

The robert bosch gmbh management essay



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The Robert Bosch GmbH with its Automotive Technology division is one of the leading suppliers for the automotive industry. The company emphasizes a long-term oriented differentiation strategy with high quality products. By possessing many internal innovation-related capabilities, a wide network of strategic alliances for technological advances and open innovation as technology sources, Bosch Automotive Technology is already well prepared for future structural changes in the automotive supplier industry. Besides possible acquisitions the company should also focus its research and development activities on important technologies in the future. We create a technology portfolio matrix in order to assess the existing technological capabilities and resources. We observe that lithium-ion batteries as well as gasoline efficiency are essential technological developments which will shape the upcoming business environment. Hence, it is important for Bosch Automotive Technology to enhance its efforts in becoming an early entrant into this promising sales market. Overall, we can state that the differentiation business strategy and the high quality products innovation strategy in the organization match very well and no major strategy shift needs to be undertaken.

Introduction

The invention of the vehicle pulverizes the transportation environment. Getting from one place to another suddenly becomes way more convenient and faster. Today the automotive industry and the related supplier industry are major employers around the world and drive economic growth in many countries. Not only due to limited fossil resources but also because of environmental protection, key players in both industries engage in

developing new technologies and innovations. Recently, many new companies are founded in emerging countries and threaten the dominant position of incumbent organizations like the Robert Bosch GmbH. This is one reason why technological advances and continuous innovations become even more important for them now. It is harder to compete on low costs. Hence, the chosen differentiation strategy is a viable means to counteract the upcoming threat.

In the following we discuss our research approach for this paper, introduce the Robert Bosch GmbH and the automotive supplier market and analyze Bosch Automotive Technology's innovation strategy in depth. After assessing the fit between its technology strategy and its applied business strategy, we conclude with recommendations and a future outlook for the Bosch Automotive Technology division.

Research methodology

We use company reports, documents from the company's website, consultancy reports, academic papers as well as figures to assess the current technological status of the automotive supplier industry and Bosch Automotive Technology. Defining the business environment the company operates in, helps us to analyze its business strategy. Afterwards we identify the most important technologies of the company and map process and product technologies into a matrix on a qualitative as well as quantitative basis. Finally, we evaluate the current situation and derive recommendations for individual technologies and provide ideas for the future technology, business and organizational strategy.

Robert Bosch GmbH

The company Robert Bosch GmbH is founded by Robert Bosch in Stuttgart (Germany) in November 1886. In the beginning its business aims at electrical engineering and mechanics for small parts (Robert Bosch GmbH I, 2012). Starting from 1898 the company expands internationally with its first foreign office situated in London. Quickly afterwards business relationships begin with the United States in 1906 by opening a branch in New York and with China in 1909. The current global sales approach has its origin in the early days of the company as well. Already in 1913 Bosch realizes 88% of its total revenue abroad (Bosch Group, 2012).

If we look at the current scope of the organization, we can easily understand its importance for the German labor market as a major employer and the global automotive industry. Bosch employs over 180, 000 people in Germany and over 302, 000 workers around the world. Germany accounts for €12 billion of the €51. 5 billion of the company's sales in the year 2011. We can identify three major divisions: Automotive Technology, Industrial Technology and Consumer Goods & Building Technology. Each of them is subdivided into smaller business units or sub-divisions. In our work we focus on the Bosch Automotive Technology (BAT) division (Bosch Germany II, 2012).

3. 1) Research and development

In total Bosch spends over €4. 2 billion for research and development which is a share of 8. 16% of the company's revenues (Bosch Germany II, 2012). A large share of it is invested in product as well as process innovations to improve resource efficiency and to foster environmental protection. This is for example especially important for gasoline engines in the BAT division.

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Even though the company does not follow a single innovation strategy it highlights and motivates people to constantly work on inventive ideas (Rotter, 2010). In addition, the amount of 4. 126 patent requests in 2011 further illustrates the weight the company puts on innovation and new technologies (Bosch Germany II, 2012). Hence, this ensures Bosch the leading position in Germany. Key examples for innovative products are the car security systems ABS and ESP (Bosch Germany I, 2012). The former is applied to prevent wheels to block when using brakes in the car and the latter consists of an electronic stability control system which ensures that the car remains stable on the road. All this can only be achieved with competent employees. On a global scale Bosch provides jobs to over 38. 000 researchers which focus on topics like sensors, information technology, production mechanics or energy storage. Out of them 1. 300 are located at the central corporate research center (Bosch Germany III, 2012), (Bosch Germany IV, 2012). The research facilities are spread over the four regions Germany, Russia, North America and Asia Pacific. In addition to the normal research activities these institutions also seek further technology sources by having contact with local universities in order to be informed about the most recent developments in their respective research fields. (Bosch Germany IV, 2012). In addition, research and development board member Klaus Dieterich argues that their long-term cooperation to leading research institutions like the “ Fraunhofer-Gesellschaft” facilitates the constant launch of new products or processes. Furthermore the corporate research center has a tight coupling with the operational business units in order to adapt its efforts to market and consumer needs (Bosch Germany V, 2012). This ensures inter-

departmental communication and collaboration and is a good example for Bosch's internal innovation-related capabilities.

Next, we want to assess some more internal innovation-related capabilities of the organization. According to Gerhard Felten who is member of the management team of the corporate research center Bosch does not only try to hire the smartest engineers in order to stay ahead of competition in the field of technological innovations. But rather the company also engages in measures to create a working environment which supports creativity. On the one hand they ensure the availability of state-of-the-art equipment and on the other hand employees get continuous training as well as space to unfold their creativity. The high amount of motivated doctoral students which are taken care of by current employees in the company eases the employment activities significantly. This argument is strengthened by the fact that 80% of the doctoral students start their career at Bosch; either in research and development or in the various business units (Bosch Germany V, 2012).

Automotive supplier industry

4. 1) Market details

To be able to make profound recommendations about Bosch Automotive Technology's business and innovation strategy we first need to create an understanding for the automotive supplier industry it operates in.

In this market several different kind of suppliers are existent. On the one hand there are large system suppliers with very advanced technologies like the Robert Bosch GmbH and on the other hand we can find small players which only provide simple supplier parts like screws or components.

Nevertheless, both groups are able to work profitable. The few dominant automotive manufacturers exercise significant bargaining power over their suppliers and therefore demand very low prices from them. Hence, product innovations and constant improvements in the supply chain management field are coherent. Furthermore, process optimizations in production and a well-functional new product development concept are essential to them as well. A very important change in the recent past is that manufacturers also initiate research and development collaborations with suppliers and now ask them to manage sub-suppliers. We argue that the German automotive supplier industry is representative on a global scale and the findings in the paper show that only a small percentage of the players focuses on cost leadership. Instead, most companies follow a strategy of having high quality and innovative products. But, very big companies can apply a hybrid approach and use both, cost leadership and differentiation strategies (Lay & Wallmeier, 1999). Roland Berger and Lazard point out that automotive companies exercise a lot of price pressure on suppliers which forces them to engage in aggressive pricing strategies in order to survive (Roland Berger/Lazard, 2010). Due to the previously discussed details about Bosch's size we can infer that the company belongs to the differentiation strategy group.

According to a study conducted by Roland Berger the size of the global automotive supply market is expected to increase from €406 billion in 2010 to €684 billion in 2025. This results in a compounded annual growth rate (CAGR) of 3.3%. Both, powertrain parts and exterior supply components continue to account for the largest share in sales (Bernhart, Hoffmann,

Kalmbach, & Kleimann, 2011, p. 36f). Hence, it could be argued that Bosch should invest more in its research activities related to these two areas.

After a sharp decline in revenue during the crisis which results in around 350 bankruptcies, sales in the automotive supplier industry now reach the pre-crisis level. In general, the market is highly fragmented and the earnings before interest and tax (EBIT) margin is around 6% (Roland Berger/Lazard, 2010). The competitive situation for process-focused segments is nicely illustrated by the following figure.

Figure : Market share distribution per segment (top 5 players and the rest)

Source: Roland Berger/Lazard, 2010, p. 22

In addition, since 2009 companies generate free cash flow again. Nevertheless, we can observe diminishing EBIT margins in each product group after the year 2007. For example, profitability for powertrain supplies shows a decline of 4.8% and electronic components even 4.9% (Roland Berger/Lazard, 2010). Starting from 2010 the profitability situation improves again in all sub-segments (Roland Berger/Lazard, 2011). This financial flexibility can be used to invest in new technologies or to build up further research facilities. Also, BAT may follow an acquisition strategy by purchasing small financial distressed companies. By that Bosch can not only increase its size and bargaining power with automotive manufacturers but it is also able to gain access to new technologies and intangible assets like the personal know-how of employees.

4. 2) Technology and innovation

According to the results of the survey automotive suppliers maintain horizontal research and development co-operations with other suppliers. The focus lies on inventing new processes or marketable goods. But for instance tier-1 suppliers also inherit vertical innovation relationships with manufacturers or suppliers on lower tier levels. Since BAT is a tier-1 supplier which is in direct business contact with manufacturers, we can infer from the study that the company keeps close vertical backwards collaborations. The reason behind it is that Bosch needs to ensure a high quality of the complex sub-products which they use for their own manufacturing (Lange, 2011).

The majority of the technological advances of the last two decades come from Europe and Japan. Important process innovation breakthroughs and today's industry standards are the fixing method for plastic and steel (2004) and concerning product innovations we can refer to the modern hybrid drive (1997), adaptive front spotlights (2003), ESP (1994) and electronic gear changer (2001) (Simon, 2006, p. 365ff).

Roland Berger concludes that in 2025 the situation in the automotive industry concerning powertrains will look quite differently compared to nowadays. This has of course also an impact on the automotive supplier market. The study argues that vehicles with an electric engine make up to 10% of the total sales volume. Whereas hybrids reach a share of 40%, but still the major piece of the sales (50%) is realized with the normal internal combustion engine (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 4).

Lithium-ion (Li-Ion) batteries increase the weight and price of electrical vehicles severely. As a result, technological progress has to be achieved in order to lower both aspects (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 56). As the following figure shows the lithium-ion battery is the current industry standard, but as we discussed before it is important to generate a next generation. Most players follow differing technological approaches concerning electrolyte and cathode (Bernhart & Valentine-Urbschat, Powertrain 2020 - The Future Drives Electric, 2011, p. 44ff).

Figure : Battery technology advances

Source: Bernhart & Valentine-Urbschat, 2011, p. 44

Having a partnership with the battery supplier who is the first to develop a solution, BAT can benefit a lot by this breakthrough and leverage the advantage of being early to the market. Besides, electrified powertrains also demand for new parts and components with an annual market volume between €20 billion and €50 billion. The study also emphasizes that Bosch already invests more in these technologies in order to compete with Asian suppliers. A very important advantage to potential entrants is that Bosch does not need large up-front investments anymore. Bosch Automotive Technology is also involved in a strategic partnership with Samsung. Together they initialize a 50-50 joint venture called SB LiMotive for batteries. (Bernhart & Valentine-Urbschat, Powertrain 2020 - The Future Drives Electric, 2011, p. 70ff).

4. 3) Current trends & future technological outlook

Furthermore, the authors argue that there will be a battle for scarce resources which are needed for the components in electric vehicles (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 12). Hence, this might force automotive suppliers like Bosch Automotive Technology division to intensify its research and development co-operations in order to find more resource efficient solutions.

Roland Berger identifies technological change as one main driver for the automotive supplier market environment. They argue that in 2025 manufacturers need to be supplied with parts and component for normal combustion engines, plug-in hybrid electric vehicles (PHEV), fuel cells and of course electric vehicles (EV). The latter increases the weight of cars significantly and therefore manufacturers and suppliers have to intensify their efforts for light materials. Daimler AG for instance already uses a lot of carbon materials to comply with this challenge (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 33ff). The prospect for PHEV and EV sales are between 8 and 10 million units by 2020 (Bernhart & Valentine-Urbschat, Powertrain 2020 – The Future Drives Electric, 2011, p. 3).

Related to the previous findings another study shows that importance and sales of electrified powertrains increases in the near future. The main reason behind it is the significant cost reductions for batteries which are realized by heavy investments. Batteries are one of the most crucial components for an efficient electric vehicle. As a result, we can observe production overcapacity and a market consolidation for global battery manufacturers (Roland Berger

Strategy Consultants, 2010). These events might also force players to intensify collaboration with other firms.

Another trend is the movement towards digitization. This leaves the opportunity for suppliers to work on their technological progress for electronic-related parts. Furthermore, the authors introduce several requirements for infotainment systems. Firstly, connections need to have enough bandwidth in order to process information quickly. Then, storage capacity has to be increased while the size of the devices needs to decline. (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 39ff). The increased mobile connectivity in cars might have a major impact on the business environment of suppliers. Therefore, BAT's research and development center in Hildesheim is affected as it focuses on Auto-HiFi and navigation system innovations.

The clear trend towards electrification in the automotive industry reshapes the business environment. Currently, suppliers' activities are centralized around parts and components. But, in the future they might expand their business scope and use the opportunity provided by the electrification trend to engage in fields like raw materials or vehicle design (Bernhart, Hoffmann, Kalmbach, & Kleimann, 2011, p. 57). Consequently, Bosch Automotive Technology might have to adapt its research and development activities, build up new competences and hire specialists who are able to cope with the new required technologies.

Overall, due to financial pressure exercised by manufacturers another study suggests that automotive suppliers invest heavily in new technologies and

innovations in order to differentiate themselves from competitors (Roland Berger/Lazard, 2011).

Bosch Automotive Technology (BAT) division

5. 1) Key figures and business strategy

Being the world's largest automotive supplier, the division is sub-divided into 9 business units. These are Gasoline Systems, Diesel Systems, Chassis Systems Control, Electrical Drives, Starter Motors and Generators, Car Multimedia, Automotive Electronics, Automotive Aftermarket and Steering Systems (Bosch Kraftfahrzeugtechnik I, 2012). BAT has a global footprint with over 160. 000 employees worldwide (Bosch Kraftfahrzeugtechnik II, 2012).

In 2011 the division makes sales of €30. 4 billion and accounts for 59% of the total aggregate revenue of the Bosch Group. The business outlook for ABS, ESP, navigation systems, fuel-saving injection systems, gasoline direct injection system or parkpilot parking assistant is very positive. There are several strategic partnerships with other companies. The EM-motive GmbH is a joint project with Daimler AG and concentrates on technological advances in the field of electric vehicles. Indeed, the joint venture now even sells electronic motors. SB LiMotive Ltd. produces lithium-ion batteries and successfully tests them with automotive manufacturing companies.

Unfortunately, the Chassis Systems Brake sub-division has problems. Parts of it are integrated in another sub-division and the rest is sold to interested companies (Robert Bosch GmbH II, 2011, p. 42). All together the division's EBIT amounts to €2. 33 billion in 2011. This is especially interesting as the Industrial Technology division has a negative EBIT (Robert Bosch GmbH II, <https://assignbuster.com/the-robert-bosch-gmbh-management-essay/>

2011, p. 51). We might argue that the Bosch Group should reconsider its research and development expenditure distribution.

Bosch Automotive Technology follows a business strategy of high quality and technological leadership. Furthermore the company emphasizes financial sustainability, cash flow generation and continuous investments in innovations. (Robert Bosch GmbH II, 2011, p. 45). Hence, the research and development spending should not be decreased in order to comply with the company culture and beliefs. Rather investments should be focused on technologies which secure stable cash flow. Referring to the three generic business strategies by Porter, we can state with confidence that BAT applies a differentiation strategy (Porter, 1998). The group also delegates responsibility to its regions and divisions (Robert Bosch GmbH II, 2011, p. 46). This argument leaves BAT a certain degree of flexibility when making decisions about investments in future technologies.

5. 2) Technology and innovation strategy

In total, Bosch Automotive Technology has research and development (R&D) costs of €3. 27 billion in 2011 (Robert Bosch GmbH II, 2011, p. 73). This amounts up to 78% of the Bosch Group's R&D spending and is also a good indicator for internal technology resource assessment.

We can assess BAT's internal technology resources by looking at the number of patents. The division is in a leading position in terms of patent requests on a domestic, European and even worldwide level (Bosch Germany I, 2012).

Here we want to introduce the concept of regime of appropriability by Teece. According to him, the concept states that legal protection and the

technology itself define the company's ability to exploit the created innovation commercially (Teece, 1986). Hence, due to the many patent we can infer that Bosch operates in a tight appropriability regime and should be able to realize profits from technological advances. Bosch group hires more than 4. 300 research engineers worldwide so it can be assumed that BAT also benefits by increasing man power in its labs (Robert Bosch GmbH II, 2011, p. 46).

The key research area in BAT is defined as technological advances to enhance driving systems. The division is convinced that further investment is necessary as the internal combustion engine remains the most important drive concept. So, innovations in the research areas of fuel efficiency like for instance injection technology and the reduction of emissions are needed. Investing over €400 million in hybrid and electric vehicles in 2011, the company emphasizes its long-term orientation. In addition to these efforts, BAT also collaborates with automotive manufacturers in this field as a further technology source. Overall, the innovation strategy of Bosch Automotive Technology clearly aims at an early market entry and a leading position with high quality products. An additional research focus is the field of digitization and connectivity within the cars. The " web-based electro mobility platform" in Singapore underlines this argument (Robert Bosch GmbH II, 2011, p. 47). Creating the Bosch Mahle Turbo Systems GmbH & Co. KG, the company intensifies its efforts in gasoline direct injection technology to improve fuel efficiency. One reason is the expected sales increase by 300% within three years. In 2013 the joint venture plans to sell 7 million turbocharger units which enables significant downsizing (Robert Bosch GmbH II, 2011, p. 76f).

Hence, we can identify a process innovation focus on vehicle efficiency which should also be one of the main innovation strategy focal points.

In the following we want to discuss some research facilities related to the BAT division in more detail. Firstly, the one at the corporate headquarter in Stuttgart, Gerlingen-Schillerhöhe. Here researchers work on fundamental research projects related to automotive technologies. In contrast, employees in Schwieberdingen, Germany, pay attention to systems and production technology whereas the clear focus in Waiblingen lies on everything connected to processing synthetic substances (Bosch Germany IV, 2012). This is essential to the company's products as many parts are made out of plastics but need to withstand heat, pressure or humidity in cars for instance. Lastly, the branch in Hildesheim, Germany, has a reputation for its many Auto-HiFi and navigation system innovations (Bosch Germany IV, 2012). Nevertheless, BAT also has research and development centers in Asia like for instance in Changsha, China (Robert Bosch GmbH II, 2011, p. 78f). Despite this fact, we can argue that Bosch rather follows a concentration strategy in terms of its research and development facilities until now.

In contrast to this rather closed innovation approach as technology sourcing, the Robert Bosch GmbH also applies the concept of open innovation and takes advantage of lead-users or creative customers by offering a communication and exchange platform. The company maintains contact to suppliers and customers and encourages them to submit ideas to improve processes or even to develop new products (Bosch Worldwide I, 2012).

Bosch's open innovation platform offers chats, videos, the latest ideas as well as news and of course it provides a highly interesting network for

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registered users (Bosch Worldwide II, 2012). Furthermore, consumers get clear guidelines and requirements before they can submit technological concepts (Bosch Germany VI, 2012). By these methods the company makes the private innovators feel needed, ensures customer loyalty and lets them contribute to the firm's future success.

The “ Genesis” program is used to work together effectively with partners. It starts already in the early phase of the development process and helps to improve processes, reduce costs and especially it fosters joint knowledge creation (Robert Bosch GmbH II, 2011, p. 71). The program can therefore be considered as an internal innovation-related capability to manage the existing and future know-how within the BAT division.

5. 3) Strategic technology development projects

In this section we shortly want to introduce three of the main technologies BAT should focus in the future. Firstly, the joint venture between Bosch and Samsung. The former has deep knowledge about the automotive industry and the latter is experienced in working with lithium-ion technology.

Together they aim at a leading position in this market segment by selling their independently developed and manufactured batteries (SB LiMotive I, 2012). It inherits three R&D centers in South Korea, United States and Germany (SB LiMotive II, 2012). At SB LiMotive over 900 employees focus on technological advances for the lithium-ion battery (Robert Bosch GmbH II, 2011, p. 75). The unique concept behind this strategic collaboration is that the company provides energy storage solutions which then are incorporated in BAT's powertrain systems for electric vehicles (SB LiMotive III, 2012).

The second technology is interrelated with SB LiMotive as it focuses on powertrain electrification. Products vary from power electronics over chargers to even motors. Besides, Bosch is also able to provide complete systems and modules for electric vehicles. Its global engineering footprint ensures Bosch Automotive Technology to respond quickly to changing demands in the different markets. Overall, 1. 000 employees are active in this field and collaborate with automotive manufacturers. As a result, a parallel hybrid system is incorporated in the new model of Porsche Cayenne S Hybrid around the world since 2010 (Bosch Automotive Technology, 2012).

Thirdly, the process innovations developed by Bosch Mahle TurboSystems play key roles in future technological advances. The objective of the joint venture is to reduce the carbon dioxide emissions significantly by exploiting the benefits of the exhaust gas turbocharger (Bosch Mahle TurboSystems I, 2012). The company already now works on future concepts to improve efficiency of the gas turbocharger and enhance the charging technology (Bosch Mahle TurboSystems II, 2012).

5. 4) Technology portfolio matrix

As a matter of fact, Bosch Automotive Technology has too many different technologies in the respective business units that we can't include all of them. Instead of only aiming for one type of innovation, Bosch engages in research and development activities to enhance process (examples are gasoline direct injection systems or parking assistant systems) and product innovations (for instance vehicle electrification or lithium-ion batteries).

Hence, we focus on the ones which we consider to be most important for the future success of the company. In addition, our selection is compromised by

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the available information about existing technologies. For instance, there is no indication of how R&D expenditure and research engineers are divided among business units or from which division the over 4. 100 patents on the Bosch Group level come from. Still, the goal of most innovations is environmental protection and resource efficiency.

We therefore create our technology portfolio matrix according to the following two axes. The horizontal axis describes BAT's current technological know-how for each field of innovation. Indicators for it are the time of involvement in these technological areas, investment expenditure or other given hints in the previously analyzed information sources. Especially, the paper by Kuhlitz provides us with some in depth knowledge about BAT's technology experience from which we can draw conclusions about the current technological situation for the respective technology (Kuhlitz, 2011). In contrast, the vertical axis of the matrix shows the future sales potential and the strategic importance for Bosch Automotive Technology's future business development. Here, we also use quantitative data and qualitative descriptions from our cited information sources to define the position of each technology. As there is no detailed overview about the business units' profitability or sales volumes, we do not include it and as a result the size of the circle describing different technologies remains the same.

In conclusion, we don't argue that the matrix is comprehensive and certainly some points are a matter of argumentation of course. Still, the following table gives a detailed overview about the underlying data for our technology portfolio matrix.

Figure : Qualitative and quantitative data for the technology portfolio matrix

Source: Own analysis aggregated from several sources

This table leads us to the following technology portfolio matrix for Bosch Automotive Technology with four different strategic options. We will give more detailed examples for possible action later in this paper.

Figure : Technology portfolio matrix for Bosch Automotive Technology

Source: Own creation

Integration of technology and business strategy

Having analyzed the existing technologies, BAT's innovation strategy and also the company's business strategy we can now evaluate the fit between them. The clear focus on technological leadership in each product group, the emphasis on high quality and the continuous R&D investment in future technologies characterize the innovation strategy of Bosch Automotive Technology. This approach perfectly fits with the followed differentiation strategy. Furthermore, the division always aims to enter early into new markets or collaborates with leading companies in the respective fields. As a differentiator it is important to stay ahead of competition and to capture profits from its developed technologies early. Therefore we can state with confidence that the huge investment in research and development support BAT's business strategy in a stringent way. In addition, the firm's efforts in hiring the smartest engineers and the close collaboration with doctoral students ensure long-term success in technological advances. The working environment with free time to exploit the employees' creativity is also

beneficial to its business strategy of differentiation. In addition, we can argue that the quite centralized R&D departments facili