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CASE STUDY ON HONDA EV CARS

Challenge:

The Honda EV Plus was the first battery-electric car from a major automaker to use lithium-ion batteries rather than lead-acid batteries. There were around 340 EV Plus models built and launched. After Honda announced the debut of its first hybrid electric vehicle, the Honda Insight, production of the EV Plus was halted in 1999.

Findings:

Overview:

Manufacturer	-	Honda
Production	-	1997–1999 (about 300 produced)
Assembly	-	Mooka, Tochigi, Japan

Body and Chassis:

Class	-	Subcompact car
Body style	-	3-door hatchback

Powertrain:

Electric motor	-	Brushless DC
Battery	-	28.7 kW-hr, 288 V (12 V×24) NiMH
Range	-	80–105 mi (129–169 km)
Plug-in charging	-	Avcon (conductive)

Dimensions:

Wheelbase	-	99.6 in (2,530 mm)
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Length	-	159.3 in (4,050 mm)
Width	-	68.9 in (1,750 mm)
Height	-	64.2 in (1,630 mm)
Curb weight	-	3,590 lb (1,630 kg)

Solution:

- The Honda EV Plus was the first mainstream electric vehicle to feature a nickel-metal hydride (NiMH) battery. The 28.7 kWh battery, which weighed nearly half a tonne, had "twice the energy and life duration" of lead-acid batteries used in most other EVs at the time, according to Honda.
- However, the EV Plus isn't likely to go much further on a single charge. Honda warned owners to expect a range of 60 to 80 miles, with the EPA officially rating the EV Plus at 81 miles. However, tests found that careful driving (and turning off the air conditioning) could get the EV Plus to 100 miles. However, the EV Plus isn't likely to go much further on a single charge. Honda warned owners to expect a range of 60 to 80 miles, with the EPA officially rating the EV Plus at 81 miles. However, tests found that careful driving (and turning off the air conditioning) could get the EV Plus to 100 miles.
- A 220-volt power supply could charge the battery to 80% capacity in two hours, whereas a full charge on a standard household socket would take roughly 24 hours.
- The EV Plus' electric motor only produced 66 horsepower, so it wasn't particularly quick. The four-seater, three-door hatchback with a weight of 1600 kilograms could hit 30 mph in 4.9 seconds. It had a top speed of "above 80 mph," according to reports.

Achievements:

The EV Plus was once the fastest electric car to complete the Pikes Peak International Hill Climb. Teruo Sugita completed the 12.42-mile route, which included asphalt and gravel, in 15 minutes and 19 seconds on a customized EV Plus 'Type R'.

Risk:

The same reason its competitors failed: When the CARB mandate was relaxed, automakers chose to discard the electric vehicles they'd been required to construct. The cost of developing and maintaining these EVs was high (battery replacements aren't cheap), and demand was limited. Honda, Ford, Toyota, and General Motors, elected to recall and destroy the few automobiles it had left on the road.

Result:

Because battery replacements are more expensive than customers expect, the corporation must improve battery efficiency. We must extend battery life to one year in order to satisfy those who want to own our electric vehicles.

Then we need to raise awareness among students and employees who work for our fuel car brand.

We have to look into the high comfort for our customers and their safety is very important to us.

CASE STUDY ON MAHINDRA EV CARS

Challenge:

- The REVA electric car was the company's debut vehicle, and it was available in 26 countries by mid-March 2011, with over 4,000 various variants sold globally. Mahindra & Mahindra, an Indian company, bought Reva in May 2010.
- The electric sedan eVerito, the electric commercial vehicle eSupro (passenger and freight), and the Treo range of low-maintenance, lithium-ion battery-powered three-wheelers are among the company's current offerings. Mahindra Electric just became the first Indian automaker to reach 170 million kilometers driven on its fleet.

REVA Electric car:

Former name	-	Reva Electric Car Company
Industry	-	Automotive
Founded	-	1994 (27 years ago)
Founder	-	Chetan Maini
Headquarters	-	Bangalore, India
Key people	-	Suman Mishra (CEO)
Products	-	Electric vehicles
Parent	-	Mahindra & Mahindra

Dimensions:

Wheelbase	-	1,700 mm (66.9 in)
Length	-	2,600 mm (102.4 in)
Width	-	1,300 mm (51.2 in)
Height	-	1,500 mm (59.1 in)
Kerb weight	-	400 kg (882 lb) (excluding battery)

Findings:

Many months after its global launch, Reva was cast up as a flop. While poor consumer response hurt sales at home, negative product evaluations in foreign driving journals hurt demand in export markets like the United Kingdom.

Solution:

1. Lack of proper service network dedicated to electric cars:

The majority of Mahindra service center employees are unfamiliar with electric vehicles. Result? Electric automobiles have poor after-sales service, whereas traditional vehicles are well-served.

2. A grossly insufficient range:

This is the most crucial consideration for an Indian buyer. The majority of city cars offered in Europe and other countries have a range of at least 200 kilometers on a single charge. The e2o plus, for example, can travel between 80 and 130 kilometers on a single charge, with an average of 120 kilometers. Many e2o plus users assert that the aforementioned figures are accurate. This reduces the range of utilization to a point where people are dissatisfied with it. As a result, demand for such a vehicle will be modest.

3. Grossly incorrect pricing:

When it comes to deciding whether or not to go electric, the upfront cost is the most crucial factor to consider. Cars larger than the e2o plus are substantially cheaper, while the e2o plus sells for 7 to 11 lakhs on the road across India. A car the size of the e2o plus should never sell for more than 6 lakhs on the road. When consumers looking at e2o plus are pushed to look at traditional products more, this is what matters the most.

Risk:

It's not like Mahindra isn't aware of the situation. They are actually afraid that if their electric cars become more popular, their income from selling gasoline and diesel cars will decline. Also, if oil demand drops unexpectedly, oil corporations will be faced with a large stockpile of oil.

Result:

Because the majority of Mahindra service center employees are unfamiliar with electric car service, we must adopt EV car purpose and instruction beginning with students.

The primary disadvantage of Mahindra REVA EV cars is that they can only travel 80 to 120 kilometers on a single charge of the battery.

Another disadvantage is that it only has two seats; if this were increased to a four-seater automobile, sales would increase, as many people prefer four-seaters over two-seaters.

The corporation must investigate the car's safety features, which should be similar to those found in gasoline vehicles.

CASE STUDY ON MORRIS GARAGES MOTORS

(ELECTRIC VEHICLES)

Introduction:

Morris Garages is a British-based automotive company headquartered in London, UK, owned by a Shanghai-based Chinese company (SAIC motor, UK). MGmotors is the largest importer of Chinese-made cars in the United Kingdom.

They officially launched their first model MG-6 in the year 2011.

Overview:

Industry	-	Automotive
Founded	-	12 April 2006
Headquarters	-	Marylebone, UK
Products	-	Automobiles
Owner	-	SAIC Motor
Parent	-	SAIC Motor, UK
Website	-	mg.co.uk

Challenges:

1. EV battery range issue

The specified range is only achievable in real life when driven in ECO mode. There is about a 15% of range drop when driven in normal mode and a further 15% range loss when driven in sports mode. Not only this, there were also reports about random shutting down of the battery.

2. Dealer support, Lack of service support, financing of charging stations and, Lack of EV charging stations

There are more electric vehicles on a road than the number of chargers available for them to charge. Though the companies provide home charging facilities, this type of charging is a highlighted problem when we drive long distances.

3. No dedicated parking spots

The EV charging conundrum is nothing but a parking issue. In India, not every 4-wheeler owner has access to a dedicated parking spot. Even in a large residential complex, many residents have opted for open or uncovered parking slots. organizations that don't have dedicated parking spots will face this problem.

4. Issues with Voice Assistant

MG uses its own software for voice assistants, which lacks proper recognition of voices.

Solution:

1. The range could be calculated in normal real-life situations. This might also be due to improper battery management which could be calibrated.
2. Lack of service options: The EV system has become redundant as of now. Yes, an EV has fewer moving parts when compared to an internal combustion vehicle, but the technology is something different in EVs. The technology implemented in the EVs must be taught to the technicians and must be practiced.
3. State governments are launching policies for most residential and workplace buildings to make provisions for EV chargers. Even our public roads don't have a regulated parking system where government or private organizations can set up mass charging stations. But, this space is currently serviced by charge point operators that run a petrol bunk-like system but with EV charging stations.
4. This problem can be rectified by collaborating with well specialized companies like Alexa or Google assistant, to improve their software.

CASE STUDY ON RIVIAN AUTOMOBILE

History:

- The company was founded in 2009 as Mainstream Motors by Robert "RJ" Scaringe. After being renamed Avera Automotive and finally Rivian Automotive in 2011, the company began focusing on autonomous and electric vehicles.
- Their first model was intended to be a sports car. This vehicle, dubbed the R1, was prototyped as a mid-engine hybrid coupe for the US market, designed by Peter Stevens. However, it was shelved in late 2011 as Rivian looked to restart their business in an effort to have a larger impact on the automotive industry.

Timeline:

- Rivian received a large investment and grew significantly in 2015, opening research facilities in Michigan and the Bay Area. Shortly thereafter, Rivian began working exclusively on electric autonomous vehicles, in an attempt to build a network of related products. It also began gearing its prototypes towards the "ride-sharing and driverless car markets."
- By September 2016, Rivian was negotiating to buy a manufacturing plant formerly owned by Mitsubishi Motors in Normal, Illinois.
- In January 2017, Rivian acquired the plant and its manufacturing contents for \$16 million, with the plant to become Rivian's primary North American manufacturing facility. Rivian's acquisition of a near production-ready facility instead of building a new factory has been likened to Tesla's acquisition of the NUMMI plant in California.
- In December 2017, Rivian revealed its first two products: an electric five-passenger pickup truck and an electric seven-passenger SUV, provisionally named the A1T and A1C, respectively.
- Nearly a year later, in November 2018, the truck and SUV were renamed the R1T and R1S, respectively, and both vehicles were unveiled at the LA

Auto Show. Both vehicles were described as ready for rough terrain and semi-autonomous, and the company outlined a plan for its next generation of models to be fully autonomous. Production was scheduled to begin in 2020.

- Rivian had 250 employees at the start of 2018. By February 2019, however, Rivian was employing 750 people across facilities in Michigan, Illinois, California, and the United Kingdom. In November 2020, Rivian employed 3,000+ persons. Over the span of another year, employment roughly tripled; in November 2021 Rivian was listed as having 9,000+ employees.
- In late 2020, Rivian planned to begin shipments of the R1T in June 2021. The June 2021 date later slipped to August. By August, vehicle shipments were delayed again, in part due to the global shortage of chips.
- In September 2021, Rivian became the first automaker to bring a fully electric pickup to the consumer market, beating industry mainstays such as GM, Ford, and Tesla.
- Rivian began delivering its first production vehicle, the R1T truck, to customers in October 2021.
- On November 10, 2021, Rivian became public through an IPO. 153 million shares were sold at an initial offering price of \$78.00, valuing the company at \$66.5 billion. The offering raised nearly \$12 billion. The shares began trading on the Nasdaq as "RIVN." The stock closed the day trading at \$100.73 per share, giving the company a valuation of approximately \$86 billion.
- On November 19, 2021, Ford and Rivian announced that the two automakers no longer plan to co-develop an electric vehicle. Ford announced the company would retain a 12 percent stake in Rivian, which reached a value of more than \$10 billion after the IPO.
- Rivian began delivering the R1S SUV model to customers later this month (December 2021.)

Challenges:

- The first main challenge of Rivian Automobile is that though the company was started in 2008 they are yet to start full-scale production and sales. Even in the US, they have not started rolling out their vehicles.
- The R1T from rivian is a pickup vehicle that was undergoing many tests during one such test the R1T was made to climb a hill with full load during that time the temperature peaked at 118 degrees Fahrenheit which had some serious strain to the internal components.
- Another challenge is at full load the R1T while climbing hill the range is reducing to 50% from full battery capacity.
- The problem with Rivian is their cars are costlier with a small range when compared to that of Tesla's.

Solution:

- The data from the previous test enables the rivian team to collect and assess performance data, allowing them to further refine the R1T systems and software to improve elements such as cabin comfort, torque control, efficiency, and range.
- After further test runs the R1T was updated and was capable of towing a trailer in sand at 40mph is really impressive
- They should increase the range and decrease the price.

Vehicles from Rivian:

There are currently three vehicles from Rivian automobile

1. R1S



The R1S is an SUV from Rivian Automobile which is a semi-autonomous Ev with a range of 300 miles/charge and can achieve 0-60 in 3 seconds.

2. R1T



The R1T is the first EV pickup truck with a range of 315 miles/charge and can go from 0-60 in 5 seconds.

3. Rivian's EDVs



The Rivian EDVs are the first delivery vehicles which are still in test runs.

The idea of EDVs was made when Rivian entered into a commercial agreement with its investor Amazon in February 2019. By September 2019, Amazon's Logistics division had agreed to collaborate with Rivian to design, produce, and purchase 100,000 electric delivery vehicles (EDVs). Initial plans suggested a first delivery date in 2021. As of 2019, Amazon expected to have as many as 10,000 electric vans in operation by 2022, but was not planning to take delivery of the entire 10,000 Rivian vans the contract calls for until 2030. The Rivian collaboration is part of Amazon's plan to convert its delivery fleet to 100% renewable energy by 2030. The van is to be produced exclusively for Amazon

and will be built with a steel chassis on a "low-feature-content" assembly line to keep costs down. The van is explicitly designed to allow Amazon to reduce costs and shrink its carbon footprint.

A 150-mile (240 km) prototype for the Amazon electric delivery van was tested on public roads in early 2021. Testing began in Los Angeles and San Francisco. By April 2021, testing was being conducted in Denver with plans to test in 16 US cities in different climate zones.

Tests in Oklahoma and Michigan were underway by July 2021. Amazon expects to have 10,000 of the electric delivery vans on the road by the end of 2022. Since this van is made exclusively for amazon delivery this is named as Amazon EDVs.

Conclusion:

The vehicles from Rivian Automobile are a great innovation and a great thing for the future especially the Amazon EDVs are a very easy and economical way of delivering products. Rivian can become a very big venture if they reduce the prices of their cars and increase the range.

CASE STUDY ON TATA MOTORS

History:

Former name	-	Tata Engineering and Locomotive Company LTD (TELCO)
Founded	-	1945 (76 years ago)
Founder	-	J.R.D. Tata
Key people	-	Ratan Tata (Chair Emeritus) & Chandrasekaran (Chairman)

Production:

- Luxury vehicles
- Commercial vehicles
- Automotive parts
- Pickup trucks
- SUVs

Introduction:

Over the years, the exploitation and pollution of natural resources have created the need for renewable and environment-friendly products. One such product is Electric vehicles which are a replacement for petroleum-based vehicles. To mark this change multiple Indian automobile companies are launching electric vehicles and one of them is the **Tata group**.

The adoption of Innovative and new technology standards coupled with customer trust that Tata Motors Commands will provide with an opportunity to enter a new emerging market. Also, the company Can work on its elaborate product range with eco-friendly technology.

Challenges:

- Scarce battery technology (Since the battery is manufactured in limited countries, there is a dearth of supply of the battery which makes the price quite high).

- Consumer perception (The consumer perception about electric vehicles in India is still weak compared to ICE vehicles).
- High price.

Solution:

To make EVs mainstream in India Tata Motors established a supportive ecosystem for EVs, called the Tata universe

Tata Power to provide end-to-end charging solutions at home, workplace, and for captive and public charging.

Risks:

- Unavailability range anxiety
- Unavailability of charging infrastructure

Result:

- Tata must try to be more innovative in the approach
- The shortage of charging stations in India is also a challenge that the company and the government must look into. The success of any industry depends on the people and there is a dire need to educate people for the betterment of mankind.