



BOARD REPORT

Volkswagen AG

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PREPARED BY

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Executive Summary

Terms of reference: VOLKSWAGEN AG (VW AG) known internationally as the Volkswagen group, is a German multinational automotive manufacturing company headquartered in Wolfsburg, Lower Saxony, Germany. **RENAISSANCE Consulting** will evaluate, prioritise and provide strategic recommendations towards the urgent issues encountered for the Board of Directors.

Prioritisation and Focus

| Issues (<i>5 highest, 1 lowest</i>) | Urgency | Financial Implication | Ethical Implication | Score | Ranking |
|--|---------|-----------------------|---------------------|----------|---------|
| Strategy, Structure and Cost Optimisation | 4 | 4 | 3 | 3.7 | 2 |
| Strategic sourcing of cobalt in Africa | 3 | 2 | 4 | 3.0 | 5 |
| E-Mobility Strategy | 4 | 4 | 2 | 3.4 | 3 |
| Product Portfolio Rationalisation | 3 | 4 | 2 | 3.0 | 4 |
| Paris Accord and Environmental Legislation | 4 | 4 | 4 | 4.0 | 1 |
| <i>Weighting</i> | 40% | 30% | 30% | Out of 5 | |

KEY RECOMMENDATIONS

By considering factors such as financial impact, operational impact, and ethical implications, the key recommendations are summarised below in order of priority.

1. Invest a capital sum of €19,500 million in building a new modular electric drive matrix (MEB) technology
2. Continue producing the volume segment albeit with a low-cost approach, centralize only decisions involving important economies of scale and decentralizing everything else,
3. Outsource its EVB production to Panasonic while working on building its own manufacturing plant to mass manufacture its own batteries for the long term.
4. Evaluate the performance of each of the brands of the current portfolio based on profitability/brand scale and liquidate weak brands.
5. Shift focus from Cobalt suppliers to EVB suppliers and exploring new technology such as battery recycling; nickel and solid-state battery technology for the long term.

Volkswagen AG SWOT Analysis

[See Appendix 1 for Industry Analysis]

| | | | |
|----------|---|----------|--|
| S | <ul style="list-style-type: none">▪ Strong global presence in 153 countries. It was the world's largest automaker by sales in 2016, retaining that title in 2017▪ Well diversified umbrella portfolio of 12 key brands.▪ Largest brand in China (the leading automotive industry) by sales.▪ Massive employee pool of 642,000 (as at 2017).¹▪ Trusted by millions of people for its German engineering quality.▪ Operates in markets with strong economic stability | O | <ul style="list-style-type: none">▪ Increased moves by governments to embrace electric vehicle technology▪ Increasing development of electric vehicles and self-driving technology▪ More partnerships -with local players especially- and restructuring, partnerships have helped VW AG grow in China▪ Increasing purchasing power of customers in developed markets²▪ The thirst for innovation is stronger than ever.▪ Emerging countries are claiming an increased share of the global automotive market |
| W | <ul style="list-style-type: none">▪ The diesel scandal of 2015 significantly dented the reputation and image of the brand.▪ Reduced operating profits due to compliance issues. VW AG has paid heavily in fines, penalties, and restitution for regulatory issues.▪ Low market share in the United States automotive industry, which is the second largest automotive industry in the world.▪ The higher end cars of VW AG have powerful emission-producing engines, hence, not environmentally friendly | T | <ul style="list-style-type: none">▪ Growing taxes on luxury vehicles³▪ High volatility in oil prices which affects petrol/diesel▪ More (time-consuming) test procedures for determining pollutant and CO₂ emissions (WLTP)▪ Fast changing customer preferences causing older models to become obsolete▪ People turning to healthier alternatives such as cycling for short distances▪ Transition to emission-free mobility (requiring huge capital expenditures) will become a global requirement.▪ Increasing vehicle-sharing and ride-hailing programs⁴ |

1. PARIS ACCORD AND ENVIRONMENTAL LEGISLATION

The new wave of emission regulations in the West as well as in China and Asian countries requires that road engines be lower than 99gCO₂ km⁻¹ which is far below the current average across all VW AG car ranges. Failure to comply with this regulation will result in a fine of €600 million per annum.

VW has three alternative lines of action/options given the situation at hand:

1. Invest a capital sum of €19,500 million in designing brand new engines and building new modular electric drive matrix (MEB) technology platforms
2. Invest a capital sum of €11,750 in modifying the current range of engines and building new modular electric drive matrix (MEB) technology platforms
3. Take no action

¹ Through its TOGETHER - STRATEGY 2025, VW AG hopes to position itself as an excellent employer of the future.

² According to 2017 data from the International Monetary Fund (IMF), **based on purchasing power**, China boasts the world's largest economy, with 23,122 billion current international dollars. The U.S. comes in second with 19,362 billion. India, Japan and Germany follow with 9,447 billion, 5,405 billion, and 4,150 billion, respectively.

³ Rodney, M. (2016), "Luxury cars could be the government's best friend", *The Conversation*, 14 February, available at: <http://theconversation.com/luxury-cars-could-be-the-governments-best-friend-54557> [accessed 8 April 2019]

⁴ Services like Uber and Lyft have brought a secular change to the world of transportation, offering far cheaper travel alternatives to owning a car, especially for city-dwellers. [Source: Lizzy, G. (2018), "Cramer: Ride-sharing is killing car sales—and it's only going to get worse", *CNBC*, 8 March, available at: <https://www.cnbc.com/2018/03/08/cramer-ride-sharing-is-killing-car-sales-and-its-going-to-get-worse.html> [accessed 24 April 2019].]

Evaluation of Strategic Options

| | Option 1 | Option 2 | Option 3 |
|---|---|---|--|
| Capital Cost (See Appendix 7) | <ul style="list-style-type: none"> Capital Expenditure: €19,500 million NPV: € (2,744.48) million IRR: -3% | <ul style="list-style-type: none"> Capital Expenditure: €11,750 million NPV after adjustment for fines: € (1,382.89) million IRR: 8% | <ul style="list-style-type: none"> No Capital Expenditure incurred. NPV of profits: € 3,698.34 |
| Implication | <ul style="list-style-type: none"> MEB technology platform developed can accommodate any changes required to meet current and future tightening of legislation and manufacture electric vehicle engines. From an ethical standpoint, this is a credible investment as it will ensure that the VW AG cars are in line with regulations demands as well as the firm's goal to ensuring a sustainable environment as stated in its 2017 annual report. | <ul style="list-style-type: none"> MEB technology platform developed can accommodate changes required to meet current and future tightening of legislation. However, some of the more powerful models would still be over the threshold. Though a cheaper financial option, this alternative does not fully deliver on ethical standards as some of the VW AG cars will still default on the environmental regulations front. | <ul style="list-style-type: none"> No MEB technology will be developed. Fines will be incurred, and profits will be eroded due to the fines. This alternative does not meet up with the ethical standards of business. It requires that VW AG cut corners to make a profit by bypassing regulatory laws and exporting cars with high emission engines to Africa. |
| Outcome | <ul style="list-style-type: none"> Though an expensive option, this will protect the goodwill of VW and will help ensure that there is no recurrence of such scandals as the diesel issue. Following through with this option will also exempt VW from the €600 million fine. This option is in line with the goal of VW to be a role model for environment, safety, and integrity.⁵ | <ul style="list-style-type: none"> This may seem relatively cheaper on the surface but will result in VW still liable to the fines. The MEB platform developed will be unable to produce electric vehicle engines resulting in additional costs for the firm in the long term. | <ul style="list-style-type: none"> Taking no action is highly unethical and will negatively affect the goodwill of VW and consumers trust for the brand. This option fails to deliver on VW's future program goals. |

The implication of these options can further be analysed from a business ethics perspective using Tucker's 5 Question Model

| Tucker's Questions | Option 1 | Option 2 | Option 3 |
|--------------------|---|---|---|
| Is it profitable? | No, the project's estimated returns is unable to cover its cost and it also has a negative IRR. (However, potential profits | No, given that fines will still be incurred erodes the profit potential of this investment. | Yes, this is because fines will not be incurred as emission standards will be bypassed. |

⁵ As part of its TOGETHER-STRATEGY 2025, Volkswagen Group hopes to be "a role model in environmental protection, safety and integrity"

| | | | |
|---|--|---|---|
| | from sales in the US were not put into consideration.) | | |
| Is it legal? | Yes, this option is in line with the regulation set by the Paris Accord. | Yes | No, this will require the firm to bypass laws. |
| Is it fair? | Yes, this option is fair to both the customers, environment and company. Its fairness to the company is that it is in line with the company's TOGETHER-STRATEGY 2025, which is to be a role model for environment, safety and integrity. | No | No |
| Is it right? | Yes | No | No |
| Is it sustainable or environmentally sound? | Yes, implementing this project will lead to the production of more environmentally friendly cars. | Yes/ No, Yes because some of the cars will be environmentally sound, and No because of the ones that will be still above the emissions threshold. | No, cars sold will be above the emission threshold which is not environmentally friendly. |

Recommendation and Implementation:

We recommend that VW AG adopt option 1 - Invest a capital sum of €19,500 million in building a new modular electric drive matrix (MEB) technology. Given that Option 2 will still incur fines as some engines will be above the regulation's threshold and that Option 3 is highly unethical, Option 1 remains the most viable alternative for VW AG.

It should also be noted that there exists an opportunity for VW AG to benefit from potential sales in the US which is likely to increase profitability. The US despite existing the Paris Accord is expected to enact stricter emission regulations which the development of the technology Option 1 delivers will be able to cover.

2. STRATEGY, STRUCTURE AND COST OPTIMIZATION

Whilst the supervisory board is settled on the categorization of the 3 new segments, a fierce debate has ensued within the management board regarding the best long-term competitive and global decentralization strategy around these 3 segments, as well as the related cost optimization of the resulting strategy.

A) THE BEST LONG-TERM COMPETITIVE AND PROFITABILITY STRATEGY

The board is contemplating ditching the volume segment in order to meet the 6.75% operating margins target or even consider other options to enhance its profitability long-term.

Assumptions:

1. The average operating margins of volume segment across the industry (not just VW AG) is generally low (below 5%), hence an industry-wide problem
2. The luxury car market is expected to grow at a CAGR of 11.51% while the volume segment growing at a CAGR of 3.4%⁶

Let us further look at external factors (the market), to determine if this is a company problem or an industry-wide problem.

⁶ Statista (2018), 'Global luxury car market size from 2010 to 2018', available at: <https://www.statista.com/statistics/281574/size-of-the-luxury-car-market/> (accessed 20 February 2019)

| Volume Segment Market | Luxury Segment Market ⁷ |
|--|---|
| <ul style="list-style-type: none"> Smaller vehicles account for more than 30 percent of global sales and could reach more than 30 million vehicles in 2020.⁸ By 2020, more than 60 percent of this market would be in emerging economies, where sales are set to grow 5 to 6 percent a year. (See Appendix 4) The market is characterized by huge sales volume and low marginal profits. The costs associated with mandated content are on the rise while prices are expected to remain low. Global profits in the entry segment category will rise an estimated 3 percent a year, to a total of EUR 7 billion in 2020. | <ul style="list-style-type: none"> The three German players BMW, Audi and Mercedes-Benz account for approximately 80% share of the global luxury car market. As per the February 2018 sales reports, BMW is the second largest luxury car player in the United States, behind Mercedes-Benz. BMW clocked sales of 28,330 vehicles in November while Mercedes-Benz recorded sales of 31,022 vehicles⁹. In 2018, this market was sized at around 495 billion euros.⁶ |

Evaluation of the Broad Two (2) Options

| OPTION 1: Continue production of the volume segment | OPTION 2: Cease production of the volume segment |
|---|--|
| Financial Analysis¹⁰ | |
| <ul style="list-style-type: none"> Lower average gross margin of 26% Huge overhead costs bring down gross profit to 21% of sales revenue | <ul style="list-style-type: none"> A reduction in sales revenue by almost 40% Higher average gross margin of 35% A reduction in direct factory overheads by 51% will boost gross profit (30% of sales revenue) |
| Risks | |
| <ul style="list-style-type: none"> Increasing expenses will further push the margin down to a lower level. Low profitability lowers investors and shareholders' confidence Competition in the volume segment will be intense in emerging markets as local players are expanding. | <ul style="list-style-type: none"> VW AG losing its overall founding purpose and identity Refocusing on a more lucrative target market (and hence customer) poses a lot of pitfalls—brand risk, confused positioning, competitive actions, etc The luxury car market is saturated already with Mercedes-Benz and BMW taking the lead¹¹ |

Recommendation

Although financial analysis shows that the production of the volume segment currently impedes VW's profits, it is the entry segment that offers the next set of growth opportunities, especially in emerging markets¹².

⁷ This refers to both the premium segment and super premium segment of VW AG

⁸ Detlev M., Nicolai M et al. (2013), 'The road to 2020 and beyond: What's driving the global automotive industry?', *Mckinsey Report*, 1 September, available at:

https://www.mckinsey.com/~media/mckinsey/dotcom/client_service/Automotive%20and%20Assembly/PDFs/McK_The_road_to_2020_and_beyond.ashx (accessed 9 April 2019)

⁹ PR Newswire (2018), 'BMW, Audi and Mercedes-Benz Account for Approximately 80% Share of the Global Luxury Car Market' available at: <https://www.prnewswire.com/news-releases/global-luxury-car-market-assessment-2018--bmw-audi-and-mercedes-benz-account-for-approximately-80-share-of-the-global-luxury-car-market-300767403.html> (accessed 15 February 2019)

¹⁰ Calculated from the 2018 forecast financial data provided in the case study

¹¹ Autocar (2018), 'Mercedes-Benz beats Audi and BMW as world's top premium car maker', 8 January, available at: <https://www.autocar.co.uk/car-news/industry/mercedes-benz-beats-audi-and-bmw-worlds-top-premium-car-maker> (accessed 1 April 2019)

¹² Detlev M., Nicolai M et al, (2013), 'The road to 2020 and beyond: What's driving the global automotive industry?', *Mckinsey Report*, September, available at: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-road-to-2020-and-beyond->

Making a small car buyer happy can translate into strong future business - an average of nearly 53% will purchase their second vehicle from the same manufacturer, R.L. Polk data shows. These trends present a solid growth opportunity for VW AG's volume segment, especially in emerging markets.

The volume segment also helps VW AG to meet environmental and road engines (mpg) regulations.

For a successful, long-term future need to get key strategic decisions right in the next decade; **it is recommended that VW AG should continue producing the volume segment; albeit with a low-cost approach e.g., offshore development facilities or a lean product portfolio, addressing the mainstream needs of consumers in this segment.**

VW AG should implement a low-cost business model, such as a limited number of body types based on one platform and a lean sales approach with a limited offer (reduction of models of the same brand) range due to generalization.

Partnering with regional players will also help VW AG to win in the volume segment. Moreover, having a local presence offers the chance to venture into promising adjacencies, such as the Chinese aftersales market which is estimated to reach nearly EUR 100 billion by 2020¹².

B) TO CENTRALIZE OR NOT TO CENTRALIZE?

VW AG wants to centralize the various functions (R/D, investment, production and sales strategies) of each brand under the three new segments (volume, premium, and super premium) as against the formerly 12 independent subsidiaries. Herbert Diess has proposed that for each of the groups 5 global geographical markets/regions, the same approach should be followed.

The potential benefits must be weighed against its likely costs to assess carefully the situations in which the centre genuinely adds value and those in which it does not.

| Potential Benefits | Likely Costs |
|---|---|
| <ul style="list-style-type: none"> ▪ Cut costs through economies of scale by consolidating processes and functions, which also saves time and improves efficiency for the company.¹³ ▪ Drive stronger financial performance from the centre with respect to internal transactions. ▪ Decreased redundancies by streamlining its internal processes. This will also significantly reduce administrative costs. ▪ Faster decision making (since fewer people are involved). ▪ Better portfolio decisions because they aggregate information about the whole portfolio (of the segment) at the top ▪ Having lots of detail—down to a very low level—united by a single vision | <ul style="list-style-type: none"> ▪ Constrained ability to tailor products and services to specific brand characteristics. It is inherently difficult for the same R&D division to work for both Polo Classic and SEAT and produce maximum results.¹⁴ ▪ Increased bureaucracy as employees are mere implementers of decisions made at a higher level ▪ It could make brand employees less motivated since they would lose authority over activities they considered important. ▪ Discourage adaptiveness and agility in the face of fast-changing markets ▪ Reduced creativity and individualization. The success of functions like engineering, product design, and sales hinges on the motivation and creativity of their professionals ▪ If done badly, centralized product management could lead to delays, additional costs, and uncompetitive products. |

Recommendation

Countervailing forces push in both directions. But the gains of centralization, in this case, is not worth the pain it could cause.

[whats-driving-the-global-automotive-industry](#) (accessed 9 April 2019).

Entry segment here refers to first time car-buyers. These cars are mostly populated in VW AG's volume segment

¹³ Research from the nonprofit organization APQC shows that centralized organizations have manufacturing costs that are about 3 percent lower than decentralized companies.

¹⁴ Under the new categorisation of the three segments; Polo Classic (VW brand) and Skoda both belongs to the volume segment.

Currently, in the industry, it's less about cost-cutting. It's really about speed and innovation because VW AG is really getting new competitors from everywhere, from the tech companies, from new emerging nations like China.¹⁵

Moreover, centralization and decentralization need not be considered mutually exclusive.

The Volkswagen Group is recommended—and will get the benefits of both—to centralize only those decisions involving important economies of scale and decentralizing everything else. This will require separating design and engineering facilities for brands within the same segments while sharing platforms, powertrains, and purchasing.

Centralisation should be done to compensation and benefits policies, product design standards, quality assurance methods, fraud reporting procedures, financial reporting systems, and the likes as these rules are meant to align the operating units with the company's overall objectives, and make the business more predictable.

A company of that size cannot steer everything from Wolfsburg. For the 5 global geographical markets/regions, the same approach should be followed.

C) COST OPTIMIZATION

| | High | | | Medium | | | Low | | | Total S |
|-----------------------|------|-----|--------|--------|-----|--------|-------|-----|--------|-------------|
| | S | P | Avg. S | S | P | Avg. S | S | P | Avg. S | |
| Cost of Sales | 4.0% | 0.2 | 0.8% | 1.5% | 0.4 | 1% | 0.25% | 0.4 | 0.1% | 1.5% |
| Admin Expenses | 5.0% | 0.1 | 0.5% | 3.0% | 0.4 | 1% | 0.60% | 0.5 | 0.3% | 2.0% |
| Selling costs | 5.0% | 0.2 | 1.0% | 4.0% | 0.3 | 1% | 0.60% | 0.5 | 0.3% | 2.5% |

S= Savings, P= Probability, Avg = Average

The cost optimization should be implemented with respect to the recommendations made to the centralisation above. Cost of sales (procurement, direct factory overheads), for example, will be sufficiently optimized, as procurement is recommended to be centralised across board.

3. E-MOBILITY STRATEGY

Volkswagen is behind in the electric car race with Tesla firmly in the lead. Volkswagen has planned to manufacture and sell 3 million all-electric cars by 2025. But in 2013, the board shifted its focus away from e-mobility to fuel-efficient combustion engine technology leading them to break their agreement with Panasonic, their previous EVB (Electric Vehicle Battery) supplier. Now, VW is looking for a new supplier to produce the EVB combined with the best development strategy.

OBJECTIVES

- To select the most suitable supplier for the EVB, who can meet the strategic goals of the company.
- To decide on what development alternative would best fit the company's production targets.

EVALUATION OF DEVELOPMENT ALTERNATIVE

Determining Factor Priority Score

We'll need to first determine what factors are most important to consider in deciding the most suitable development alternatives for Volkswagen.

High Priority Factors

| Factors affecting choice | Factor Priority Level | Reason for Factor Priority Score |
|--------------------------|-----------------------|--|
| Time to market | 3 | If VW is to reach its goals by 2025, it must not sacrifice on its speed of delivery. Given that Tesla already produced 350,000 cars in 2018 while VW produced only around 50,000 within the same period. ¹⁶ So there is a lot of catching up to do. |

¹⁵ Saheli R. (2016), 'One day pretty soon, your car will be as smart as your phone', *Mckinsey Report*, 4 August, available at: <https://www.cnbc.com/2016/08/04/tech-and-auto-companies-will-face-competition-from-insurers-and-repairers-to-supply-smart-cars-and-their-gadgets.html> (accessed 9 April 2019).

¹⁶ Michael, J. (2019), "Tesla reports record production numbers in 2018", *Quartz Membership*, 2 January, available at: <https://qz.com/1513166/> (accessed 25 March 2019)

| | | |
|-----------------------------|---|--|
| Confidentiality | 3 | The quality and range of EVB is the primary differentiating factor amongst EV producers, and so these trade secrets must be kept to protect the of the company's advantage over the competition |
| Internal Competency | 3 | In order to gain that edge VW critically requires over its competition, it must invest heavily in hiring necessary electric-vehicles-competent talent and developing ground-breaking technology that would improve the quality of its batteries while driving costs lower than the industry benchmark enabling mass adoption. ¹⁷ |
| 3rd Party Capabilities | 3 | If VW invents the best EV batteries but the suppliers lack the skills required to manufacture them for the final consumer, it becomes a serious bottleneck for the company. |
| Price Sensitivity | 2 | Based on research conducted comparing the highest selling EV of 2018 to their prices, a correlation score of -0.2677 was discovered. ¹⁸ This indicates a weak correlation between the price of the EV and its demand, therefore it has a low-price sensitivity (See Appendix 3). Although the EVB contributes 50% of the total cost of the vehicle, VW should be willing to spend more if necessary, to prevent stalling its market share acquisition attempts. |
| Customer Ownership | 2 | The supplier might be producing the batteries, but VW takes full responsibility for the entire car and so to avoid any risks to its reputation, VW must take full ownership of the relationship with the final customer. |
| Complementor availability | 1 | There is little value that can be added to mutual customers by a complement product/service of another company |
| Centrality to whole product | 1 | The EVB is the core component on the electric vehicles but irrespective of what development alternative we choose, this fact will not change. |
| Development Independence | 1 | Same as above |
| Critical to performance | 1 | Same as above |

| DEVELOPMENT ALTERNATIVES | | | | | | | | |
|---------------------------|-----|-----------|-----------|-----------|-----------|----------|-----------|-----------|
| FACTORS AFFECTING CHOICE | F.P | Make | Acquire | Partner | Outsource | Contract | License | Reference |
| Central to whole project | 1 | 2 | 2 | 2 | 1 | 1 | 0 | -2 |
| Critical to performance | 1 | 2 | 2 | 1 | 1 | 1 | 2 | -2 |
| Third party capabilities | 3 | -2 | 2 | 2 | 2 | 2 | -2 | 2 |
| Development independence | 1 | -2 | -2 | 1 | 1 | 1 | 1 | 1 |
| Internal competency | 3 | 2 | -1 | -1 | 1 | -1 | -1 | 0 |
| Confidentiality | 3 | 2 | 1 | 1 | -1 | -1 | 1 | -1 |
| Complementor availability | 1 | -2 | -1 | 0 | 2 | 2 | 2 | 2 |
| Customer "Ownership" | 2 | 2 | 2 | 1 | -2 | -2 | -1 | -2 |
| Time to market pressure | 3 | 2 | 1 | 1 | -1 | 0 | -1 | 0 |
| Price Sensitivity | 2 | 2 | 2 | -1 | 1 | 1 | 0 | 0 |
| TOTALS | | 20 | 18 | 13 | 6 | 2 | -6 | -2 |

F.P= Factor Priority, Weighted Score = F.P*Score provided in the case study, [TOTAL] = Sum of weighted scores

Evaluation of Top Development Alternatives

¹⁷ With its future program TOGETHER – Strategy 2025, the Organization hopes to develop battery technology as a new core competency

¹⁸ Roland, I. (2018), "China NEV Sales for 2018", *evolumes.com*, 15 February, available at: <http://www.ev-volumes.com/> [accessed 25 March 2019]

| Development Alternatives | Make | Acquire | Partner | Outsource | Contract | Licence | Reference |
|--------------------------|------|---------|---------|-----------|----------|---------|-----------|
| Total Weighted Score | 20 | 18 | 13 | 6 | 2 | -6 | -2 |
| Rank | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Evaluation of Supplier Alternatives

| Supplier Option | Financial Impact | Operational Impact | Product Impact | Risk |
|-------------------|--|---|---|---|
| Panasonic | <ul style="list-style-type: none"> Highest savings per EVB unit: offering a price 10.85% lower than the average cost offered per unit.¹⁹ Could potentially save €185,25m over the next 3 years relative to the average cost offered per unit. | <ul style="list-style-type: none"> Offers Just-In-Time inventory management which would allow VW to save 12.96% in inventory requirement and reduce working capital requirements up to €4.42bn yearly (See Appendix 6) 3-year contract is a relatively short duration | <ul style="list-style-type: none"> Offers the highest quality EVB. Offers decent battery range. Battery lifespan is the same as all other suppliers. | <ul style="list-style-type: none"> Possibility of product designs and specifications leaking to rivals, Tesla given the fact that both parties have a more invested relationship. Relatively low maximum capacity per annum might put a lid on growth in the long-term. Panasonic's production capacity will not be able to cover VW's demand after the year 2023, therefore the option of a long-term partnership is off the table. |
| Supplier 2 | <ul style="list-style-type: none"> 8.57% lower than the average cost offered per unit. Potentially save 146.25m over the next 3 years relative to the average cost offered per unit | <ul style="list-style-type: none"> Does not offer JIT which means VW would have to tie down more working capital into inventory. Highest maximum capacity amongst all the suppliers, capable of supplying twice the need volume by 2025. | <ul style="list-style-type: none"> Lower than average battery range and quality, might put the EV produced by the company at a disadvantaged position against other competitors. | <ul style="list-style-type: none"> Short-term contract might lead to production stall if the supplier decides not to renew the contract after its expiration. Short term contract might also give supplier higher bargaining power to negotiate less favourable deals during renewal talks. The average quality battery might lead to reduced customer satisfaction. |
| Supplier 3 | <ul style="list-style-type: none"> 2.86% higher than the average cost offered per unit. Potential increase costs by €48.75m over the next 3 years above the average cost. | <ul style="list-style-type: none"> Does not offer JIT which means VW would have to tie down more working capital into inventory. Length of contract provides VW a level of financial stability as prices are locked in while still offering a break clause, if during the partnership, the supplier becomes | <ul style="list-style-type: none"> Above average EVB quality. Offers decent battery range. | <ul style="list-style-type: none"> Relatively low maximum capacity per annum might prove to be a problem in the long-term. |

¹⁹ where the average cost offered per unit is €437.5

| | | | | |
|-------------------|---|---|--|--|
| | | unreliable. | | |
| Supplier 4 | <ul style="list-style-type: none"> ▪ Highest costing EVB units: offering a price 14.29% more than the average cost offered per unit. ▪ Increased cost for shipping will cost the company €9.75m extra over the next 3 years.²⁰ ▪ Potentially increasing costs by 253.5m over the next 3 years.²¹ | <ul style="list-style-type: none"> ▪ Offering JIT inventory management system which would save warehousing costs and increase working capital. ▪ High maximum capacity per annum ensures that the supplier can deliver over and above production goals. | <ul style="list-style-type: none"> ▪ Above average EVB quality. ▪ Offers decent battery range. | <ul style="list-style-type: none"> ▪ The 15% increase above average total cost per unit, might be too high to achieve profitability on each EV unit. ▪ The contract offered by the supplier spans over a period of 5 years and includes a no break clause, this might pose a problem if the supplier becomes unreliable. VW might have to pay a hefty fee as dictated by the contract. |

Strategic Options Available

After the evaluation of Volkswagen's current situation, it is evident that the company must make decisions that would have effects on its immediate EV efforts and on long term goals of producing 3 million EV by 2025. From the assessment of both the supplier options and the development alternatives; here are the possible strategies Volkswagen can choose from going forward in the production of its batteries.

Short-Term Options

1. Outsource EVB supply to Panasonic
2. Contract Panasonic to produce EVB
3. License

Long-Term Options

1. Joint Venture with Panasonic
2. Setup Manufacturing plant to make own EVB.
3. Acquire Supplier 2 to produce batteries

Recommendations and Implementation

Short-Term Recommendation

We recommend VW to adopt *outsourcing* its EVB production to Panasonic has its short-term plan specifically over the span of the 3-year contract.

Here are the reasons we recommend this:

- This will allow VW to gain access into the EV market and allow them to start competing with Tesla to gain market share before Tesla gains a strong foothold of the market.
- Outsourcing its production would also give VW room to majorly focus on the *research* of batteries with longer lifespans and ranges, to increase its competitive advantage, without having to worry about the other logistics involved.

Long-Term Recommendation

We recommend VW work on building its own manufacturing plant to mass manufacture its own batteries, during the 3 years it's contracting to Panasonic. Here are the reasons we recommend this:

- Panasonic's maximum production capacity per annum will not be able to satisfy VW's demand after 2023.
- Because of the large volume of electric vehicles, VW is hoping to manufacture in the coming years, VW can save on the cost of production of each unit based on economies of scale, at the same time giving them complete control over its supply chain.

²⁰ where the average Shipping cost per unit is €6

²¹ where the average total cost per unit is €443.50

Using Tesla's Gigafactory has a benchmark, we can extrapolate VW's future possible outcome if they go ahead to build their Gigafactory.

| Gigafactory Feature | Tesla | VW |
|----------------------------|--|---|
| Factory Output | Tesla forecasts an annual output of 1.5 million EV batteries from Gigafactory 1, at the end of the factory's construction by 2020. | VW requires an output of 6 million EV batteries by 2025 |
| Factory Construction Costs | Tesla in partnership with Panasonic plans to invest \$5 billion into the construction of its Gigafactory. | Construction costs is estimated at \$20 billion (€17,684,500,000) based on Tesla's costs to output 1.5 million EV batteries. |
| Cost Savings | Tesla targets cut in the cost of battery prices by as much as 30% by the end of the factory construction. | Under the same circumstances, the cost of producing its batteries would be down to €306.25. And VW would save a total of €3,740,625,000 in battery production costs between 2020 and 2025 |

Assumptions

| Issue | Assumption |
|--------------------------|---|
| EVB Energy | Each EVB consumes 31.9 kWh of energy. Based on the average of the top 10 selling cars of 2018 |
| Savings from Gigafactory | Assume that the production savings from building the Gigafactory don't increase based on economies of scale. The savings are relative to the average cost offered per unit €437.5 |
| Exchange Rate | Current Dollar to Euro exchange rate as of April 12, 2019 |

4. PRODUCT PORTFOLIO RATIONALIZATION

Research shows that year after year, businesses earn almost all their profits from a small number of brands—smaller than even the 80/20 rule of thumb suggests²². From the 1st quarter financial results, VW AG generates 80% to 90% of their profits from fewer than 20% of the brands they sell, while they lose money or barely break even on many of the other brands in their portfolios - especially the volume segment

| Margin Analysis (2018) | Volume | | Premium | | Super-premium | |
|-------------------------------------|--------|--------------|---------|--------------|---------------|--------------|
| | Q1 | Yr. Forecast | Q1 | Yr. Forecast | Q1 | Yr. Forecast |
| % of total Direct Factory Overheads | 70% | 51% | 13% | 23% | 18% | 26% |
| % of Gross Profit | (1%) | 6.2% | 8% | 46.6% | 93% | 47.1% |
| % of Total Gross Margin | 26% | 16% | 9% | 41% | 64% | 43% |
| % of Sales Value | 38% | 40% | 28% | 34% | 34% | 26% |

Volkswagen Group need not get trapped on a growth treadmill, chasing multiple market opportunities, some of which they have no hope of gaining an advantage. Instead, they should be clear-minded about what they do best, develop a solid value proposition and build distinctive capabilities that will last for the long term.

Evaluation of Strategic Options

²² Nirmalya K. (2004), 'The Right Way to Kill a Bad Brand' *Harvard Business Review*, 1 December, available at: <https://hbswk.hbs.edu/archive/the-right-way-to-kill-a-bad-brand> (accessed 6 February 2019)

| Strategic Options | Benefits | Financial Impact | Risks/Drawbacks |
|---|--|---|---|
| Using the BCG matrix (See Appendix 2), VW should divest the poor dogs-e.g SCANIA and MAN - and harvest the cash cows. | <ul style="list-style-type: none"> This will spot opportunities for VW AG and helps draw attention to the investment needs | <ul style="list-style-type: none"> It will boost profitability, at least, for the short term. | <ul style="list-style-type: none"> Market share and industry growth are not the only factors for profitability. It denies synergies between the different units |
| Evaluate the performance of each of the brands of the current portfolio based on profitability/brand scale and liquidate weak brands. | <ul style="list-style-type: none"> This will present a united portfolio that has fewer, highly-differentiated and more-valuable brands. VW AG can use the resources they've freed to make their remaining brands better and more attractive to customers | <ul style="list-style-type: none"> VW will boost profits by deleting loss-making brands. Long term profitability is guaranteed as only brands with high potential value are retained. | <ul style="list-style-type: none"> Sales volume and revenue may slow down If VW discontinues some brands, customers might discontinue their affiliation with VW and defect to or another competitor. |
| Only cease the production of strict-loss-producing vehicles and allow the large and diverse collection of brands. | <ul style="list-style-type: none"> Having a large number of brands increases the odds that a customer will choose to buy one of theirs. The sum of the 12 brands is greater than its parts. | <ul style="list-style-type: none"> Having several brands in the same category can suffer VW from diseconomies of scale, as well as further increasing potentially hidden costs. Marginally profitable brands would also be left, hence impeding profits | <ul style="list-style-type: none"> This does not provide a long-term solution as more brands could still be potentially chock-a-block with loss-making. Brands cannibalize each other's sales (and overlap), which inevitably leads to failure. |

Recommendation

VW will improve performance by deleting not just loss-making brands but also declining, weak, and marginally profitable brands. We hereby recommend that they follow Strategy 2. Even though revenues may fall in the process, brand deletion will provide a shot in the arm for an additional reason—hidden costs (due to portfolio complexity) will decline when they reduce the number of brands they sell. The new brand portfolio, which will be more simplified and valuable, also reduces costly managerial resources.

Implementation Strategy

Step 1- Performing a Brand Audit: Senior executives from marketing headquarters, heads of region and the management board meet to conduct the brand audit. Each executive has a worksheet that lists all the brands in the company's portfolio, their global market shares, annual sales, and other such data in tabular form²³. (See Appendix 5)

This will reveal the fistful of brands in the company's portfolio that has clearly differentiated positions or have global market shares greater than 1%, shifting the justifying of the performance of pet brands.

This audit makes the need to prune brands apparent throughout the organization and serve as a springboard to the next step.

Step 2- Pruning the Portfolio: VW AG should choose to retain only brands that meet both of the following criteria:

Brand Power: the brand is—or has the potential to become—number one or number two in its market. The brand should also foster synergies between business units. STARS such as Audi and SKODA (See Appendix 5) for example, meet both of this requirement

Brand Scale: the brand is big and profitable enough—even if it was not a global brand—to justify the investments that the company would make in attempts to keep up with **disruptive mobility** such as

²³ We could not compute this due to unavailability of (coherent) market data from credence sources.

electrification, connected vehicles, shared mobility, and autonomous vehicles.²⁴ For instance, SEAT, although not a global brand like Golf, still has a chance to scale due to its strength in Europe and other regions.²⁵ The other brands in the portfolio should be marked for deletion.

Step 3- Liquidating Brands: After identifying all the brands they plan to delete, executives need to re-evaluate each of them before placing it on one of three internal lists: merge, sell, or milk (in order from the most complex to the simplest to execute).

Merging Brands: When the brands targeted for elimination have more than a few customers or occupy niches that might grow in the future. VW should transfer the product features, attributes, the value proposition, or the image of the marked brand to the (most similar) one they plan to retain. This should be done around the same time they drop the brand, not before or after.

Selling Brands: VW should choose to sell brands that are profitable, but they do not meet the 'brand power' criteria. Brands that also contribute low value to the Group or doesn't maximize the company's capabilities (such as Ducati) should be put on the block.

Milking Brands: Some of the brands that are marked for deletion may still be popular with customers. If selling them is not possible because of strategic reasons, the brands can be milked by sacrificing sales growth for profits. They stop all marketing and advertising support for such brands, apart from a bare minimum to keep cars moving off the factory.

Step 4- Growing the Core Brands: There is a need to identify swim lanes for each of those retained brands as well as building the processes to make sure they keep those swim lanes differentiated and unique. For each one of the brands, executives need to search for growth opportunities by first reviewing the brand's positioning, gathering competitive intelligence, and seeking insights from consumers²⁶. Each brand could reach new customers, develop new delivery systems and penetrate new geographic markets.

Risks and Mitigation

What if the new owners compete with us and steal market share? VW should create legal safeguards to ensure that the brands they sell do not return as rivals.

For merged brands, a joint strategic brand position should be developed, and advertising copy harmonized so as to achieve a (usually gradual) transition of the brand proposition in consumers' mind.

Employee layoffs of deleted brands can be heavily reduced by applying methods such as

- a freeze on hiring, promotions, or pay raises
- a freeze on filling positions left vacant when employees leave voluntarily
- asking employees to take time off or reduce their hours
- reducing authorized overtime

It is also observed that VW AG incur huge overhead costs—especially for the 1st quarter. A holistic assessment—a new way of thinking that helps VW transcend the cost-cutting mind-set by focusing on processes instead of line items/activities—should be carried out. e.g. delivering parts directly to the floor could eliminate the materials inventory, the necessity of putting materials away, the issuing of authorizations to withdraw them, and the work of pulling the materials out again. Everything follows from robust processes: higher quality, better cycle time, and much lower overhead.

REDUCTION OF THE PRICE OF VOLUME RANGE IN KEY EMERGING MARKETS

Seven emerging economies—China, India, Brazil, Mexico, Russia, Turkey, and Indonesia are expected to contribute about 45 per cent of global GDP growth in the coming decade.²⁷ China, for example, is the largest market as measured by vehicle sales, and—until 2015—it has also been the fastest-growing market in the world. India is expected to emerge as the world's third-largest passenger-vehicle market by 2021.

²⁴ In line with its 'TOGETHER - Strategy 2025', VW plans to have 50 purely electric-powered vehicles models **across all three categories**

²⁵ According to VW's Annual Report 2017, SEAT was one of the fastest-growing brands in Europe having a significant increase in deliveries in Poland (+24.8%), Spain (+23.1%), the United Kingdom (+18.3%)

²⁶ What do those people want from their car experience? Defining brands by customer needs ("people who choose this brand don't compromise between functions and design, rather want it all") instead of defining brands by product (for instance, a premium brand) or consumer segment (say, young adults).

²⁷ World Economic Outlook, October 2018

In reducing the price of volume range in these key emerging markets, VW AG needs to deploy these four dynamic strategies:

Understand Local Perceptions: VW AG needs to figure out the innate local appeal of their cars in each emerging market and then formulate pricing strategies around them. It is not enough to develop a country-level strategy, the diversity and dynamism of China, India, and Brazil defy any one-size-fits-all approach. But by creating and targeting city clusters (that are segmented according to demographics, scale, geographic proximity, and customer characteristics.) within them, VW AG can seize growth opportunities.

Capitalize on the 'German Engineering' Cachet: VW AG has long touted “German engineering” as the key difference between its cars and their competitors. They should take advantage of this strong reputation they’ve garnered and factor them into their pricing. This German authenticity will continue to resonate strongly in several emerging markets, allowing the company to charge a premium—even in its price-reduction strategy.

Create Price Ladders: Creating a price ladder with four rungs: basic, good, better, and best - with the bottom rung (e.g., Polo Classic) very low, while the top rung (for instance, SKODA) is aspirational - enhances perceptions about their cars. Customers gradually become more comfortable with the idea of paying higher prices for more features and new technologies. The multitiered pricing structure will enable VW AG to generate higher revenues than those it would have realized if it had clung to a single price point.

Prepare for the currency volatility: Currency volatility is so disruptive to multinational pricing strategies as the depreciation of currencies in international markets affects their earnings in their home currency (in this case, €)²⁸. Raising prices in the emerging markets in order to compensate for the depreciation’s effect on VW’s € earnings would mean their product can become as much as 40% more expensive overnight which can lead to market share loss, as well as drops in revenue.

Therefore, VW AG should be set up to make very frequent pricing changes and responding quickly enough to currency and other changes in local conditions. This will require decentralized pricing decisions, considering local economic conditions and the prices offered by competitors.

5. STRATEGIC SOURCING OF COBALT IN AFRICA

VW AG is facing a break in supply agreement of a strategic material (Cobalt) from the world’s largest supply area (Democratic Republic of Congo)

Evaluation of Strategic Options

| S/N | Strategic Options | Operational Impact | Risk |
|-----|--|---|---|
| 1 | Relax current tender by allowing for price review every 3 years | Supply can only be locked for 3 years. After that, VW AG will have to negotiate terms. Production levels are left to fluctuate depending on the outcome of negotiations. | Cobalt prices may continue to swing higher during the agreement period thereby increasing the cost of input after every review. |
| 2 | Shift focus from Cobalt suppliers to EVB suppliers with special focus on Chinese suppliers | -Ensures the supply of batteries to its EV fleet while still exploring company battery production. -Potential massive jumpstart in the EV race as China is the largest EV market | Suppliers may also insist on more flexible long-term agreements |
| 3 | Source cobalt from suppliers in Zambia and Central African Republic in addition to the DRC | -Increased supply base -Production continues at projected pace due to continuous supply. | Suppliers in this region may not be able to meet the huge volume requirements |

²⁸ In a survey of 77 of Frontier Strategy Group’s global clients, 88.3% of those in these markets said that currency volatility posed the greatest material risk to their pricing strategy during 2014 and 2015.

| | | | |
|---|---|--|--|
| 4 | Explore new technology such as battery recycling; nickel and solid-state battery technology | VW remains competitive in the EV market as new battery technology would greater reduce the price of VW's EVBs and hence the price of its EV fleet. | The technology may take a very long time before it becomes 'commercially feasible' |
|---|---|--|--|

Recommendations and Implementations

We recommend that **VW AG adopts Strategy 2 in the short to medium term** while also engaging in **Strategy 4 as a long-term strategy**.

Strategy 1 is not cost efficient for VW AG as the cobalt prices have been in an uptrend and is still projected to trend higher due to robust demand. Suppliers might be willing to accept a shorter term price fixing but this would be met by higher price demands at the end of the fixing period.

Strategy 3 may not provide enough supplies to meet VW's strategic requirements for its massive EV push.

Strategy 2 is apt for a short to medium term horizon (4-7 years). EVB suppliers such as Panasonic already have already established contract terms with cobalt suppliers. VW can tap into this by creating strategic partnerships with these suppliers.

Strategy 4 is the best for a long-term strategy as an upswing in the price of cobalt will keep EV prices on the high side. This coupled with the fact that over 60% of global supply comes from a country faced with political and economic instability necessitates the shift away from cobalt²⁹.

PROCEDURE

STEP 1: Approach Panasonic to negotiate EVB supply deal and details.

STEP 2: Establish long term supply with Chinese firms such as Contemporary Amperex Technology Co LTD and also negotiate EVB supply deals.

STEP 3: The Research and Development (R&D) unit headed by Herbert Diess should begin exploring and developing alternative battery technology and battery recycling capabilities.

ETHICAL ISSUES

STRATEGIC SOURCING OF COBALT IN AFRICA

ANALYSIS

VW AG is pushing an electric-car offensive, aiming to launch more than 10 electrified models by the end of next year and is targeting over 30 new battery-powered models by 2025.³⁰ This massive volume requirement (24-36 million kg a year for three million EVs) will require more cobalt than mining companies can provide at the maximum price in VW AG's tender³¹. VW AG has been accused of engaging artisanal miners in the DRC (known for their use of child labour and lack of adequate safety protocols) in its supply chain.³²

RECOMMENDED ACTIONS

1. Release a press statement publicly speaking against the use of child labour and unsafe working conditions in mines.
2. Engage the Compliance team to explore systems through which the supply chain can be vetted all the way back to the mine in order to avoid using cobalt from artisanal mines.

²⁹ Nicolò C. et al. (2018), 'Metal mining constraints on the electric mobility horizon', *Energy Insights by Mckinsey*, April, available at <https://www.mckinsey.com/industries/oil-and-gas/our-insights/metal-mining-constraints-on-the-electric-mobility-horizon> (accessed 24 April 2019)

³⁰ Pratima D. (2017), 'Exclusive - Glencore makes large cobalt deal, securing EV battery supplies for VW', *Reuters*, 6 July, available at: <https://uk.reuters.com/article/uk-glencore-cobalt-vw-exclusive-idUKKBN19R20B> (accessed 20 April 2019)

³¹ Megan G. (2017), 'In shift toward electric vehicles, Volkswagen looking for cobalt contracts', *ARS Technica*, 24 September, available at: <https://arstechnica.com/cars/2017/09/in-shift-towards-electric-vehicles-volkswagen-looking-for-cobalt-contracts/> (accessed 10 April 2019)

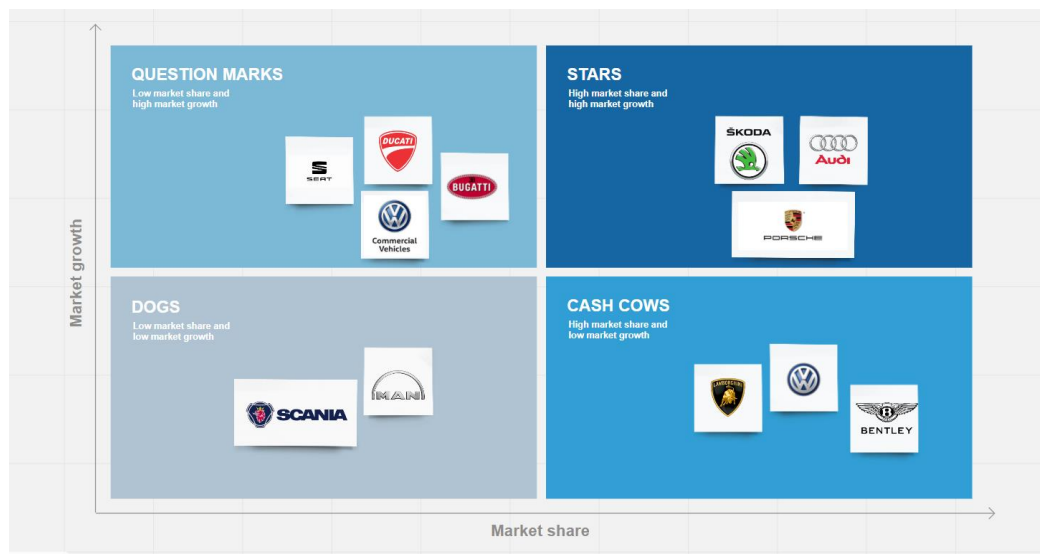
³² Jess B. (2016), 'A Big Supply Chain Issue - Cobalt Mining', *Supply Chain 247*, 24 January, available at: <https://www.supplychain247.com/article/a-big-supply-chain-issue-cobalt-mining> (accessed 10 April 2019)

APPENDICES

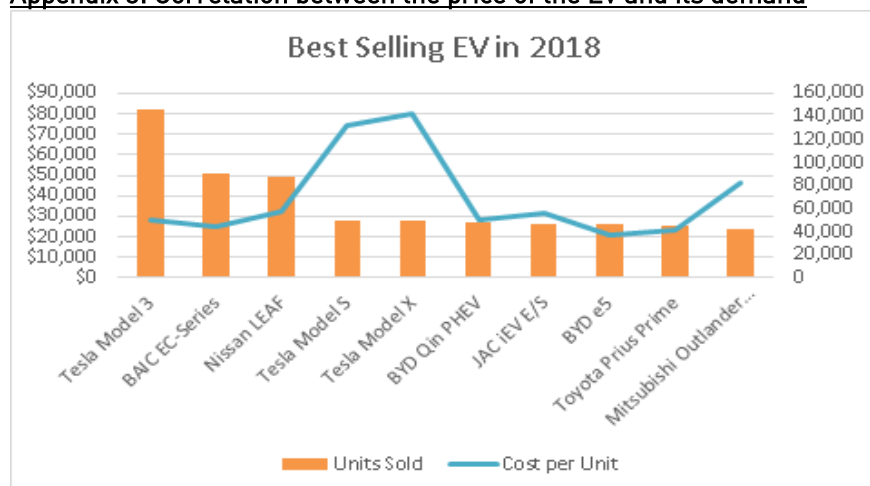
Appendix 1: External Scan – PESTEL Analysis for the Automotive Industry

| POLITICAL | ECONOMIC | SOCIAL |
|---|---|---|
| <ul style="list-style-type: none"> Promotion of public transport in some developing countries Political Stability in major markets such as China Government's subsidy on fuel-efficient cars | <ul style="list-style-type: none"> Growing taxes on luxury vehicles Increasing purchasing power of customers in developed markets Economic stability of major markets -Oil prices instability which affects petrol/diesel | <ul style="list-style-type: none"> Fast changing customer preferences causing older models to become obsolete Increasing demand for self-driving vehicles People turning to healthier alternatives such as cycling for short distances |
| TECHNOLOGICAL | ENVIRONMENTAL | LEGAL |
| <ul style="list-style-type: none"> Promotion of public transport in some developing countries Political Stability in major markets such as China Government's subsidy on fuel-efficient cars | <ul style="list-style-type: none"> Growing taxes on luxury vehicles Increasing purchasing power of customers in developed markets Economic stability of major markets -Oil prices instability which affects petrol/diesel | <ul style="list-style-type: none"> Fast changing customer preferences causing older models to become obsolete Increasing demand for self-driving vehicles People turning to healthier alternatives such as cycling for short distances |

Appendix 2: Constructed BCG Matrix of the Volkswagen Group



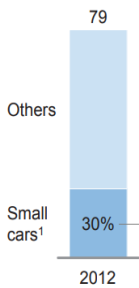
Appendix 3: Correlation between the price of the EV and its demand



Small cars show big potential in emerging markets

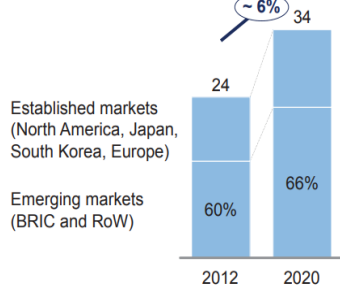
Small cars with significant sales share

Global sales volume
Million units



Strong growth of small cars in emerging markets

Development of small car sales
Million units



¹ Including class A and B with subcompacts, microcars, and superminis
SOURCE: IHS Automotive; McKinsey

The Brand Audit Sheet

Line up all the brands in your company's portfolio on a single sheet of paper, listing their global market shares, annual sales and profits, and market positioning in tabular form, and you can see just how many brands overlap and how few brands account for the bulk of corporate profits.

| Brand | Global Market Share | Regional Presence | | | | | Percentage of Sales | Percentage of Profits | Cash Status |
|-------|---------------------|-------------------|---------------|--------------|----------------|----------------|---------------------|-----------------------|----------------|
| | | North America | Latin America | Asia Pacific | Western Europe | Eastern Europe | | | |
| A | 15% | strong | fun | | | | 17% | 20% | cash generator |
| B | 7% | weak | value | | | | 8% | 10% | cash user |
| C | 3% | | | | | | | | |
| D | 1% | | | | | | | | |
| E | >1% | | | | | | | | |
| F | >1% | | | | | | | | |

Market position:
Dominant (#1 in the region)
Strong (#2 or #3 in the region)
Weak (#4 or lower in the region)
NP = Not present in the region

Brand Positioning:
Quality, value, upscale, fun, adventurous, premium, safe, reliable, trustworthy, aggressive, cheap, etc.

Cash Status:
Cash generator
Cash neutral
Cash user

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Appendix 6: Working Capital Savings for E-Mobility Strategy

| | 2015 | 2016 | 2017 | 2018 Forecast ³⁴ |
|--|--------|--------|--------|-----------------------------|
| Financial Data, € million³⁵ | | | | |
| Raw Materials | 4,021 | 4,396 | 4,858 | 4,425 |
| Inventory | 31,369 | 34,947 | 36,113 | 34,143 |
| Raw materials as a percentage of inventory (%) | 12.82 | 12.58 | 13.45 | 12.96 |

Saved Working Capital = 12.96% of €34,143 million
= €4, 424.93 million

Appendix 7: Capital Cost Calculation for Strategic Options For PARIS Accord and Environmental Legislation

| Figures in millions | | | | | | | |
|-----------------------------------|---------------|-----------------|------------|------------|------------|------------|------------|
| Fine | € 600.00 | Cost of Capital | | | 14% | | |
| | Current Year | Year 2019 | Year 2020 | Year 2021 | Year 2022 | Year 2023 | Perpetuity |
| Present Value of Fines | 0 | € 526.32 | € 461.68 | € 404.98 | € 355.25 | € 311.62 | € 4,328.56 |
| Total Present Values of fines | € 6,388.41 | | | | | | |
| Option 1 | | | | | | | |
| Project's Cashflow(Present Value) | € (19,500.00) | € 1,535.09 | € 1,481.22 | € 1,429.25 | € 1,379.10 | € 1,330.71 | € 9,600.14 |
| IRR | -3% | | | | | | |
| NPV | € (2,744.48) | | | | | | |
| Option 2 | | | | | | | |
| Project's Cashflow | € (11,750.00) | € 1,535.09 | € 1,481.22 | € 1,429.25 | € 1,379.10 | € 1,330.71 | € 9,600.14 |
| IRR | 8% | | | | | | |
| NPV | € 5,005.52 | | | | | | |
| NPV after accounting for fines | € (1,382.89) | | | | | | |
| Option 3 | | | | | | | |
| Present Value of Projected profit | € - | € 438.60 | € 388.66 | € 344.41 | € 305.19 | € 270.44 | € 1,951.04 |
| NPV | € 3,698.34 | | | | | | |

³³ Adapted from Nirmalya K. (2003), 'Kill a Brand, Keep a Customer', *Harvard Business Review*, December 15, available at: <https://hbr.org/2003/12/kill-a-brand-keep-a-customer> [accessed 28 March 2019]

³⁴ Using **Moving Average Forecast method** using the past three years data

³⁵ Source Figures are from the Volkswagen group Annual Report 2017, Consolidated Balance Sheet of **Automotive Division**, page 122. Volkswagen group Annual Report 2016, Consolidated Balance Sheet