

Introduction to Innovation Management

TATA Nano- The people's Car

Critically evaluate the uncertainties and technical/business risks inherent with innovation based activities relating to TATA Motors' Nano

MSc International Innovation Management (IIM)

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Introduction-

The arrival of the Tata Nano on the Indian scene generated widespread excitement with its promise of bringing car ownership within reach of even ordinary middle-class families; and for demonstrating 'New India's unique capacity for innovation and engineering (Nielesen and Wilhite, 2015, p. 371). **Then after**, Nano became a car that needed no introduction. Some despised it, while others thought it was a brilliant invention by Ratan Tata.

India is a country with majority of its population residing as low income group or (we can say middle class and lower middle class). Therefore, buying a car is still a dream for many of them. There is conception that cars are belong to rich or upper middle class and above them (Indeed, 2015).

According to the survey conducted by NFHS-5 (National Family Health Survey) among 6,64,972 families, or households (for 2019-21) only 8 per cent of Indian households or 1 in 12 households own cars (Rampal, 2022).

Then, in 2003, Ratan Tata, former chairman, Tata Motors, had shared his vision at the Geneva Motor Show of making a car that would cost less than half the price of Suzuki Motor's Maruti 800, the cheapest and affordable car available in the Indian market at that time (Prasad and Sahay, 2021, p. 178).

Then after, in January 2008, Tata Motors (a leading Indian automobile company) – launched its new Tata Nano at the Auto Expo in Delhi. Promoted as an Indian 'People's Car', and priced at only 100,000 (1 lakh) Indian Rupees- INR (US\$2,500) (Nielesen and Wilhite, 2015, p. 371).



(Source: Automotive News Europe, How Tata built the Nano, January 14, 2008)

In this study we can evaluate the uncertainties and technical/business risks inherent with innovation based activities relating to TATA Motors' Tata Nano with the help of below points,

- a) The principal drivers for the innovation.
- b) The barriers and risks faced by the company in developing this innovation.
- c) The key determinants in the process of committing to develop the innovation.
- d) The processes and technologies which the company used to carry this development forward.
- e) The extent to which the development relied on resources external to the company and the ways in which the deployment of these resources was managed.
- f) How management overview of the development was maintained.
- g) The extent to which I feel this innovation process represents best practice.
- h) My own critique of the whole innovation process, and an evaluation.



(Source: MotorBeam, Ratan Tata Gets Inducted Into Automotive Hall Of Fame, 27 July, 2015)

a) The principal drivers for the innovation:

The entire concept of the Tata Nano was conceived by Ratan Tata, Chairman of Tata motors. In November 2003 Ratan Tata saw a family of four on a scooter. It was raining and the family was somehow managing and adjusting themselves on the two-wheeler.

This incident moved Tata so immensely, that he took it on himself to come up with a safer alternative for this. He wanted the country to move around in a safer mode of transport (Mishra, 2020)

"Today's story started some years ago when I observed families riding on two-wheelers. The father driving a scooter, his young kid standing in front of him, his wife sitting behind him holding a baby. I asked myself whether one could conceive of a safe, affordable, all-weather form of transport for such a family,". This is what Ratan Tata said while launching the Tata Nano in New Delhi Auto Expo in 2008 (Mishra, 2020).

Tata Nano was launched in three variants- Tata Nano Standard, Tata Nano CX, and Tata Nano LX with dimensions 3.3m, 1.6m, and width 1.5m and engine 624cc with 27hp.

b) The barriers and risks faced by the company in developing this innovation.

As Tata Nano was entirely a new concept, new design, new innovation, new engineering so there was no chance to adapt any minor design/engineering from existing car models. Therefore, a completely new design had to be crafted from scratch (Sangeeta and Pradeep, 2011).

- **Production and Delivery-**

The company had a plan and strategy to start their production in West Bengal's Singur, and they also planned their suppliers nearby. Everything was set and ready to go. The company was about to start production in West Bengal's Singur. However, this plan turned into fiasco and this didn't bode well with many well-wishers of the state. The acquisition of land for the factory sparked widespread protests around the state. The manufacturing plant was eventually shifted to Sanand in the Indian state of Gujarat (Ray and Ray, 2011, p. 221). This hampered Tata's delivery and production schedule. The plant in Sanand, Gujarat was not able to meet the demands due to the slow production rate (Marketline Case Study, 2010, p. 12).

- **Cheapest Car' tag-**

Tata mentioned and used the Tag as 'Cheap Car' or 'World Cheapest Car' for marketing. Because the Nano was manufactured with an intention to serve to the lower-middle class society of the country. The society/people for whom Nano might even be their first car ever.

However, with all this eagerness, Tata didn't realise the negative impact and publicity it gathered. The word 'cheap' was being related to 'low quality', 'low valued', 'low standard'. Unfortunately, this shooed away many potential customers from the stigma of buying the 'cheapest car in the world' (Parsad and Sahay, 2021, p. 179).

- **Some modifications were needed after a small number of Nanos caught fire-**

Tata faced further problems when a small number of customers reported that their Nanos had caught fire. There were approximately six such reports in 2010 (thankfully no one was killed in the engulfed car). The reason for the fires was said to be "specific" to the cars involved, rather than a fundamental design flaw. Tata responded to the spate of incidents by retrofitting safety modifications, such as additional fuses in the electrical systems. However, it is likely that the reports would weaken demand for the Nano (Marketline Case Study, 2011, p. 12).

- **The Nano faces competition from other low-price cars**

A key competitive challenge for the Nano is the Maruti M800. This is also a budget car, a little larger than the Nano and fitted with a slightly more powerful engine. Shortly after the Nano's launch, Maruti announced that it would not be reducing the price of the M800 in order to compete on price.

Bajaj is also a potential competitor in this market segment. For the past few years, it has been in discussions with both Nissan and Renault on the possibility of bringing its Ultra Low Cost car to market (Marketline Case Study, 2011, p. 12).

c) The key determinants in the process of committing to develop the innovation.

d) The processes and technologies which the company used to carry this development forward.

Tata motors addressed several key characteristics that all Indian families (particularly lower middle class, middle class) would place importance on when considering a car low price, adequate comfort, fuel efficiency, maintenance, spare parts, and safety (Breuer and Upadrasta, 2017, p. 9). Moreover, Tata Nano's engineering concept in two approaches- strategic approach and technical approach.

❖ **Strategic approach**

Core team for innovation and NPD

Tata built a core team of 500 people (including those in charge of setting up the plant in West Bengal/ and after Gujarat) who worked on the concept for four years. In first stage, they came up with centered on a door-less four-seater that was more a quadricycle than a car. The design proposed the use of plastic weather-proofing similar like rickshaws/auto rickshaws and contemplated using new materials. This idea created a conflict with Tata's brief (and that was simple- it would seat four, have a low operating cost and meet all safety and emission standards). Therefore team scrapped the initial proposal and design and focused on the process of building what would be a car differently (Breuer and Upadrasta, 2017, p. 8).

Collaboration

Since no minor adaptation of existing car models could achieve the price imperative of the low cost car, an entirely new design had to be crafted from scratch. Breaking with many established conventions about how to design, build and source components, Tata Motors created a new blueprint for designing low-cost cars—combining in-house

design capabilities for initial prototype design and engine development, with collaborative partnerships. About 80% of component design and manufacturing was outsourced mainly to Indian suppliers (Kripalani, 2004 cited in Ray and Ray, 2011, p. 221) many of whom had a track record of manufacturing to global standards (Bowonder, 2004 cited in Ray and Ray, 2011, p. 221). Amongst foreign partners in the network was Bosch Automotive (Ray and Ray, 2011, p. 221).

Working with less and using powerful process i.e. lean design concept, engineers and suppliers worked together to redesign many components. This coupled with reduction in the amount of steel in the car and the use of lightweight steel reduced the cost tremendously (Lawaspect, n.a.).

The car was met all Indian emission, pollution, and safety standards, though it only attained a maximum speed of about 65 mph. The fuel efficiency is attractive—50 miles to the gallon (Hagel and Brown, 2008).

Opportunities and Skills

The opportunity to work on this car also gave Tata's engineers a chance to showcase their skills, because most other car products are designed abroad and engineers just have to manufacture components to a specific blueprint. In this project they designed light fixtures that meet all regulatory needs, fit the car and are low-cost (Ray and Ray, 2011, p. 222).

A Modular Design Revolution

The most innovative aspect of the Nano is its modular design, which has reduced cost significantly for the supply chain and distribution network for Nano, where it can be sold in innovative kits approach in which their components can be build and shipped separately to be assembled at various locations (Lawaspect, n.a.).

As Ratan Tata, chairman of the Tata group of companies (Ex), observed in an interview with The Times of London: "A bunch of entrepreneurs could establish an assembly operation and Tata Motors would train their people, would oversee their quality assurance and they would become satellite assembly operations for us. So we would create entrepreneurs across the country that would produce the car. We would produce the mass items and ship it to them as kits. That is my idea of dispersing wealth. The service person would be like an insurance agent who would be trained, have a cell phone and scooter and would be assigned to a set of customers" (Hagel and Brown, 2008).

❖ Technical Approach

Design and manufacturing Patents

In this whole process of innovation for Tata Nano, new design/engineering and manufacturing, Tata Motor's has filled for 34 patents. For an instance, Nano has a smaller engine because more horsepower would be a waste in India's overfilled and congested cities where cars travel at maximum speed range 10-20 miles an hour, therefore making the airbags a redundant features of the car (Lawaspect, n.a.).

Small wheel and Mounting-

The Nano was carefully designed to use small wheels which are lighter, which positively impacts economy, performance and ride quality, it also save the complexity.

Engine-

The four-stroke parallel twin 624cc engine and its mounting position i.e. rear mounted gives extra interior space to car. The rear engine, rea-wheel drive format eliminates the driveshaft so that it is cost effective.

Interior-

The styling of the Nano is based on functionality and comfort. Features like a radio, anti-lock brakes, airbag and air conditioning were also eliminated as they were included in models only if specified by the consumer. This reduced average costs on the basic models as these were functions that were not entirely important to a functioning vehicle. But most importantly, the smoothly curved design, two huge cubby holes ensure that the cabin gets an airy feel, lots of storage and almost eliminates the need for a glove box. The curved edges should also have a role to play in crash safety (Gaur and Sahdev, 2015, pp.17417-17417).

- e) **The extent to which the development relied on resources external to the company and the ways in which the deployment of these resources was managed.**
- f) **How management overview of the development was maintained.**

As we have seen, Tata wanted to produce Nano's standard model in affordable price so most of the Indian middle class society can buy it. So Tata has had to make savings wherever it can in the production and supply process. Great care has been taken to minimise tooling and production costs; for example, the door handles and mechanisms for the left- and right-side doors are the same. A central instrument cluster allows ease of right- or left-hand drive production (BURSA, 2008).

Tata Motors put in place an early **vendor integration** program to mine innovative ideas for lowering design and manufacturing costs by leveraging, exchanging and sharing knowledge within the network (Ray and Ray, 2011, p. 222).

Early integration of suppliers in the design phase facilitated concurrent engineering by enabling overlapping development phases to reduce the time to market, as well as costs during the subsequent manufacturing phase (Ray and Ray, 2011, p. 222).

Along the way, the vendors, which include Bosch for powering the car, Lumax for lights, Sona for steering, Shriram and Ricoh, were coaxed, corralled and challenged by Ravi Kant, the CEO of Tata Motors to cut costs. As he told a vendor at a meeting at the company's technical center, "If this car clicks, it will be as much your success as ours." The vendors took up the challenge and reengineered their own products and thereby brought down costs by 15 per cent (Aiyar and Bhupta, 2008).

Suppliers have been treated as development partners, and key Tier 1 s such as GKN (driveshaft) and Bosch (multi-point fuel injection and electronic engine management systems) have been given long-term, single-source supply contracts. Around 90% of Nano components will be outsourced, with 75% coming from single-source suppliers (BURSA, 2008).

Similarly, the chief engineer responsible for the Nano project was aware that "the price of the car is what the customer pays in the beginning but later on what matters is the performance of the car"—through its life-cycle. To achieve this, the Nano packaged product features such as very high fuel economy (50 mpg), compact but a spacious inside to accommodate at least 4–5 passengers, and high maneuverability—making parking easier in small spaces. Features that added further value to customer was a small luggage compartment under the front hood with a rear-mounted engine. Serviceability of the car was enhanced by having an additional opening on the rear floor which would provide access to the intake manifold and the motor. With a 33-h engine that clocked a 120 km/h top speed the Nano does not have radio, power steering, power windows, central locking or air-conditioning in the base model. The instrument panel is rudimentary—just speedometer, odometer and fuel gage (Ray and Ray, 2011, p. 223).

To lower manufacturing costs of sub-assemblies in the main plant, a labour-intensive assembly method was adopted. Tata's past development experience of the Indica family of cars taught its engineers some important lessons in how to exploit labour intensive but capital sensitive industrial engineering processes. The decision to use of skilled but cheap local labour instead of the industrial robots on a car like the Indica shaved roughly \$1 billion off the design and production cost and lowered the break-even output to 80,000 vehicles—about 30% less than the volume that global auto companies need to profit from such a car (Ray and Ray, 2011, p. 223).

Values of the new adopter group of young achievers were added to the original purpose to provide an equally safe and affordable car. Value proposition and stakeholder segments. The Nano was re-positioned as a smart, trendy, modern city car. The target audience was shifted from the scooter families to the young generation, college going youths, women, first time buyers and those looking for an additional car (Breuer and Upadrasta, 2017, p.10).

An action plan was put in place and sales increased - at first

Tata responded to weak sales towards the end of 2010 by implementing an action plan. The Nano was advertised on television In December 2010, the Nano was advertised on television for the first time. In fact, plans to use television advertising seem to have been underway as early as August 2010. According to online journal afaqs!, one

advertisement was based on the idea of the Nano as a car that would bring "joys" to the family that owned it, others targeted consumers wishing to trade up from motorcycles, and emphasized "privacy, intimacy, joys, and convenience". The use of television is a departure from Tata's initial approach of low-cost advertising (Marketline Case Study, 2011, p. 13).

Improved financing arrangements were made available

When the Nano was launched, prospective customers had to provide deposits that could amount to as much as 95% of the purchase price. This was a useful source of cash for Tata. However, to make buying easier, Tata Motors Finance introduced a financing scheme in which a customer could be approved for a loan of 90% of the purchase price within 48 hours of application. Tata also partnered with 28 banks to offer low-interest loans for this purpose. In a bid to attract motorcycle owners, Tata created a part-exchange / loan deal (Marketline Case Study, 2011, p. 13).

An extended warranty and low-cost service scheme was introduced

The free warranty on Nanos was extended to four years or 60,000 km. This was offered to existing owners as well as new buyers. A further inducement was a maintenance scheme. The monthly charge for this was INR 99 (\$2.20) (Marketline Case Study, 2011, p. 13).

The sales network was extended

Tata already had a sales network consisting of 619 branches. In 2010, it established 210 additional showrooms, and recruited 1,200 employees to staff them. The showrooms were small - no more than 500 square meters - and contained a single Nano. Tata also had the cars displayed at outlets owned by the retail chain Big Bazaar, to raise awareness among consumers (Marketline Case Study, 2011, p. 13).

Nano exports began

While Tata's initial focus was the domestic market, 2011 saw it begin to export the Nano. In May that year, the Nano was sold in Sri Lanka for the first time, and in June exports to Nepal began. Exports to the United States and Europe are likely to follow, although the car may need some upgrades before it is acceptable in these markets. Some analysts believe that the margins for the Nano in India are very low, while exports tend to have higher margins. If this is the case, expanding exports should bolster the overall profitability of the car for Tata (Marketline Case Study, 2011, p. 13).

Early 2011 showed a strong rise in sales, but this was not sustained

Sales of the Nano rose during the first six months of calendar 2011. Quarterly sales volume in the last three months of 2010 were down 58.6% on the sales during July-September 2010, but Q1 2011 saw a 153.8% increase on the final quarter of 2010. The first six months of 2011 had sales growth of 42.7% compared to the last half of 2010. However, this acceleration was not sustained. During Q2 and Q3 2011, sales declined by 7.2% and 66.3%, respectively. It remains to be seen whether a recovery in sales will occur going forward (Marketline Case Study, 2011, p. 13).

g) The extent to which I feel this innovation process represents best practice.

h) My own critique of the whole innovation process, and an evaluation.

The Tata Nano is specifically for Indian-market and that is designed to serve a very specific need - a first car for the many scooter/two wheelers and moped-riders.

According to my study, this was a unique innovation for India considering weather and road condition where majority of the people using motorbike/two wheelers to commute within the city, office, etc. Due to heavy traffic, extreme weather condition (such as heavy monsoon, hot summer and winters) it is very risky, uncomfortable and unbearable when you ride motorbike. Similarly, it is a family car and gives us more safety on Indian roads and in crowd.

Also because of its compact size, you can drive on the busy road (anywhere in the city) easily. It doesn't take much space for parking as well. So less contribution to the road traffic and congestion.

In the same way, in terms of fuel economy, Tata Nano is quite good (by comparing with other cars) and as I mentioned it is affordable for middle class people.

With attention to Innovation of Tata Motors'- Tata Nano offers everyone a compact but spacious car (for 4-5 people) in the same price range as a two wheeler/motor.

Hence, considering all, Tata Nano offers us a compact but spacious car within the same price range as a motorbike.

At the same time, if we want to do something different and if that is strenuous to get it done, it needs to borrow expertise from different and multiple fields. That's why innovation is combination (Satell, 2017, p. 38). The Tata Nano is combination of different strategy, process, design, engineering and innovations.

As study showed, Tata Nano is combination of frugal and disruptive innovation/innovation strategy.

In other words, Tata Nano is one of the most globally recognized companies for frugal innovation. Tata Nano was the final result of a four-five years of R&D expedition carried out by the Tata Nano development team. We have already focused on Tata Nano's engineering concept i.e. strategic approach and technical approach (Gaur and Sahdev, 2015, pp.17417-17417). By considering, Tata Nano's engineering concept and their two important approaches, it feels this innovation represent really good practice in auto industry.

As we have seen from beginning Tata Nano was a promise from CEO to the common-middle class people of his country to fulfil their dreams (like Tata advertised/marketing the Nano). And this was also more of safety concern which came from Ratan Tata (Ex CEO of Tata Motors). This totally was a new and exciting innovation for the Indian people including CEO and employees of Tata Motors. However, we also noticed some barriers, risk and failures which came across this development.

The price promised/committed as INR 100000 (\$2500) for a Nano but the striking difference between the development phase model and market entry model is approximately 25% hike in the base price (Gaur and Sahdev, 2015, pp.17417-17417). This is mostly because of increase in raw material price.

Similarly, somehow their first marketing tag went in the wrong direction. When they said 'Cheap Car' or 'Cheapest Car in the World' people took in the wrong way and thought like this car is not value for money, they might compromise quality, this car is symbol of poor people, it will show our lower status, etc. Eventually, they change their tag lines as well as the advertisement and marketing strategy and then focused on youth, safety smartness, functionality, etc.

On the other hand, the appearance of the Nano in the auto industry has set a new benchmark for other auto industry leaders to follow in terms of innovation. Whatever Tata Motors did for Nano that is lesson learnt and future guideline for competitors. For an instance, first listen to what the people need, their affordability and only then work towards meeting that on an innovative platform (Lawaspect, n.a.).

Then again, Tata Nano is not just a specific type of car, however, it is also a bundle of proprietary technologies, process, supplier and supplier relationship and a mind-set that prizes frugal engineers which applied to the needs of the developed countries like rich Europeans and North American markets could easily result in an upgraded car at lower cost than its competitor (Lawaspect, n.a.).

On the whole, though it is not completely successful model or process, however, I believe, it is one of the good innovation in its field that for sure.

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