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A STEP TOWARDS SUSTAINABLE GROWTH: CASE STUDY ON MAHINDRA ELECTRIC MOBILITY LIMITED AND ITS STRATEGIC DECISIONS

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ABSTRACT :

Subject Area: *The subject area of our study is the issues concerning Indian electric vehicles (car) market. Our case study focuses on* ***Mahindra Electric Mobility Company.****In particular, the impact of strategic decisions taken by the company on the sale of its product over the course of five years is studied and analyzed. In addition, the case study discusses the present scenario of electric vehicle market in India amidst the initiatives taken by government and its future prospects witnessing the climate change and global warming issues. It determines the best possible way in which company can expand its business and maximize its profit under the given constraints circumventing the business. The success or failure of business strategy used by the company in the present environment is also analyzed in detail.*

KEYWORDS : *Mahindra Electric Mobility,Case Study, global warming*

INTRODUCTION

Study Level/Applicability: A study of strategic decisions taken by the company in ensuing the growth and expansion of its product can help us in understanding the electric vehicle market in India. There is a direct relationship between strategic decisions taken by the company's management on the expansion of its product as well as the financial health of an organization. A study of these decisions can help us in observing the relationship between the two. The study also helps in understanding the initial challenges that any innovative product faces in the first few years of its expansion .The present case study can be utilized as aid to teaching in courses such as MBA/M.COM/Post Graduate programs in management; executives training programs and for undergraduate courses for discipline such as Management Accounting, Marketing, Strategic Decision Making. This study can be used to understand Break even analysis, leverage, return on equity. Moreover, it will also help in understanding strategic decision making, and will reiterate the concept of SWOT analysis, PEST analysis and porter's five forces competition model.

Case Overview: As the world is opting alternate fuel systems for vehicles, electric vehicles have become one of the most prominent alternate fuel systems globally. New age companies like Tesla, Venturi, Coda, etc. have forced traditional players like BMW, Audi, and Jaguar to move into electric market and a reflection of that can be seen by new completely electric car launches by these companies in the past two year. On

similar lines, Mahindra Electric Mobility Limited, a subsidiary of Mahindra Group, acquired Reva Electric Car Company in 2012 to enter into consumer market of Electric Vehicles in India. Since then, the company has taken various strategic management decisions to ensure the viability of the product. Post the acquisition, the company revamped the car and came up with a new vehicle for consumer market named **E2O.** The sales of the company did not pick up as the product was only seen as a B2C product. In 2014, the company took a strategic decision of shifting from B2C and expanding into the B2B market by selling the new generation Mahindra E2O plus to ride hailing startups like Lithium and OLA. As the strategy of entering into B2B market seemed promising, the company added a new series of electric vehicle to its line of products with Mahindra Logan electric launched in 2017. Whether the company is able to increase its sales of electric vehicles after launch of new model? Is the company able to make profits after taking the strategic decision? What are the future prospects of the company in the competitive environment? These are the prominent questions the case study tries to determine.

Expected Learning Outcomes: Use of the strength weakness opportunity and threat (SWOT) analysis as a tool to aid strategic decision making to analyze the external factors affecting the company decision making, the political, economic, sociological and technological (PEST) analysis is performed. Porter's five competitive forces model is applied to determine the competitive intensity and attractiveness of overall industry. The impact of government policy in promoting sales of electric vehicles and the effect it had on demand for electric vehicles in India, leading to the sale of electric cars of Mahindra Electric, is also analyzed in detail.
Through this study we will also learn:

- Take over strategy used by Mahindra in getting into the electric market.
- How government policies have affected the sales and promotion of new technologies in electric vehicle market in India.
- How limitation of a resource has affected the government policy, which consequently has affected the B to B sales of Mahindra Electric vehicles in India.
- Competition faced by the company domestically by other Indian car manufacturers.

Practical Implications: When we look at the case of Mahindra Electric and its expansion we see a direct relationship between two major factors-

1. Strategic decision taken by the company in shifting from B2C to B2B market and the effect it has on its sales.
2. How crucial government policies can impact the growth and expansion of any new innovation in any industry. In case of Mahindra electric, we realize that the policy decisions taken by the government in terms of subsidy for electric market affect the selling price of their cars.
3. Further into government policy, we also observe how government tenders leads affect the B2B sales of their cars and the implications it has on the expansion of the company.

Social Implications: In a world where climate change is one of the biggest threats globally, a substitution to fossil fuels have become a priority. The Indian government has also taken steps to encourage usage of electric vehicles giving subsidies on electric car purchases. Any change in government policy towards electric vehicles not only has an impact on EV business in India, but also on acceptability of electric vehicles as a primary source of transportation.Mahindra Electric as a company has tried to prove that a social change towards environment friendly vehicles can be taken, taking a small step towards reducing carbon footprint. A reflection of such efforts has been seen throughout the country, with various state and central government trying for electric public transport like busses, and it has been possible only because of strategic steps taken by Indian car manufacturers towards electric vehicles in India.

PROLOGUE

With the population of around 1.33 billion, India is the second most populous country in the world and will become the first most populous in next twenty years witnessing the current growing rate of around 1.1%. Due to urbanization and commercialization, 500 million people will be shifting to cities by 2030. This will lead increase in the demand for mobility. Today, in the era of Fourth Industrial Revolution (Industry 4.0), world is looking forward to new and sustainable mobility solutions amidst the fast technological advancements, rising environmental concerns, increasing oil prices, energy security, climate change, global warming, and changing needs of consumers. With increasing environmental consciousness around the world, the Government of India and authorities all around the world are promoting many eco-friendly technologies for the sustainable living. The objective is to reduce the carbon footprints emanating from the country. Many small steps and new initiatives have been taken in this regard by various stakeholders of the society. To drive this change, regulation has become the prime force. Ranging from energy audits to star based labelling, the regulations enforced by the Government could be witnessed everywhere. Agreement on Climate change in Copenhagen is also one of the active move in the same direction. 'Urban Renewal' programme is undertaken to emphasize on the need of energy efficiency and incentives are given to urban transport authorities for application. National Solar Mission and many other such initiatives are encouraging the use of renewable energy sources keeping in mind the alarming levels of pollution. Indian corporations have thus started focusing on energy efficiency. The automobile sector have now concentrated their manufacturing in producing electric vehicles and traditional companies based on internal combustion engines are buying smaller electric vehicle companies.

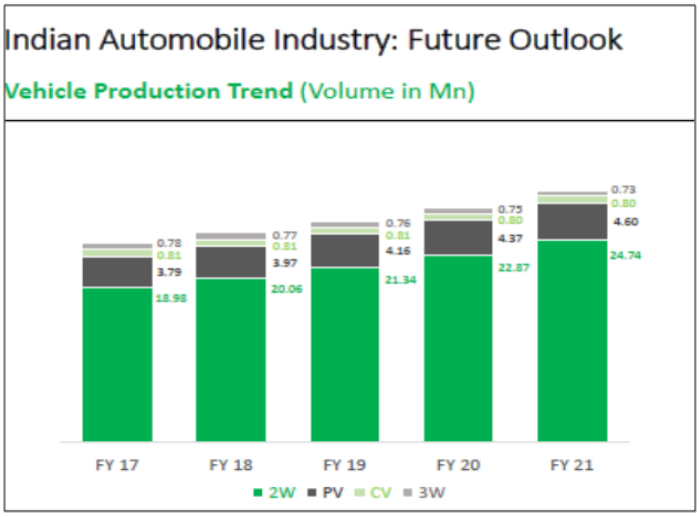
INDUSTRY SCENARIO

India stands on the fourth position with respect to the automobile industry. It will become third largest by 2021. The present contribution of automobile industry in Gross Domestic Product of India is 7.1%. Keeping in mind the sustainability criteria, it has become very important to develop an efficient public and personal transport system in the country. The technological advancement is leading to the disruption in the global automotive industry. Digitization, automation and new businesses model is revolutionizing the industry.

Figure 1: Current Status of Automobile Industry in India

Passenger Vehicles	2 Wheelers	3 wheelers	Commercial Vehicles	Tractors
Number of OEMs				
15	13	7	12	17
No. of Manufacturing units				
29	22	7	34	20
Maruti Suzuki Hyundai Tata Motors Fiat Ford Honda General Motors Mahindra Nissan Toyota Volkswagen Group Renault Premier Auto Mercedes Benz BMW	Hero Moto Corp Honda Motors Bajaj TVS Suzuki Motorcycles Yamaha Mahindra Royal-Enfield Piaggio Vehicles LML Harley Davidson Triumph Kawasaki	TVS Bajaj Piaggio Atul Auto Scooters India Mahindra Force Motors	Tata Motors Ashok Leyland Force Motors Hindustan Motors Isuzu Motors Mahindra AMW Motors Piaggio Vehicles SML Isuzu Ltd Eicher Volvo Man Force	Mahindra Escorts TAFE John Deere New Holland Tractors International Tractors Force Motors Indofarm Tractors SAS Motors HMT Tractors CNH Industrial ACE Preet Tractors SAME DEUTZ – FAHR INDIA Standard Tractors Captain Tractors Trishul Tractors

Figure 2: Future Outlook



With the increasing emphasis on "Electric, Shared, and Connected" mobility, E-mobility is now driving the automotive industry. The guiding force here are four: shared mobility, autonomous driving, connectivity, and electrification. By 2030, Electric Vehicles (EV) could see big momentum in market.

COMPANY PROFILE

The pioneer of EV technology in India is Mahindra Electric Mobility Limited. "They acquired a majority stake in the Reva Electric Car Company in 2010 to advance the design and production of electric cars worldwide. By integrating Reva's electric car technology with their own leading engineering, they build higher performance electric vehicles that satisfy customers' demand both for better lifestyles and a healthy environment. At Mahindra REVA, they are constantly seeking solutions to issues that range from the kind of products that will define the future and the technologies that will go into these vehicles to the intelligence that these vehicles will possess and the way they will be manufactured. These questions are shaping their vision of the Future of Mobility. The advanced vehicles of the future will not only offer unmatched features, safety, and convenience. They will also be clever and environmentally friendly. The increasing fusion of electronics and IT with automotive technologies will give rise to vehicles with advanced intelligence and connectivity. Other developments in distribution models, financing options, flexible ownership models, personalization of vehicles and greater choices across the ecosystem will further alter the entire experience of interacting with the mobility ecosystem. As a total systems solution provider, they develop all our Electric Vehicle (EV) systems in-house and are pushing EV technology to the next step to create better energy management, faster charging, and advanced telematics. The company offers innovative electric vehicles and mobility solutions, technology licensing, and licensed manufacturing and distribution.

They are well established as a major global player with the largest deployed fleet of electric cars on the road today. They have sold around 1,800 electric vehicles in Europe, and more than 1,700 are on the road across Asia and Central and South America. In total, they are present in 24 countries worldwide and growing. The Mahindra Group's manufacturing expertise and wide global distribution network will help Mahindra Reva scale up production and spread green technology across the globe. In 2012, they inaugurated a new plant in Bangalore, with the capacity to build 30,000 vehicles per year. In keeping with their commitment to clean technology, the plant received a Platinum rating from Indian Green Building Council (IGBC). The new facility harvests rainwater, uses natural light and ventilation, and harnesses solar energy for electricity and heating. With this clean manufacturing process of clean vehicles and a battery recycling program, their electric cars aim to have the lowest dust-to-dirt carbon footprints in the automotive world.
In 2007, Reva was named one of India's Coolest Companies by Business Today They received the 2008 Frost and Sullivan Powertrain Company of the Year award for excellent sales volume,

market penetration, and customer satisfaction. And in 2009, Business Week voted our founder and Chief Technology Officer, Chetan Maini, one of India's top 50 most influential people. In 2010, the Reva-i was crowned Car of the Year at the Overdrive & CNBC TV 18 awards. In 2013, they were named amongst the Top 50 most innovative companies in the world by Fast Company".

In 2016, the company rebranded as Mahindra Electric Mobility Limited with the intention to reflect not just the business line of producing vehicles but also developing power train and integrated mobility solutions.

1. SWOT Analysis of Mahindra and Mahindra Mobility Limited

The SWOT analysis is the strengths, weaknesses, opportunities, and threats analysis of the company. This analysis will help company to develop strategic business models, identify core strategies, will provide competitive advantage and help in better future planning. It should use the strengths to exploit opportunities, reduce weaknesses to exploit opportunities, use strengths to reduce threats, and reduce weaknesses to reduce threats.

Strengths of Mahindra Electric Mobility Limited:

The various strengths of the company are mentioned below:

- The company has a strong brand name and is known for its quality products.
- First mover advantage in the electric vehicles market in India.
- Low running cost for maintenance and recharge Environmental friendliness
- Most energy efficient
- No emission of nitrogen or carcinogenic substances
- Very low CO2 output
- Smooth driving experience with best in class technologies are found in Mahindra EVs.
- Manufacturing facilities of conventional cars can be used.
- Can facilitate to earn stronger revenues and profits.
- The wide product portfolio of the company is the major strength of the company that will help it to further expand its customer base.
- The location advantage is an added advantage as it has geographical presence in different regions.
- Effective social media management and strong networking.
- Customer relationship marketing are also on the positive side of the company.
- Well developed and efficiently integrated Information technology infrastructure.
- Strong access to suppliers
- Well accepted in international markets
- Competent human capital
- Efficient Value chain and Supply Chain integration
- Workplace diversity adds to the intellectual capital
- Technology advancements, innovations, and intellectual properties.

Weaknesses of Mahindra Electric Mobility Limited:

The various weaknesses of the company are mentioned below:

- High initial price (around 30% more than equivalent conventional cars).
- Limited range
- Range of conventional cars approx. 900 kms on one full tank whereas range of most modern electric cars around 150kms.
- Recharging time - significantly greater amount of time to recharge an EV than to refill a conventional car.
- Shortage of spare parts as compared to conventional cars' parts.
- Low sales lead to low revenue and profits.

- Limited car designs.
- Low safety standards
- Low speed as compared to conventional ICE cars
- Maintenance problems of the cars
- The EV cars are still not fit for the long drives
- Marketing strategies are still not very aggressive and not upto the mark.
- Insufficient funds for manufacturing new models.
- The infrastructure and environment at present is not very conducive.

Opportunitiesto Mahindra Electric Mobility Limited:

The various existing and potential opportunities to the company are mentioned below:

- Create more job opportunities.
- Availability of skillfullabor at cheaper prices.
- Develop more fuel efficiency of BEVs and improve range for the HEVs.
- Provide training to dealers and launch more EVs in the market.
- Optimize production process to minimize losses.
- Improve the governmental aim schemes for EVs and strengthen infrastructure.
- Provide smaller incentives for a longer duration to improve acceptability.
- Greater opportunities for research and development.
- Create customized models for the physically challenged people
- Utilize the growth in population in its favor
- Effective utilization of subsidies provided by the Government
- Opportunities to enter new market segments as there is huge untapped market
- Growing congestion in vehicles in urban areas
- Grow in international markets.

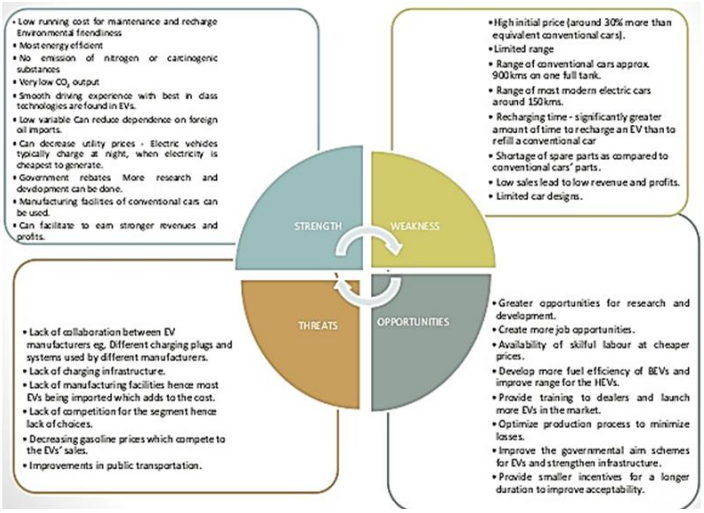
Threats to Mahindra Electric Mobility Limited:

The various potential and existing threats to the company are mentioned below:

- Lack of collaboration between EV manufacturers, e.g., Different charging plugs and systems used by different manufacturers.
- Lack of charging infrastructure.
- Lack of manufacturing facilities hence most EVs being imported which adds to the cost.
- Decreasing gasoline prices which compete to the company's EVs' sales.
- Improvements in public transportation
- Shortage of skilled labour.
- Increasing competition from Telsa Roadster, Weego Whips, Nissan Leaf, Ford EVs.
- Changing regulatory framework
- Deteriorating overall economic conditions.

These strengths, weaknesses, opportunities and threats of Mahindra and Mahindra Mobility Limited can provide company with overall useful analysis of where it stands with respect to its short term and long term vision. It will certainly help company to take suitable actions to bridge the gap, if any.

Figure 1.1: The SWOT Analysis of Mahindra and Mahindra Mobility Limited



2. THE PESTEL ANALYSIS OF MAHINDRA AND MAHINDRA MOBILITY LIMITED

The company is facing new challenges in promoting and increasing the sales of its electric vehicles. The PESTEL analysis will help company to analyze its macro environment. It will also give insights about the factors favoring its growth and which are unfavorable for its growth. It comprises of political, economic, social, technological, environmental and legal factors surrounding the company and affecting it.

Political Factors:

The political factors consists of the government's role in encouraging the growth of electric vehicles in India and influencing Mahindra Electric. It includes subsidies, grants and funding initiatives given to the company. The various initiatives taken by the government as discussed earlier are pro to the company's growth. Government is also giving tenders to the company to produce the electric vehicles. Still, the incentives for the company to manufacture and sell EVs are still less as compared internationally.

Economic Factors:

These factors indicate the overall economic position of the country, industry and the company. Currently, it is still not very conducive for the growth of the company. Sales of the company are not increasing at very high speed. The purchase price of the vehicle is one of the main challenge for penetration.

Social Factors:

These are related to the attitude of the consumer towards Mahindra Electric. There is still lack of awareness about the electric vehicles in India. Consumers even if are willing to purchase the car are unable to because of high prices compared to the conventional vehicles. There is also perception of range anxiety among the consumers.

Technological Factors:

These consists of the innovation and technological advancements influencing the company. To make electric vehicles cost effective, the company will need to focus more on research and development and innovation. The limitations of EVs revolve around the distance they can travel with one charge. Average kilometers that they can travel is very less (100-200 Kms/hr) as compared to conventional vehicles (greater than 600 kms). There is lack of effective charging infrastructure. The cost of battery is too high. The technology advancement can only help in solving these problems.

Environmental Factors:

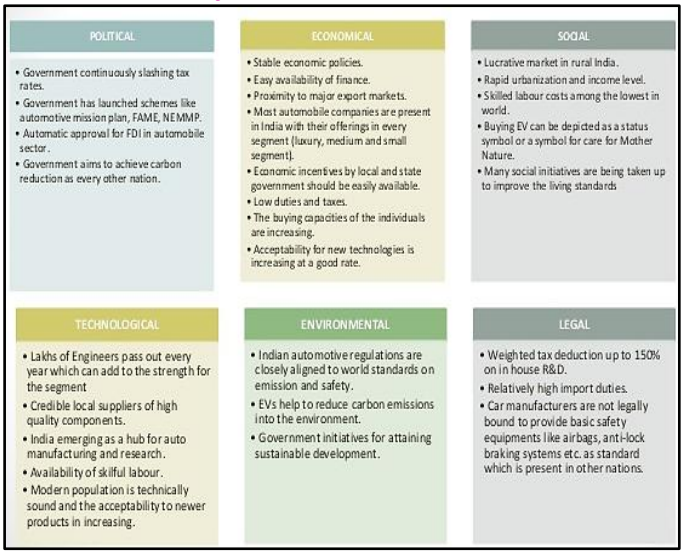
Electric vehicles of the company will reduce the pollution and CO_2emissions. The company is encouraging the relicense of the efficient energy and green India. This is a pro factor for company's growth amidst declining Air Quality Index of India and global warming. The company should take into consideration

that the production of EVs should not increase the pollution levels and more of renewable energy sources should be used to manufacture it.

Legal Factors:

These factors consists of the various legislation of the country to support the initiatives taken by the company.The National Electric Mobility Mission Plan (NEMMP) 2020 was launched by theCentral Government in 2013 to boost the manufacture of hybrid and electric vehicles in India and aims to achieve production of seven million electric vehicles by 2020. This initiative has been complemented by the Government providing demand-side incentives through its Faster Adoption & Manufacturing of Hybrid and Electric Vehicles in India (FAME) scheme. Still, various laws are required to make the infrastructure more conducive.

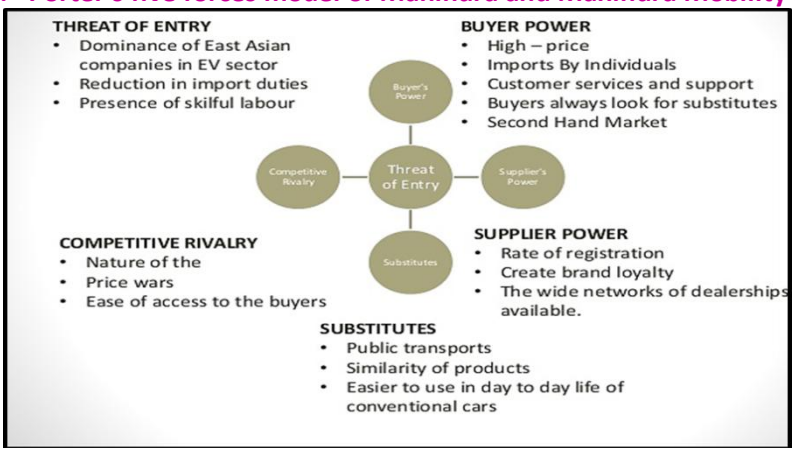
Figure 2.1: The PESTEL analysis of Mahindra and Mahindra Mobility Limited



3. PORTER'S FIVE FORCES MODEL OF MAHINDRA AND MAHINDRA MOBILITY LIMITED

Porter's five competitive forces model is applied to determine the competitive intensity and attractiveness of overall industry. The analysis shows that the competition in the industry for Mahindra Electric is going to increase with Tata and Hyundai coming into the picture with the manufacturing of efficient electric vehicles. But overall the attractiveness of the industry is decent and is going to increase in the coming years. Most of the forces as shown below demonstrate high intensity.

Figure 5: Porter's five forces model of Mahindra and Mahindra Mobility Limited



4. FINANCIAL ANALYSIS OF MAHINDRA AND MAHINDRA MOBILITY LIMITED

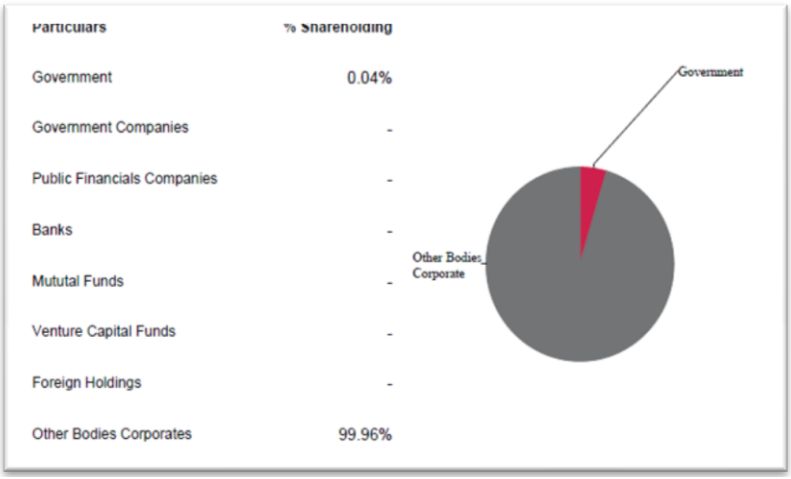
A. Capital Structure

TABLE 4.1

Amt. in INR as on August 01, 2018	
Particulars	**Amt.**
Equity share capital	269.80 cr
Preference share capital	-
Debentures	-

B. Equity Shareholding Pattern (as on August 01, 2018)

Fig 4.1



As it can be illustrated from the above figure that it's a private company and 99.96% of the shareholders are corporate bodies (Mahindra and Mahindra) and 0.04% equity is of government.

NOTE: THE DATA FOR BALANCE SHEET AND PROFIT AND LOSS STATEMENT ANALYSIS HAS BEEN TAKEN FROM CONSOLIDATED ANNUAL REPORT OF MAHINDRA AND MAHINDRA LIMITED. FOR FURTHER DETAILS PLEASE VISIT:https://www.mahindra.com/investors/reports-and-presentations

ANALYSIS OF FINANCIAL STATEMENT

Question: Analyze the financial statement of the Mahindra Electric Mobility Ltd. in detail and also perform the 5-year trend analysis on profitability, liquidity, leverage, and volatility analysis of the company.

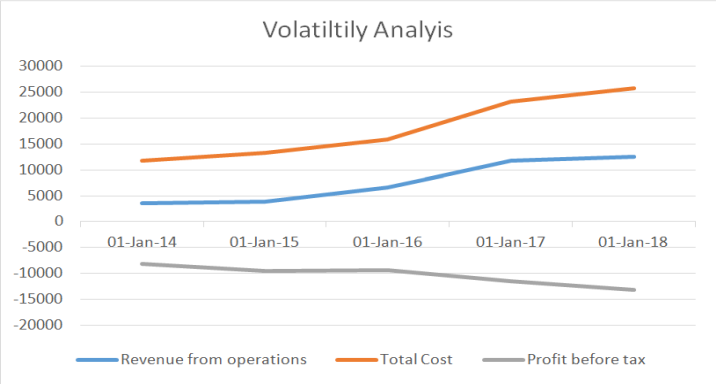
C. Ratio Analysis

TABLE – 4.2

Particulars	31-Mar-18	31-Mar-17	31-Mar-16	31-Mar-15	31-Mar-14
Leverage Ratios					
Total Debt/Equity Ratio	0.24	0.13	0.29	4.32	1.04
Total Assets/Equity Ratio	1.43	1.45	1.56	6.3	2.24
Total Debt/Total Assets	0.16	0.09	0.19	0.69	0.47
Interest Coverage Ratio	-129.31	-61.61	-18.64	-13.27	-10.99
Liquidity ratios					
Quick Ratio	0.54	0.64	0.75	0.09	0.2
Current Ratio	1.64	1.63	1.27	0.34	0.67

Performance ratios					
Gross Margin	33.97%	23.19%	19.98%	16.15%	22.02%
Net Margin	-99.69%	-94.66%	-134.36%	236.65%	-217.86%
Return on Fixed Assets	-71.16%	-58.49%	-53.69%	61.56%	-53.62%
Return on Equity	-54.68%	-49.54%	-52.04%	274.98%	-91.61%
Return on Capital Employed	-54.95%	-46.63%	-48.59%	145.23%	-61.19%
Total Asset Turnover	0.38	0.36	0.25	0.18	0.19
Fixed Asset Turnover	0.7	0.61	0.39	0.25	0.23
Days Receivables Outstanding	115	111	31	34	29
Days of Inventory	159	158	190	232	206

1. **Revenue and Profitability:** The company has persistently been running in losses in the last 5 years. The net loss of the company increased from <8,051> lac Rs. in FY 2014 to <12,901> lacs Rs. in FY 2018. Though the company has managed to increase its sales turnover Rs. 3,528lacs in FY 2014 to Rs. 12,608 lac in FY 2018 (11,728.94 in FY 2017). The higher revenue is mainly due to new product development. The sales turnover has increased by ~7.50% in FY 2018 from the previous year. The reduction in profitability of the company is attributed to total expense which has increased by ~20% in the last 5 years (from FY 2014 to FY 2018) and ~11.02% from the previous year, i.e. from 23,275 lacs in FY 2014 to 25,842 lac Rs. in FY 2018. The total expense ratio in FY 18 stands at 204.97% which is very high. The company's gross margin ratio stood positive and has improved over the years, from 22.02% in FY 2014 to 23.19% and 33.97% in FY 2017 and 2018. The net margin ratio has deteriorated in FY 18 in relation to FY 2017, from <94.66%> in FY 2017 to <99.69%> in FY 2018. The positive gross margin ratio and negative net profit margin ratio signals that Reva Ltd. Needs to control its indirect expenses. The loss of the company in is also due to nationwide decline in the demand for the automobiles and applicability of more stringent rules and new taxation structure GST.
2. **Liquidity:** The company's liquidity position has improved in the last 5 years as shown by increase in current ratio, from 0.67x in FY 2014 to 1.64x in FY 2018. However, in relation to FY 2017 the company liquidity position in FY 2018 has almost remain constant and in fact its quick ratio has declined to 0.54x in FY 2018. The company's cash position is lowest in FY 2018 Rs. 563 Lac.
3. **Leverage:** The total debt to equity ratio of the company is below 1 implying that the company's outsider debt in relation to equity is low, 0.24x in FY 2018. Outsiders charge on total assets is also low stood at 0.16x. It has been able to succeed in reducing the fixed charge, i.e. financing cost.
4. **Volatility:** The revenue of the company has remained volatile and shows increasing trend despite the nationwide decrease in demand for automobiles which is a positive sign. The company has been under the losses from last 5 years and by analyzing the income statement it can be interpreted the company needs to control its indirect cost to attain profitable figure while maintaining the increased level of sales volume.



MARGINAL COSTING ANALYSIS

Question: Classify the operating expense of the Mahindra Electric Ltd. in fixed cost and variable cost.

TABLE -4.4 CLASSIFICATION OF FIXED COST AND VARIABLE COST OF MAHINDRA ELECTRIC MOBILITY LTD.

Fixed Cost	Variable Cost
Employee benefit expense	Cost of material consumed
Finance cost	Purchases of stock in trade
Depreciation and amortization	Power and fuel
Rent, rates and taxes	Freight and forwarding charges
Insurance repair and maintenance	Excise duty on finished goods
Advertising and sales promotion	Sub-contracting expense
Legal and professional fees	Travelling and conveyance/Sales promotion
Payment to auditor	Communication costs
Provision for doubtful debts advances	
Miscellaneous and other expense	

TABLE – 4.5

Classification of variable cost					**Amount in lacs**
Particulars	**31-Mar-18**	**31-Mar-17**	**31-Mar-16**	**31-Mar-15**	**31-Mar-14**
Cost of material consumed	8502	9143	5145	3317	2689
Purchases of stock in trade	0	0	0	0	0
Power and fuel	126	85	81	89	77
Freight and forwarding charges	151	104	81	53	51
Excise duty on finished goods	0	0	3	17	8
Sub-contracting expense	343	336	206	201	182
Sales Promotion/Travelling and conveyance	699	807	349	293	291
Communication costs	37	46	27	39	36
Total	9858	10521	5892	4009	3333

TABLE -4.6

Classification of fixed cost					Amount in lacs
Particulars	**31-Mar-18**	**31-Mar-17**	**31-Mar-16**	**31-Mar-15**	**31-Mar-14**
Employee benefit expense	6057	4423.25	3017.63	2920.84	2542.14
Finance cost	464	659	671	659	671
Depreciation and amortization	2619	3289	3147	3288	3146
Rent, rates and taxes	398	255	253	176	175
Insurance	57	54	37	21	18
Repair and and maintenance	398	265	209	161	83
Advertising and sales promotion	1500	1562	1373	848	1051
Legal and professional fees	819	444	504	658	405
Payment to auditor	17	23	22	16	14
Provision for doubtful debts and allowances	1	17	65	12	4
Miscellaneous and other expense	469	369	239	254	147
Total	12799	11360	9537	9014	8258

Question: Perform the CVP analysis, break even analysis on Mahindra Electric Ltd for the period 2014-18. Also, margin of safety for the said period. How much sales are required in FY 2019 to attain break even sales assuming that the fixed cost will be same.

TABLE -4.7 COST-VOLUME PROFIT ANALYSIS

	Amount in lacs				
Particulars	**31-Mar-18**	**31-Mar-17**	**31-Mar-16**	**31-Mar-15**	**31-Mar-14**
Sales	12608	11729	6548	3837	3528
Less: Variable cost	9858	10521	5892	4009	3333
Contribution	2750	1208	656	-172	195
Less: Fixed cost	12799	11360	9537	9014	8258
Profit/ (Loss)	-10049	-10152	-8881	-9186	-8063
Less: Tax	-	-	-	-	-
Loss	-10049	-10152	-8881	-9186	-8063
Profit-volume ratio = Sales/Contribution	**21.81%**	**10.30%**	**10.02%**	**-4.49%**	**5.52%**
Variable cost as % of sales = 100%- Profit Volume ratio	**78.19%**	**89.70%**	**89.98%**	**104.49%**	**94.48%**
Break-even sales (in Rs.) (in lacs) BES= Total fixed cost/P/V ratio	**58679**	**110291**	**95217**	**-200699**	**149665**
Break-even sales as % of total sales	**465%**	**940%**	**1454%**	**-5231%**	**4242%**
Margin of safety (in Rs) MOS = Actual sales - Break even sales	**-46071**	**-98562**	**-88669**	**204535**	**-146137**
MOS as % of total sales	-365%	-840%	-1354%	5331%	-4142%

CVP analysis or profit volume analysis: Cost volume profit analysis depicts the relationship between the sales, variable cost and profit. The contribution margin ratio formula is:
CMR = (Contribution or Sales less variable cost/sales) *100

Or,

1-variable cost ratio

The calculation for CMR has been made in the above table for years 2014-2018. The firm's contribution margin has improved over the past 5 years. From 5.52% in year 2014 to 21.81% in FY 2018. CMR was negative at 4.49% in year 2015, however, since then the company has made significant improvement in increasing its CMR. Despite the improved contribution margin ratio, the company's profitability is lowest due to higher fixed cost.

Break-Even Analysis and Margin of safety:

Break-even sales: The break-even sales is that level of sales at which the firm is situation of no profit no loss. At BES the firm's contribution is equal to its fixed cost. It can be calculated as:

BES (in units) = Total fixed cost/Contribution per unit

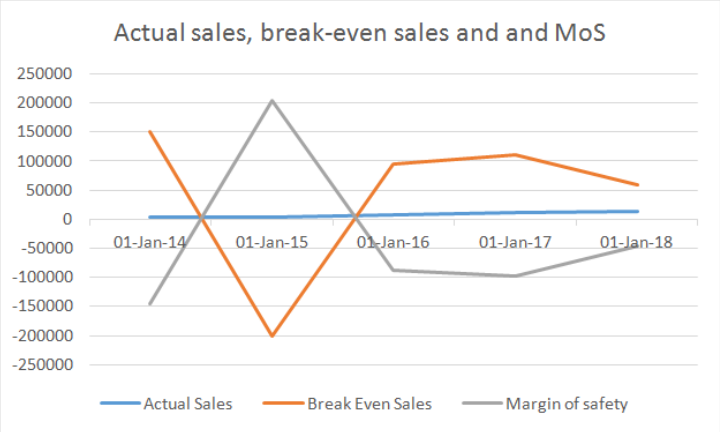
Or,

BES (in currency) = Total fixed cost/ CMR

Margin of safety: It is the additional buffer of sale over and above break even sale. It is that level of sales till which the actual sales can fall before the profit becomes zero.

Margin of Safety (in currency) = Actual sales – Break even sales

The following chart depicts the relationship between actual sales, break even sales and margin of safety in the last 5 years.



Since the company has been running under the losses, it is not able to achieve the break-even point in the last 5 years. The margin of safety in the recent 3 years is negative indicating high risk involved. Assuming that the fixed cost remains constant in the current year, to cover up the current year loss and fixed cost, Reva electric must make additional sale of Rs.92510 lacs.

CONCLUSION AND ROAD AHEAD

Even after a lot of strategic decisions taken by company, the company is not able to achieve even the breakeven and is incurring losses. Revamping old model and launching of new models has also not led to substantial increase in its sales over five years. Still the company is spending and promoting the manufacture of electric vehicles is due its strong future vision of Shared and electric mobility. As government is increasing the incentives for the company such as reducing the rate of GST on electric vehicles from 12 to 5%, it is obviously going to be beneficial for the company. But in the price sensitive market of India, making EVs viable take more efforts. Constraints such as range anxiety, current infrastructure, high prices, battery package, and incentives to buy are major hurdles in adaption of electric vehicles in India. Effective charging spots, discounted or free parking, redesigning of urban infrastructure are prerequisites. The role of government is of utmost importance for both manufacturers and consumers. Government should provide

more incentives to automobile companies to manufacture EVs at a greater scale and make consumers aware of its importance to use them. A proper policy framework needs to be developed. Research and development should be increased by the company. For successful implementation of mission, there needs to be a collective efforts from different stakeholders. Skilled labour force is also required for manufacturing EVs. Mahindra Electric is sacrificing profits presently but the future prospects of the company are very bright even if its car is not moving yet.

SUPPLEMENTARY READINGS:

- Global EV Outlook, International Energy Agency-IEA Report 2016.
- Gujarathi, P. K., Shah, V. A., and Lokhande, M. M. (2015). Design, Modeling, Simulation and Analysis for Conversion of Conventional Tata Indica Car into Plug in Hybrid Electric Vehicle. In *The 28th International Electric Vehicle Symposium and Exhibition (EVS28), KINTEX, Korea*.
- BP Statistical Review of World Energy- www.bp.com/statisticalreview, June 2012, accessed on 08/04/2016.
- "Statistics Report 2013", Central Statistics Office, National Statistical Organization, Ministry of Statistics and Programme Implementation Government of India.
- Understanding the electric vehicle landscape to 2020, Global EV Outlook 2013.
- "India's CO2 emissions pathway to 2050" www.metoffice.gov.uk/media/ pdf/b/f/AVOID_WS2_D1_41.pdf.
- The National Electric Mobility Mission Plan-2020, Ministry of Heavy Industries & Public Enterprises, Government of India, Available at: http://dhi.nic.in/NEMMP2020.pdf
- Electric Vehicles in India Policies, Opportunities and Current Scenario ADB Open Innovation Forum, Manila, 2015.
- Promoting low carbon transport in India: Electric Vehicle Scenarios and a Roadmap for India, United Nations Environment Program, Transport Unit, http://staging.unep.org/transport/ lowcarbon /PDFs/ElectricVehicleScenarios.pdf
- Aarya Market Research Survey Report on Consumer Perspective on E-mobility - Confederation of Indian Industry-CII, Ahmadabad, India, 2014.
- Annual reports_2015-18, available on https://www.mahindra.com
- Google scholar.com, Jstore.com, Researchgate.com

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