakožto nováček v průmyslové výrobě ložisek, využila veškerých dostupných prostředků pro propagaci kuželíkových ložisek. Na začátku umístila inzeráty do národních časopisů. Později začala vydávat svůj vlastní firemní časopis, který byl určen jak zaměstnancům tak firemním zákazníkům. Dalším velmi úspěšným způsobem propagace (firmy) byly různé výstavy a automobilové veletrhy. Tento způsob reklamy je nadále velmi úspěšný po celém světě, protože využívá zvědavosti lidí, kteří si chtějí vystavený výrobek prohlédnout a tzn. „osahat“. Poté co byla vynalezena televize a internetová síť, se společnost Timken zaměřila na propagaci svých výrobků výhradně využitím těchto masmedií.

Cíl analýzy byl úspěšně dosažen. Autorce se podařilo popsat konkurenční faktory průmyslové výroby ložisek v poválečném období. Bohužel i přes všechny získané informace týkající se dané problematiky nebylo možné toto období podrobně analyzovat. Bylo by zapotřebí mnohem

více času a úspěšné spolupráce s vybranými společnostmi pro získání informací, které by zaplnily prázdná místa.

Je zřejmé, že od vzniku americké společnosti Timken je její značka úspěšným konkurentem na trhu s ložisky. Firmě se podařilo překonat v 30. letech období velké hospodářské krize a stejně tak i bez větších problémů překonala 2. světovou válku. Dle mého názoru, je úspěch této společnosti založen na rodině Timkenů a jejích členů, kteří zasvětili svůj život rodinnému podniku. Myslím si, že toto je jedna z nejdůležitějších konkurenčních výhod, kromě již zmíněného marketingového mixu analyzovaného v této práci.

8 Annotation

Author: Tomanová Martina

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This paper deals with the issue of competitiveness in the bearing industry. The target of the paper is to describe particular competitive factors within the business policy of The Timken Company. It shows the development of separate parts of the whole business to maintain the company's competitiveness. Product, price, distribution, and promotion, which are essential elements of the marketing mix, are analyzed in detail.

Anotace

Autor: Tomanová Martina

Název katedry: Katedra anglistiky a amerikanistiky, Filozofická fakulta

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Tato práce se zabývá problematikou konkurenceschopnosti v průmyslovém sektoru výroby ložisek. Jejím cílem je popsat jednotlivé konkurenční faktory v rámci obchodní politiky americké společnosti Timken. Popisuje vývoj jednotlivých částí celého obchodu tak, aby byla zajištěna konkurenceschopnost firmy na trhu. Detailně analyzuje základní prvky marketingového mixu tj. produkt, cena, prodej a propagace.

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