

INDIGENIZATION:

THE ONLY SOLUTION FOR SUSTAINABLE

DEVELOPMENT OF INDIA:

EVIDENCES FROM AUTOMOTIVE

INDUSTRY AROUND THE WORLD:

VOLUME 4

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PUBLISHER: MRS. SUREKHA ASHISH URKUDE, CEO/ Sole Proprietor: IJROD Group, Nagpur, Maharashtra, India, 2015

E-BOOK-I.S.B.N.: 978-93-5235-445-0.



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ACKNOWLEDGEMENT

Dearest Almighty God,

Words are inadequate to express what I feel.

My Sadguru Swami Madhavnath (Late Mr. Madhav Vishnu Wakade, Sadashivpeth, Pune), my father Mr. Manohar Govind Urkude, mother, Mrs. Prerna Manohar Urkude, sisters Ms. Ashwini and Dr. Amita, my wife Mrs. Surekha, my daughters Ms. Ayushi and Ms. Arya, my Ph.D. Guides Late Dr. Madhukar Rode and Dr. Arun Ramchandra Bapat, His Excellency Honourable President of India Dr. A. P. J. Abdul Kalam. Many Scientists, Economists, Military personnel, Engineers, Managers and Roadside Mechanics, many true Gandhian Thought leaders, Sarasanghchalak Rajju Bhaiyya and many swayansewaks, and many Swadesi movement leaders like Mr. Rajiv Dixit, many industrialists most prominently Mr. Rahul Bajaj, even experts in many other fields and of course good friends of mine have requested to keep their name secret as they feel getting work done devotedly for the sake of the humanity or for the sake of the nation, is more important than name, fame and vote of thanks.

Thanks to Almighty, who helped at every moment, for this almost nil plagiarism book, when was written since 1992, till 2004, except for the published data taken from the surveys, and from the authentic organisational data from SIAM, or JD Power or PCRA, AMA, FADA, ACMA, FICCI, SEBI, etc.

Though Author is working on this project since 1992, many felt that the complicated statistics and research methodology may be kept away in case this book has to be read by all, hence, this book has simple hypothesis testing been kept, with some cases, live examples those happened before 2004 A.D.

What is applicable to India is true for every other nation too, and hence with due respect, I tried to kept myself away from blame game, it also proves that, more the indigenisation more will be the new ways to think about similar as well as different things, and implement too, and thus, every nation should be self reliant in the coming era to let human society achieve the Millennium Development Goals (MDG) of UNO, hence this small effort, otherwise as my other book suggest it would be a Million Year Development Goals (MYDG).

Yours Sincerely,

Dr. Ashish Manohar Urkude.



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Aim: Totally indigenous car and all the high end technologies

=> Made In India = Customer Delight.

AIMS AND OBJECTIVES:

To make each and every car technology according to the latest and future internal and external customers' demand. To keep upgrading present technology to cope up with future, through continuous R & D. All the technology will be developed in India using all Indian resources. This will make India self-reliant on the technological field. It'll achieve the ultimate goals on total Techno-Socio-Economic Standards. It'll delight the customers till they reach the self-actualisation level in the field of car technology. As Car stands at the middle of the basic technology to the space age future technology once this is achieved India can achieve the indigenisation of space and future technologies as well.



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CHAPTER 25:

INDIGENISATION OF SERVICES IN THE CAR SECTOR BY CONVENTIONAL MEANS AND USING IT AND WEB



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PART A:

Conventional Means:

In his 2003 Review, Mr. Harry Thompson has predicted that Computer and Car business by IBM, Ford and GM and to other companies have following things in common:

a. These companies are becoming more customers focussed. They discuss with the customer and try to provide their needs.

b. These companies have understood over the years that Customers' view is very important. The reason being as one individual if gets disappointed can pull the legs of at least other few.

What these companies are doing at present?

Customers' view, at the point of contact is noted and responded well:

- a. At purchasing point,
- b. At customer shipping, there is a receiving staff interaction,
- c. With customers while delivering the goods,
- d. While customers' invoice is made,
- e. While customers' pay the account with companies bill,
- f. While customers' tax, insurance, and other important papers are been made,
- g. While first few warranty services are offered, and
- h. While warranty period is over still customers comes for regular servicing.

Customers' view at the non-point of contact is noted and responded well having great personnel influence. The reason being all the non-direct point

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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE of contacts are spread-over in many places. It spreads influence of the company on the customer mind set. Customers' opinions from and towards reviewer, approvers, staff experts, advisers or on the combined sources of information, email counselling. Even giving consultation about alternative products, investment finances and other sources to existing customers to build the brand image and loyalty towards the company.

Part B:

Using IT and the Web:

The Survey of S and M of sales and marketing professionals shows that by 2004 around the world, almost 33% of car business would be on the Web. What are the reasons; expected advantages and what are the Steps in this Car business using IT and the Web can be known from the following points:

A. Reasons:

Further analysis shows that the Reasons of using IT and the Web for the e- marketing in the car business are:

> It has distinctive power to attract more customers,

➢ In the year 2007 almost one billion people will own the mobile phones having Internet facilities,

- > It helps to built loyalty among the existing customers,
- > In many fields it has improved customer services,
- > It has streamlined the business processes,
- Incremental sells to existing customers,
- Growing market share,



- > Enhance communications among customers,
- > Enhance communications among employees.

B. Expected Advantages:

USA organisations used this technique in the Sales and Marketing department with following advantages:

Faster Cycle time,

Higher Response Rate,

Improved lead management and simplified campaign testing,

Increasing Revenues,

Increasing Productivity,

Improved working in each channel,

Improved Selling and marketing strategies,

Reduction in sales force turnover,

Integration with marketing professionals,

Customer Relationship Management (CRM),

Improved Software and Database,

Cost of Customer related activities as collateral fulfilment can be reduced by 10% to 20%.

Many car companies have used Internet and mobiles to identify buyers, then target those buyers and create interaction with them many turn out to buy the car.

C. Steps Involved in the Online Services in the Car business:

All the car companies expect extraordinary performance from their sales representatives. In order to back up this activity the Web and the mobile has

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helped a lot to these car companies. Major Steps involved in these services are:

Step 1: Get Customer Feedback:

Pre-Sales,

After sales but in the Warranty period,

In the long term service contract but for Preventive Maintenances only,

For the Breakdown Maintenances.

Step 2: In Presales:

Contact is set up with the customer online through email survey,

Focus is made on the strategic groups,

Focus is made on the stratified groups.

Step 3: Define standards for the company for the Web Serving like below:

- a. For the online services reply time must be within 12 hours.
- b. For the offline services reply must be within 12 hours.
- c. For emergency services it must be immediately within few minutes.

Step 4: Slim and Thin Process is made using following factors:

- a. Trying to cut off multistage work process,
- b. Cutting off the flab from the Process Registration and thus its usefulness is known,
- c. By Asking Suggestions,
- d. By Rewarding the best suggestion online or offline,
- e. Positively distributing information regularly to the sales team,
- f. Collaborating with the other websites and by giving due credit to the



Part C: Revolutionary Suggestions:

1. AMC:

The Web can add this extraordinary dimension in the car business. There can be an Annual Maintenances Contract (AMC) introduced in the Car as well. At present it is available in the Computer field. In this the contractor gives free services to the customer for the usual tri-monthly servicing job. How ever he charges only for the parts, which required to be replaced. This improves the loyalty factor for the customers.

2. Buy Back scheme and Selling new car on discounted price. While doing this act of selling the cars through the IT enabled services would be fully furnished according to the requirement of the customers. The finances available for both the parties would be available on spot. This also improves the brand image and the loyalty of the customers. Infact if car companies decide the life of the car then they can carry out this after every year for the car customer also bought and is willing to buy.



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CHAPTER 26:

BUSINESS OPPORTUNITIES IN THE MOST PROMISING TECHNOLOGIES IN THE FUTURE CAR MARKETS AS PER THE CUSTOMERS' DEMANDS



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE This chapter, gives the details about the Hydrogen fuel driven cars, solar cell driven cars, fuel cell driven cars, sky cars, liquid Hydrogen fuel driven cars, etc. mastering these technologies can help Indians capture at least their own Indian car market as within 25 years the petroleum fuel will be extinct from the earth. Lot of customers have already started talking on these technologies as they feel they cannot afford high priced petroleum fuel. Shifting of technological base is always difficult but if Indians try to master these technologies part by part, screw-by-screw and nut-by-nut from today itself it will help them achieve self reliance on the technological field as this same technology is useful in other fields as well.

<u>Part 1:</u>

Present Situation:

In the October, 2000 issue of the magazine, The Machinists, it has been predicted that at present the estimated yearly turnover in the car technologies business around the world is around USD 500 Billion. This includes all the kinds of technologies used in the car market right from the Zero Technologies to the Higher End Technologies.

1. The Zero Technologies like pins, and circlip,

2. The Basic Technologies like bolts, gaskets, wiring harnesses, and tools required for the Lathe machines,

3. The Middle ware technologies like few assemblies in the cars like steering gear box, the starters, and





4. The Higher End Technologies like the luxury cars, the computers and the Robotics assemblies in the plants.

How much Indians have the share in this business? Not even one percent. It means even at the present juncture Indians stand nowhere around the world level. The lacunae are already discussed in the earlier chapters. Still the major reasons can be proclaimed to be the lack of awareness about the latest standards, lack of R & D efforts and dearth of funds in the every sector of industries in India. Most importantly the business bosses in India also do not know there can be more business in the car sector other than just:

- Dealership,
- Selling Spareparts,
- Service Stations,
- ➢ Garage,
- > Petrol Pump.

They don't know that they can fetch millions of dollar if they manufacture world class Basic and Middle ware patented technologies. Many are unaware about the patented parts. Many can manufacture but are unaware about the business opportunities in the Zero technologies as well. Many have said that they did not know the business opportunities in the patented parts like burglar alarms, steering wheel locks, automatic locking systems, rare view mirror for the Mercedes, Gaskets for the fittings, etc. By manufacturing all these businessmen in India can earn millions of dollars worldwide, in the car business.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE It is estimated that every Car is made up of more than Thirty Thousand (30,000) distinct individual parts.

How much Indians manufacture? Take a look at the present version of the cars in India and the claims by their authorities in India about the indigenisation of their cars: *(Reference: Each companies' Annual Report 2003):*

- a. In Maruti cars only 70% parts are made in India,
- b. In Hyundai Santro cars only 70% parts are made in India,
- c. In Fiat Palio only 5% parts are made in India,
- d. In Mitsubishi Lancer, only 3% parts are made in India,
- e. In Ford Ikon 70% parts are made in India,
- f. In Mahindra vehicles 90% parts are made in India,
- g. In Ambassador Cars 95% parts are made in India,
- h. In Mercedes cars 0% parts are made in India,
- i. In Skoda Octavia 0% parts are made in India,
- j. In Opel Cars 1% parts are made in India,
- k. In Toyota Cars 0% parts are made in India,
- 1. In Honda cars 0% parts are made in India.

Let us exclude the next version of the cars by these companies.

This proves that Indians are totally relying on the foreign technologies. What can be the result of this dependency?

- a. Indian high-class customers will get addicted to so call quality products of foreign made goods.
- b. The assembling technologies brought from the foreign cars to assemble their Complete Knock Down (CKD) parts and assemblies of

E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE the cars will bring dependency on the maintenances and services front,

- c. There is no technology transfer hence no manufacturing rights to the Indian businessmen,
- d. The next version of the cars will not be manufactured in India,
- e. Even these multibillion foreign companies buy the shares of the company they collaborate and try to overtake these companies or try to increase their say in the company by holding a big share in collaborations. Example: Suzuki has increased its share in the Maruti-Suzuki to 54% from its 49% share earlier. Thus, indigenisation efforts are totally avoided by money and management tricks.
- f. The foreign companies bring their conglomerate and sister companies or friendly companies product in India through free gifts or by fitting it into the cars or by giving a free tour package kinds of luring offers and thus bringing downfall to the Indian products and services.

These are few possibilities. Still, even these simple possibilities have brought downfall in the Economies of many countries like Indonesia, Malaysia, Mexico, and Argentina. As ultimately it brings borrowed dependency on the country where these products are marketed.

Also, by the time the nations and the organisations realise these facts the Multi-Billion Dollar companies mainly from developed nations bring down their next versions of cars. But natural, next version product slowly brings down obsolescence to its previous version if the product has more virtues



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE than its earlier versions. Since last few years every car giant brings its next version car within the span of two to three years.

So, the best solution for Indians is to carry out Research, Design, Develop, Manufacture, Maintain, Service a Car of Totally Indian origin. Otherwise force the present car factories to indigenise the car manufacturing. By Indian Technocrats, Bureaucrats and other human resources are well versed in all these Car technological fields. Only thing required is the focussed efforts. Business Opportunities in Targeting India's Own Indigenous Luxury Car:

As India is the fastest growing car market, global giants are entering the country. Hence, by manufacturing this Car Indigenously, India can become Self Reliant on the Techno-Socio-Economic front.

A. Major Reasons

•By the end of 2005, the entire car manufacturing organizations around the world will have to manufacture the cars, with minimum condition of having 85% of its parts Recyclable.

•By the end of the year 2007 A.D. it will be increased to 100% recyclable cars.

•It indicates that requirements of R & D investments in the Car Sector are huge for developing recyclable parts as mentioned above. Indians are not doing it at present, which probes the major opportunity.

•SIAM has predicted One Million Cars Turnover by 2010.

•Thus, if it does not happen India will be dumping ground of Technologies for the World Car Giants having Billions of Dollars turnover (which is more



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE than GDP of many individual countries for example GM, Ford and Toyota have USD 100 Billion Annual Turn All Around the World).

B. Expert's Opinion (Answers to a Questionnaire)

•It includes VP of Telco, CEO of Bajaj Auto Mr. Rahul Bajaj and Experts from IIT, IIM, ARAI, ONGC, BHEL, Daewoo, Hyundai, Engineers, Expert Mechanics, Businessmen in vehicle sector, Economists, Financial Experts, etc.

•1. Increase in sales of Luxury cars show economic growth.

•2. Car Industry is the biggest industry in the world.(USD 1 Trillion).

•3. Luxury cars are one of the peaks of the personal asset.

•4. Motor Vehicle Act-1988 must be revised according to new technologies of luxury cars.

•5. Even Public Sector of the Repute of ONGC, BHEL can manufacture better Luxury cars.

•6. Buying Luxury cars bring borrowed dependency on the Indian Customers. It also brings addiction to the foreign made goods, as every now and then these high-class customers are gifted with some or other kinds of foreign products.

•7. Maintenances, Services, Spare Parts, keep these cars busy with foreign transactions. Thus, constant source of money goes out of India.

•8.MNC be allowed to sell Luxury cars only if they transfer technologies.

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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE •9.Indian Car Experts claim that they can manufacture each and every part of the Luxury cars with mastery within the span of five years of the launching of the project.

•10. Indians are getting exploited in terms of cheaper option for Human Resources, Material Resource, and Financially too.

•11. If technology is not transferred it becomes permanent dependency on the foreign source.

•12. Esteem associated with the Luxury car owners influence the other followers (people) to buy the foreign made goods. Thus, Indian made goods looses its hold in the market. Thus sagging the Indian Economy. It may lead India to Mexican Crisis, Argentina Crisis, Indonesian Economic Crisis, or even can lead Indians to the kinds of Total Debt Trap due to dependency on these Auto Giants/MNC.

•13. These Auto Giants/MNC bring other conglomerates to India thus boosting their sales but influencing down fall of their Indian counterparts.

•14. In 1996 PAL conceded all its share value in the car market. One of the major reasons was its 80% Technical Staff got triple paid job in the MNC.

15. These Professional Cars MNC earn huge profit not only in India but also from global business, which is of no use to India.

16. Directly or indirectly huge foreign exchange is spending on various foreign made goods including Luxury cars.

17. Remember, Luxury car owners are the highly influential people and have very big say in the Financial matters in their fields. These people become





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE addicts to foreign made goods. Can the followers be ignored? So the whole lot of high-class Indian consumers are almost been lost to these MNC commodities including Luxury cars.

18. Luxury car is that market where money is list important where as customer delight is main aim of the product.

C. Why Indian customers are paying high cost for the cars?

•1. The customer pays for the investments in the R & D and its implementations by the original MNC car giants. Remember every car part is created once but innovated and improved time and again from its earlier versions.

•2. These MNC like Ford, BMW, GM, Toyota manufacture their own patented car parts. Otherwise they assemble parts from the company of their own countries or from one among the conglomerate.

•3. The cost of infrastructures and building plants in India, which includes the Assembling Robotics and Supporting Technologies. They, invest less pay less but earn more profits. Means we are paying for their profit as well, if they have shareholders.

•4. The cost of shipping these technologies: The CKD (Complete Knock Down) form is the imported car assemblies or the car parts. These parts are assembled in India and then sold.

•5. The Cost of Advertisements and Marketing for the latest technologies in the cars.



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6. Thus, if the cars are manufactured indigenously the cost of the car should be reduced to literally 50% of its present price.

D. Sample Calculations:

- Simple Screws, Nuts and Bolts, Circlip, Holding Pins, like simple parts when manufactured in India cost maximum Rs. 10/= to Rs. 20/= Where as the same costs Rs. 120/= to Rs. 180/= when imported from the country of origin.
- 2. The simple oil filter manufactured in India costs Rs. 200/= maximum.Whereas its same imported version costs Rs. 760/ =
- 3. It is the case with the oils, lubricants, tyres and tubes, greases, paints and other products.
- 4. The cars are sold at par with the prices in USA like USD 8000 or Rs. 4 Lacs and so on. But spending of MNC has drastically reduced. As our Engineers are paid almost Rs. 1 lac per annum or USD 2000 per annum, where as in USA they get same terms in USD 1 lac per annum. Thus spending of these cars giants has reduced to one tenth. But profit margin has increased.
- 5. So prices can reduce drastically when the product (CAR) is Indiginize.

E. Why Luxury cars only? :

As mentioned earlier there are following kinds of technologies in the world: Zero End Technologies, then Basic Technologies to make circlip, nuts, bolts, and pins. Then Middleware Technologies to make few assemblies in the





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE small cars, the washing machines, and the printing machines. Lastly Higher End Technologies like Luxury cars, CAT Scan Machines, Missile Technologies, Automated Robotics.

On this basis, if one can observe that, 80% of the organizations listed in CII directory or even in the American Industries Directory are directly or indirectly related to the Automobile Sector. They are full time busy in the manufacturing of few of these Basic and Middle ware technologies.

•In India these CII listed companies are not manufacturing the parts required for the Higher End Technologies yet.

•Thus to acquire skills of Higher End technologies Indians have to master the Basic and the Middleware technologies of latest world standards.

Opportunities:

•Present Turn Over in the field of Basic Technologies and the Middle ware Technologies is around USD 500 Billion (The Machinists-Magazine-October-2000). How much share Indians have? Not even 1%. This includes the tools for the lathes, the nuts and bolts, the circlip, the hosepipes, the gaskets, and few small assemblies in automobiles.

•Even mastering manufacturing technologies of a single part of a car can make a giant MSI in India as individual part can fetch at least USD Five Million.

•No need to say if indigenisation takes place the Dealerships, Service Stations and Garages can be the most promising Opportunities.



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•Communication in local language can percolate the technologies at grass root level and can generate number of skilled workers.

PART 2:

Present Claims and Facts of Indigenisation:

1. **India claims** to have developed Super Computer indigenously but it has only developed the parallel computing technique not the hardware. It is imported from IBM, Samsung and other such companies.

2. Tata Motors claims that Tata Indica is the totally indigenous Car.However, it is not so. Here are few visible facts which can shake this claim:It is designed by IDEAS of Italy.

•It is fitted with Hitachi Fuel Injection System,

•It is using Robotics in the factory which is made in USA, Italy, Japan, and Germany,

•It is fitted with microprocessors made in Japan.

3. **Maruti Suzuki** Claims to have Indiginize the Cars it manufacture. However, it is not so:

a. Still many Engine Parts and the Gear Box parts are directly imported from the parent Suzuki Factory. Even for few cars the Engine and the GB are directly imported from Japan.

b. Mr. Khattar, MD, of Maruti claimed to have Indiginize only 70% parts of the Maruti Car.

c. The Robotic Technology to assemble various parts of the car in the factory are totally brought and maintained from the Japanese counterpart.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE d. Last but not the least Suzuki has 54% claim in the factory so ultimate say will be from the Suzuki, Japan. Means Management has the power to reject any thing that harms the parent company in Japan.

Total indigenisation efforts have been already rejected. Suzuki is not ready to sell its total claim. At present Suzuki-54.2% ahs the highest share in the Maruti Suzuki Venture. Government of India has 18.3% share and Public Issue-27.5%.

Isn't it true that 54% Profit of Suzuki every moment is siphoned out from India and is going towards Japan?

4. **Many MNC Car makers** claim that they have collaborated with the Indian Car companies for some share, 25%, 50%, or like that. Where as they have Billions of Dollars worldwide turnover. Thus, these tiny investments are opportunities. Later on these MNC adopt simple management tricks to buy more shares of the Indian Company (Counterpart).

5. **The Technology Transfer** is a distant thought for these companies. They keep their Indian counterpart dependant on them. Also, MNC take advantage of ignorance of technologies, and treating R & D as a burden activity and even lack of awareness about the latest technologies among their Indian counterpart.

6. **Directly or indirectly** these companies in Indian collaborations bring their other products made by their sister concerns into Indian market. The way to bring may be by giving free gift, concession or some kind of lucky draw. They make people addict of their products.





•7. **By the versioning** (Next improved products) in the products, these foreign MNC keep their R & D ventures full fledge working and keep customers busy with them. Thus, before the mighty market forces shake the Indian counterpart. Thus, if these technologies are not Indiginize India will get looted.

•8. **Japanese companies** stop manufacturing the parts after they pass some ten advanced versions. Example: Camera bought in 1992 could not get its spare parts in 2000 as the company stopped manufacturing its every kind of production and dealings (of this older version).

•9. Japanese carmakers sale product at low cost where as the spare parts and services are costlier. Many Indian consumers cannot afford these hefty ventures. Few consumers in India, especially the middle class people treat important commodity like car, as a life long asset. The company, which can manufacture Luxury cars, can easily manufacture the small cars.

•10. With heavy budget over the R & D, Marketing and Advertising (Almost 1.5% to 2% of their annual turn over) these multibillion-dollar MNC capture market and internal and external customers. Internal customer (Employees and Vendors) and External Customers mean Consumers of the product. Infact they keep the loyal customers always luring. Specially mentioning here would be GM, Ford, Toyota, which have more than USD 100 Billion turnovers every year. Their 2% means at least USD One Billion which is a hefty sum by any means for other companies to afford in the world.





<u>PART 3:</u>

Business opportunities in the most promising future car technologies: Section A.

Cars running on the Alternative Fuels:

The non-conventional fuel driven cars also have the most promising future in the car market. The non-conventional energy sources are those fuels other than petroleum. As the petroleum is getting extinct within the span of twenty-five years, these technologies require thorough research and implementation in the market. Who so ever brings the cheapest and most efficient technologies will be the ultimate winner in this race. Already Indians have registered their foot in bringing cheaper technologies in Super Computers and the Space Launching. Indians can bring same revolution in this sector as well.

The search of an alternative fuel driven cars and it fuel is getting momentum in India. There are three main factors, which are influencing this movement:

- > Fast Depletion of non renewable Fossil Fuel,
- The increasing import bills ruining country's economy, as India spends Rs. 60, 000 Crores annually to import 70 million tons of petroleum products.
- Environmental imbalance created due to burning of fossil fuels is a major concern for all the countries in the world.
- Scientists are trying to find solution over the more permanent kind of fuel, which can be used, in longer run with least hazards.



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SN	Year	Import bill in
		Billion Dollars
		(USD)
1	1996-97	9.7
2	1997-98	8.3
3	1998-99	6.4
4	1999-00	12.5
5	2000-01	16.5

<u>Table: 26.1</u>: Showing increase in India's Oil Import Bill:

Description of the Table: (Reference: 2001 Oil Import bill of India)

Thus, Import bill of oil is increasing day by day as the numbers of vehicles on the Indian roads are increasing day by day. From 1996 till 2000 within five years it got almost doubled from 9.7 Billion USD to 16.5 Billion USD. Which has alarmed the Indian citizens as well as to the scientists and the engineers and the businessmen as well.

> Environmental concerns to get a cleaner fuel.

> Consumers are demanding car and vehicle technologies with energy and economic sources, which have deep roots in the processes spread all over the India.

➢ Increasing number of cars and other vehicles on the Indian roads. As India has been recognised as the second biggest market for Automobiles. It is estimated that in 1997-98 passenger car sold were 416000 in 2000 it was 633000. Thus, in 2010 it will be 2.4 million. In 1997-98 MUV sold were 134000 and in 2010 MUV sold will be almost 500000 units. In



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE commercial vehicles it was 156000 units in 1997-98, which will be almost 600000 units in 2010.

> India's lower Self-sufficiency in the Oil. Infact decreasing Oil-Self Sufficiency is very important factor to deal in future, which is also the challenge before the Indians.

Table: 26.2:

Decreasing Percentage of India's Self Sufficiency in the Oil Sector:

SN	Year	% Of Oil Self
		Sufficiency
1	1996-97	39%
2	1997-98	37.60%
3	1998-99	34.30%
4	1999-00	31.70%
5	2000-01	28.70%

Description of the table:

From 1996 to 2000 India's self sufficiency is reducing in the oil sector. Though production is increasing still the number of vehicle is also increasing at extremely faster rates. Thus, from 40% to 30% decrease in five years can make totally dependent country in coming twenty odd years.

Hence alternative fuels technologies have to be given very high priority.

Few most promising alternative fuel driven car technologies are given below:

i. Solar Cells Driven Cars: It requires the technology to manufacture highly sensitive photovoltaic cells made up of Silicon as a main material.





This requires the Indian Electronic Industry to come up to present age. At present Solar Cells are used for water heating. Still Indians have not mastered the Solar cell driven car technologies. Even if few students have done the project in the Engineering colleges it is not commercialised. Where as in Australia Honda, Ford and General Motors are conducting cross-country car race in the month of October every year. Every year every company shows it's might over the solar driven cars. India is nowhere at present. The talent in the Engineering Colleges is going waste. It can capitalised only if some Indian car company like Tata Engineering, Bajaj, Mahindra and Mahindra or other indigenous company come forward and manufacture it after through research then only it can capitalise in future. Where as at present they are busy in short term profit gaining tactics like collaborating with foreign companies. They must realise the future lies in these kinds of technologies only, as India is tropical country so it receives maximum amount of solar energy almost for eight months of the year.

ii. Fuel Cell Driven Cars:

It is relatively recent technology. In India however no significant breakthrough is possible in this technology. Though every engineering graduate from Mechanical, Electrical and Chemical streams got exposed to the theory behind it, still Indians have long way to go to master this technology which can run the cars. Few Scientists feel that the most promising technologies that derive the energy from renewable and nonrenewable (as transition stage) sources could be these fuel cells. Fuel



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE cells are more versatile, much cleaner, more efficient, and unaffected by the depletion of fossil fuels.

- Technically, its working is very simple. A fuel cell is an electrochemical device; electricity is produced by chemical reactions. The Reactants are Hydrogen and Oxygen the most abundant gases. These are supplied continuously to batteries. As, Fuel cells are often linked to the batteries that never run down.
- > There are several types of fuel cells. Which provide DC (Direct Current) voltage that can run power motors, lights, any number of electrical appliances as well besides those which can drive the cars. The most promising among the fuel cell technologies which is likely to be car drivers is the Proton Exchange Membrane Fuel Cell (PEMFC). It uses a Polymer Electrolyte Membrane (PEM). This Fuel cell uses a simple chemical process to combine Hydrogen and Oxygen into water, producing electric current in the process being an exothermic reaction. PEMFC operates at fairly low temperature about 50 to 80 degrees Celsius. Thus, it gets warm very quickly and don't require expensive containment (control) structures. As other Fuel Cell Technologies have higher temperature working PEMFC supposed to be the most promising technology among all the fuel cell technologies. Only problem it is facing today is storing of highly explosive gas the Hydrogen. Also the higher temperature required to be generated is also a problem in other kinds of the Fuel Cells. Thus, there is huge scope for the R & D ventures in Automobile, Chemical Engineering, and Electrical and especially in the





Alternative Fuel Industries. Who so ever is successful in developing cheaper technologies for fuel cell in India will bring revolution not only in India but also around the world.

ii. Flexible Blended Fuel Driven Cars:

Only Ford, General Motors have this kind of technology. In this the cars run on Petrol mixed either with 5% or 10% or 15% of ethyl alcohol. Thus there is a flexible fuel mixture available. If next versions of the engines find still more flexibility it can fetch billions of dollars to the R & D scientists and the manufacturers.

iii. Battery Operated Cars: Indians have indigenously manufactured these kinds of cars successfully and 7000 of them named 'Reva' are running already on the Indian roads since 2002. These cars are extremely compact, and are battery driven. However they are not family cars and hence are not much in demand. Thus, huge R & D potential to go for the next version i.e. for the family cars, which are battery driven. Also the problem of charging the battery. The frequency at present is very high. So, the research on the long life of battery has to be taken seriously who so ever is successful will be getting all the benefits from the project as well.

iv. Hybrid Cars: These cars mainly use the conventional petroleum engine of the car to start the vehicle. It drives the generator, which charges the battery all the time. Then for the rest of the driving on the road the Battery supplies the current to drive the electric motor, which drives the vehicle. In USA Ford sold 8000 cars and infact started battery-charging stations around the nation. Still, this frequency is very high so the cars





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE failed to be popularised. Still if developed the rural population will be the most to get benefited from these cars.

v. Alcohol Driven Cars: This technology has the deepest root in the national economy of every country it is been used. The main reason is it uses the grains, the corns, certain vegetables extract etc. from farm to the houses. Infact the most benefited part of the country will be the industrial zones with Delhi as a centre Mumbai as centre and industrial areas near the Sugar factories. Molasses of the Sugar cane are used prominently for the manufacturing of the alcohols. Thus, the whole western Maharashtra, the Uttar Pradesh, Delhi, Punjab, Harayana will be the most benefited area. It will also help in building other agricultural based industries in these zones.

Pure Alcohol: In Brazil and other Latin American Countries since few decade cars are driven on the 100% Pure Ethyl Alcohol. It has helped these countries economy by few percent. It is due to increase in use of agricultural grain, corns, and some other farm wastes to manufacture ethanol. It boosted the farming for ethanol. It helped increase in jobs, creating and increasing household income of many farmers, and saving petroleum imports. The technologies used to drive the alcohol engine car are also simple.

Blended Alcohol: In USA gasoline (petrol) is blended with 10% ethyl alcohol (Ethanol). In Brazil, almost all the cars are driven on blended fuel, Petroleum with 22-24% Ethyl alcohol (Ethanol). Infact, in India this process is used in the truck and transportation industry. Good news is



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Ashok Leyland is successful in indigenising this technology with the help of IIT, Delhi and Indian Institute of Petroleum (IIP), Indian Oil corporations (IOC) and Delhi Transport Corporations (DTC). The Ministry of Nonconventional Energy Sources (MNES), Government of India, sponsored this whole R & D project.

vi. Hydrogen fuelled cars: Remember Hydrogen is the most abundant fuel in the Universe. It can be used in the cars as well as in the space vehicles. Hence, this technology has the wider range of use and it is the most promising technology of all. If India masters this technology then for almost hundred years no other country will dare to dominate the Indian fuel market. Let us see what are the cars companies worldwide are doing at this front. Almost every car company is working day and night to develop the best possible technology for the Hydrogen driven cars. Still the best report in 2003 over this subject is from the Ford Car Company of the USA.

In 2003 Technology Report, Ford Company has claimed to develop the Hydrogen driven cars. Ford has developed the model U concept car. Internal Combustion Engine (ICE) propels the U car. This engine is optimised to run on Hydrogen fuel instead of gasoline (petrol). The engine is supercharged (provided with high oxygenated air or more amount of air is provided than normal flow) and intercooled for maximum efficiency, power, and range. Its emission of all pollutants, including carbon dioxide, is nearly zero, and the engine is up to 25 percent more fuel-efficient than a typical gasoline engine.



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The Hydrogen ICE is a common-sense power plant that uses existing, proven technologies to deliver the environmental benefits of a Hydrogen fuel cell, but at a fraction of the complexity and cost. The engine is based on Ford's global 2.3-liter, I-4 engine used in the Ford Ranger, the European Ford Mondeo, and a number of Mazda cars. It is optimised to burn Hydrogen with high-compression pistons, fuel injectors designed specifically for Hydrogen gas, a coil-on-plug ignition system, an electronic throttle, and new engine management software.

Model U Engine is very specific and specialized. As Hydrogen has a very wide combustion range (from 4 to 75 percent), Hydrogen-fuelled engines are able to use a wider range of air/fuel mixtures than gasoline engines, and can be run in the fuel-efficient "lean" regime without the complications of pre-ignition or "knock." Thus, it can be used in the Himalayan regions a well. It can reach an overall efficiency of 38 percent, which is approximately 25 percent better than a gasoline engine.

In addition, there are no carbon atoms in the fuel; combustion of Hydrogen produces no hydrocarbon or carbon dioxide emissions. Even without after treatment, oxides of nitrogen are very low, and catalyst research may soon reduce tailpipe output of potentially smog-forming emissions to below ambient conditions in many cities. This means that the air leaving the Model U's tailpipe could actually be cleaner than the air coming into the engine.

Designing a gasoline engine to burn Hydrogen fuel has typically resulted in significantly lower power output—until now. Ford researchers have



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE shown that with supercharging, the Hydrogen ICE can deliver the same power as its gasoline counterpart and still provide near-zero-emissions performance and high fuel economy. The centrifugal-type supercharger provides nearly 0.3 Kgf per square centimetre, of boost on demand.

Also, Model U uses a novel dual-stage inter-cooling process. After leaving the supercharger, the intake air passes through a conventional air-to-air intercooler, then through an air conditioning-to-air intercooler for a further reduction in temperature.

vii. Other Gases Driven Cars, ex. Liquid Nitrogen driven cars, etc. One of the scientists from MIT (USA) drove the car on Nitrogen. He used the cylinder of Nitrogen, evaporated the gas and made to pass though defined channel. Finally it drove the propeller, which ultimately drove the car. Though speed is every low i.e. approximately 10 Kmph, still a new concept has born. How many Indian car companies and Institutes have these facilities? Can the Indian organisations allow such practical? Aren't these very big questions? Though India is long away from this project but the knowledge explosion to the new generation will bring some positive in future.

Thus, business opportunities are knocking in the R & D of alternative fuel driven car sector at every moment but Indians are not capitalising its huge potential talents. If one idea clicks and it is patented then it can bring the whole future business in the car sector to India.

Section B.



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Flexible Robotics car manufacturing Technologies to manufacture variety of cars:

In the present context India do not have the car manufacturing technologies as advanced as the MNCC have. Take example of Ford it has flexible car manufacturing Robotics plants in USA and UK and on many overseas projects. These kinds of technologies allow the Robots to manufacture lot of versions of the cars, by few manipulations in the computer and Robotics settings. Though there are innumerable possibilities, still let us see some kinds of Robotics that are been developed for various purposes in the car plants.

- Robots for assembling certain parts,
- > Robots for assembling certain assemblies of the car parts,
- Robots used for the car painting,
- Specialised Lathe Machines and Robotics Technologies are yet to be developed using the CAD, CAM to manufacture intricate engine, gearbox, and fuel injection system parts. It includes the software required for CAD, CAM to carry out these operations,
- Milling Machines Automation, Planar Machines Automations, and Lifting machine automations, automatic tool changers, Linear Interpolations, etc.
- CNC operated Sawing, Drilling, Vertical Milling, Gear Cutting, Grinding, Tooling, as advanced as the world's the best in these fields of the likes of Ingersoll Cutting Tools Company, Cincinnati Milacron, Mazak



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Corporations, Boston Digital Corporations, Nikken Kosakosho Works who are leaders in the car manufacturing field.

Robotics coupled with computer system meant for various simulations.

The combined effect to manufacture a car can be best seen on the Suzuki Cassette. Suzuki Corporations of Japan Manufactures a single car in whopping 53 seconds only.

Using these technologies Ford has planned the objectives for the 2002. It includes positive corporate pre-tax operating earnings, improved result in both Europe and even in South America. Ford also targeted non-product related cost reductions of USD 2 Billion, capital spending of USD 7 Billion and realisation of USD 1 Billion in cash from diversifying non core operations. Ford is also terminating 35000 employees worldwide as a part of restructuring. Ford also plans significant new or freshened products in the US annually and capacity reduction of about 1 Million cars per year by the mid-decade. It will focus on material cost reduction, discontinue low margin- models and divest non-core assets. Thus, Computer Systems and Robotics are vigorously taking over the jobs of the human resources in the giant car companies like Ford for the betterment of the product, processes and services of the car resulting to higher profit and growth of the company.

Example of Other Company using this technology may be the Chrysler Corporation, which has reduced the development time of the car by almost 40% than its previous best attempt.





After manufacturing there are Robots used for the impact testing of the cars as well. On this front also Indian car manufacturers have not reached the pinnacle as their world competitors have.

However, in the Indian context, all the MNCC are using car-manufacturing technologies from the parent companies or from some other foreign sources chiefly from Japan, USA, Germany, Italy and UK. It is not the thing that Indian Engineers do not know about this technology but it is a matter of implementation of various indigenous projects related to the Robotics are very less in India. At the same time Indian Engineers are slowly gaining the momentum in this technology.

The biggest advantages of using these kinds of Robotics along with the Computer and Simulation Technologies are:

Increase in the overall efficiency of the plant,

Improvement in the quality of the cars,

Improvements in the technologies of the cars,

Reduction in the cost per cars,

Predicting the future happenings using various computer and / or robotics assisted simulation tests.

Improving the profit of the car organisation,

Improving the Brand name day by day,

Improved all over safety of the cars from the environmental to breakdown point of view.

Unfortunately Indian Businessmen have little knowledge of all these Robotics concepts and hence have contributed to very high cost economy. As these



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE same technologies are used also in other fields including Pharmaceutical industry, Electronics industries, Printing Technologies, and many more.

Section C.

Technologies to develop the eco-friendly but durable materials in the cars:

With the new car technologies being developed every day some international norms have been developed. According to these norms, by the end of 2007, every car part and its technology will have to have only one character in it the recyclable capability. Thus, the part can be sold in the Car market only if it has recycling capability.

The important thing is India is the multi-terrain country. Its diversity in climate and defined whether also requires the car parts which are durable in all these conditions. The biggest advantage is that India has overall well defined weather pattern i.e. distinct summer season, the rainy season and the winter. Only on occasion it may change, otherwise it's the routine.

So, the parts developed for the cars will have to suiting all these conditions without harming the ecological balance.

The Metallurgical contents of the Iron and Steel used in the cars will have to be recyclable in the Indian hearths without harming the ecology. It is the case with Aluminium, the Plastics, the Rubber material, Glasses, the Curtains, the Bulbs, the Electronic equipments, and other materials.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Thus, there is a huge scope in developing these kinds of technologies, products and to manufacture these kinds of materials of latest world standards.

Section D.

Technologies in the Servicing and Maintenances in the cars: At present maximum of these jobs are done manually. Only in few servicing and maintenances workshops these technologies are used. However, it also has the same problem, all the technologies are imported from USA, Japan like countries and are also maintained by their engineers. Sooner or later, when the number of cars will be exceeding the manageable proportions than the garages and the services stations in India. So, ultimately these servicing and maintenances teams of engineers and mechanics will be using these technologies for the timely and efficient works. Thus, Indian R & D engineers and scientists have extraordinary work in their hand to develop these technologies at cheaper and better way than their foreign counterparts. These technologies mainly involve the indigenous development of following most used technologies by the technologically advanced countries:

The Lifting Jack Systems for every kind of cars,

The Car Washing Technologies including Robotics to reach every corner of the car with least possible time,

Denting and Painting technologies,



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The Automatic Wrenches, Automatic Spanners, Automatic Screw Drivers, Automatic Washer Fitters,

Automated Oil checking and filling technology,

The Automatic Fuel Injector Technologies,

The Automated Engine Decarbonisation Technologies,

The Honing machines, the Polishing machines, also requires the up gradation in technologies,

The software used for indigenising automating all these activities also has the extraordinarily high scope.

Section E:

Very important technologies, which needs immediate attention from the Indian indigenous manufacturers:

Some technologies that are not yet been developed in India but form the very important aspect in the car business at present:

- > The microprocessor controlled fuel injection system,
- > Highly efficient Petrol fuel injection system,
- > The Catalytic Converters to reduce the exhaust fuel pollutions,
- > The tubeless and puncture less tyres,
- CNC machines,
- The cheaper engineering and accounting and office software of the like of AutoCAD, ProE, IDEA, Access, which cost more than few lac to few crores of rupees which Indian companies cannot afford to develop the indigenous car accessories, spare parts and major parts.





Section F:

Technologies to build satisfactory customer relationship in the cars:

To provide customised solutions to an increasingly savvy and well-informed audience. It gives buyers the power of choice to make their own unique car models, reflective of their own unique car models, reflective of their distinct individual style, preferences and requirements.

It includes the computer and Information Technologies.

- > Mobile phones operated and fitted and charged in the cars,
- > The LCD screen computer or displays in the cars,
- The Global Positioning System (GPS) and mapping system for the to run on the Indian roads,

The list is unending still it is worth mentioning here would be that these technologies are not yet been manufactured or even developed in India. Thus, these technologies have tremendous scope in the Indian market. If MNC carmakers are bringing it in the Indian market then it must have a very good scope in the global market as well. As only for Indian market no company can afford manufacturing such kinds of goods. Thus, proving the golden opportunity in this business as well.

Section G:

Software needs to be developed for the Customers Relationship Management (CRM) specifically for the Indigenous Indian cars:

As the name suggests CRM offers end-to-end visibility of your operations and is designed to effectively manage your varied functions viz. marketing, sales and services.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE It also supports customer process in a variety of industries. This means you can easily combine industry core process with the generic and industry specific capabilities.

If Indian software giants develop this CRM it can create a seamless flow of business information and business transactions and knowledge across the entire value chain thus building true customer centric operations.

There is one softaware, which is very popular in the world and that is SAP. However it costs several crores of rupees. Hence it is the need of the day to develop cheaper and indigenous software so that the Indian SSI will be able to afford for it.

In SAP there is an industry specific CRM process for the automotive segment, but there is no specially developed CRM for the Car sector in India is available till date.

Hence, once developed, the indigenous software will look after Customer and Car relationship management. Even car companies can manage there on customers as well as the product through all stages of their life cycles. It includes the car market planning, car sales and distribution management, car finances, car insurances, and after sales services, etc.

That is why my point is why to settle with the generic CRM when our own Indian software experts can develop company focussed, specific car focussed CRM.



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Section H: Export Oriented Manufacturing:

Even a single part having one million requirements in the world car market can build a big Medium Scale Industry in India. As that company would have more than at least Rupees One Crore turn over in this business. Few Indian companies like Sunderam Fasteners, India Forge, Mukund Iron, Bharat Forge are already selected some such parts. Some are making Hosepipes; some are making forged connecting rods of the car engine. However, Indians will be totally self sufficient in the car indigenisation only if they manufacture all the 30000 car parts, in distinct cars, having flexible machinery to manufacture these car parts. He flexible categorically means the machinery set up with which different sizes of parts can be manufactured at different times for different requirements. Thus it is futuristic requirement. The different quality parts when exported will enhance the Brand image of Indian companies and hence the 'Made in India' tag and will bring laurels to India along with huge Foreign Exchange.

PART 4: SAMPLE SOLUTION FOR FUTURE DEVELOPMENT PROJECT:

To develop the Indigenously Built Fuel Cell Driven Car:

Due to environmentally cleaner and more efficient technology, fuel cells are considered a future option for domestic, industrial, transport, and Agriculture sectors and for power supply in remote areas. Fuel cell program in India has included technology development for the components as well as various types and sizes of fuel cells in various power ranges. This program at present is essentially government sponsored involving R&D institutions and the industry. A Public Ltd. Company, Bharat Heavy Electrical Ltd has





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE developed Phosphoric acid fuel cell (PAFC) stacks of 5 Kilo Watt (kW), 10 kW and 25 kW. The R&D division of this company has also developed 50 kW PAFC power plant. A Canadian PAFC fuel cell of 200 kW has been tested for an automobile in the Indian conditions using propane rich liquefied petroleum gas as the fuel. Work is also in progress on Molten Carbon fuel Cells (MCFC), Polymer electrolyte membrane fuel cell (PEMFC), Solid Oxide Fuel Cells (PEMFC), Solid Oxide Fuel Cells (SOFC) in different power ranges. If private parties like Tata Motors, Mahindra and Mahindra and Bajaj Auto Limited like automobile Indian giants can contribute in this it will be a easier and faster result oriented project.

a. What are Fuel Cells? Considering the fact that fuel cell technology can provide power in a cleaner way by utilizing a conventional or a non-conventional fuel, the Government of India has aimed to developed fuel cell technology with the potential user listed in Table 26.3:

SN	Power	Potential Users	
	Range		
1	1.5 Mega	Luxury hotels, Some factories,	
	Watt	Hospitals, Banks, Business Centres,	
	(MW)	Information technology Centres,	
		Chlorine, soap and alkali industry,	
		Petrochemical industry, Offshore	
		oilrigs, Dairies and Food stores, etc.	

|--|





		Off shore oil rigs
2	0.2 MW –	Small Commercial Complexes
	1 MW	Restaurants
		Residential buildings
		Bigger Automobiles
3	1 – 25	Decentralized power packs
	Kilowatt	Military applications
	(kW)	Remote and disaster site applications
		Four Wheelers like cars

The fuel cell program in India has included technology development as well as demonstration, largely supported by Government – the Ministry of Nonconventional Energy Sources, Department of Science and Technology, Ministry of Coal and few other divisions.

Important Note: For the Automobiles and especially the cars this one-kilo watt to twenty-five kilowatt powered cells will be very useful. As almost 25 KV is the range at which ignition occurs in the car engine having spark plug. Hence, it can be given more importance in India and hence must be the prime target of R & D of the Motor Industry.

b. Types of fuel cells: The development of fuel cells is more than 150 years old. The classification of fuel cells can be done on the basis of configurations, fuel and oxidant, direct or indirect fuelling, type of electrolyte and temperature of operation. Various parameters of classification are given in Table 26.4:



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Table 26.4: Parameters	for	classification	of	fuel	cells:
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S	Direct	Indirect	Ordinate	Temp.	Electrolyte
N	fuel	fuel		۰C	
1	Hydrogen	Hydride	Oxygen	Low	Dilute
				< 260	Sulphuric
					Acid
2	Hydrazine	Ammonia	Air	Low	Dilute
				< 260	Sulphuric
					Acid
3	Ammonia	Hydro-	Hydrogen	High	Dilute
		carbon	peroxide	(600 -	Sulphuric
				700)	Acid
4	Hydro-	Methanol		High >	Phosphoric
	carbon			750 ∘C	Acid
5	Methanol	Ethanol			Sodium/or
					Potassium
					Hydro oxide
6	Coal	Coal			Solid oxide,
					Molten
					carbonate,
					Solid polymer
					electrolyte

Temp. = Temperature -> electrolyte relationship is given in Table 26.5:



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SN	Temperature	Fuel Cell Type	Remark
1	65°C – 160°C	Alkaline fuel	Low
		cell	
2	Less than	Solid Polymer	Lower
	120°C	Electrolyte	Temperature
		Fuel cell	
3	175°C- 200°C	Phosphoric	Lower
		acid fuel cell	Temperature
4	600 – 700°C	Molten	High
		carbonate fuel	temperature
		cell	
5	More than	Solid oxide fuel	Temperature
	750°C	cell	

<u>Table 26.5</u>: Temperature range, Electrolyte and Type of fuel cell:

Cell voltage as a function of the operating temperature for various types of fuel cells gives the achieved cell voltage, a measure of efficiency, as a function of cell operating temperature. Even though, phosphoric acid fuel cell has the lowest efficiency, it is technologically most advanced. It is considered to be the first generation fuel cell but it has proven cell life, tolerance to impurities in the fuel and oxidant and it is low cost. Molten carbonate fuel cell is considered to be the next generation fuel cell, while



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE solid oxide fuel cells are in the development stage. Alkaline and solid polymer electrolyte fuel cells are being developed for vehicular applications.

c. Global Overview of the technology:

A number of leading industries, viz. Ballard Power Systems, Plug Power, Fuel Cell Energy, International Fuel Cells Corporation (IFC), Energy Partners, H-Power, Honeywell, Northwest Power Systems, Toyota, Siemens and other have been targeting fuel cell markets for transportation stationary and portable applications.

OEMFC fuel cells are being used for decentralized as well as for decentralized power generation. Ballard is the leading manufacturer of PEMFC Power Systems. This company has signed an agreement for the supply of 30 public buses in 10 cities in Europe. Daimler – Chrysler (D-C) and Ford Motor Company committed \$ 750 million for research in PEMFC. Plug Power and North West Power Systems are developing PEMFC Systems in 5-50 kW and 7-10 kW for home applications. A 50 kW system is being developed for the DOE. IFC has demonstrated an un-pressurized fuel cell for automobile engine.

PAFC units of 200 kW are commercially offered by IFC. About 200 PAFC Systems had been put up for demonstration and field-testing in Japan, Germany, Italy, and USA etc. Based on methane, a fuel cell system runs at the wastewater treatment plant in Oregon. PAFC developers are targeting cogeneration market where the heat produced by fuel cell power plants can be utilized.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Developers of MCFC's in USA target commercial fuel cell sizes of 250 kW to 3 MW for power generation and cogeneration applications. Some of the manufacturers of MCFC's are Fuel Cell Energy, Hitachi Ltd. Mitsubishi and some other companies.

During these developments, however, one needs to address the following issues:

High power density of 0.18 – 0.22 Watts/cm²

Increasing cell life up to 40,000 hours

Electrolyte management

Corrosion problems

System integration

Reliability and Durability of MCFC stacks

Cost reduction

Siemens Westinghouse, Ze-Tek, Honeywell, Global Thermoelectric and Ceramic Fuel Cells Ltd are working on SOFCs. Siemens had developed tubular SOFC units of 1 kW, 25 kW, 100 kW and 250 kW. It plans to commercialise SOFC plants of 1-5 MW shortly. Siemens AG and Shell Hydrogen jointly plan to develop fuel cell commercial power systems of 250 kW to 10 MW capacities. Ceramic Fuel Cells Limited of Australia has tested a 1 kW SOFC stack on liquefied propane gas. Honeywell is targeting portable power packs of 500 kW SOFCs.

With their functional applications of different type of fuel cells are summarized in the Table 26.6.



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SN	Fuel Cell	Applications
	Туре	
1	PEMFC	Commercial domestic, back up
		power systems, automotive
2	PAFC	Commercial power generation, Co-
		generation
3	DMFC	Portable stationary and
		automotive application
4	MCFC/SOFC	Distributed power, centralized
		power, and industrial
		cogeneration.

Table 26. 6: Type of fuel cells and their functional applications:

d. The Present Indian Program:

The fuel cell program in India has included technology development as well as demonstration, largely supported by Government – the Ministry of Nonconventional Energy Sources (MNES), Ministry of Coal and recently by Council of Scientific and Industrial Research (CSIR).

The various projects taken up by the Ministry lay emphasis on the development and application of suitable materials, catalysts, processes, components and systems. Phosphoric acid fuel cell (PAFC) stacks of 5 kW, 10 kW and 25 kW have been developed and tested. The application of PAFC fuel cells for demonstrated in laboratory conditions. A 50 kW PAFC power plant, based on hydrogen, has been developed by a government owned company (BHEL). After initial performance tests, the plant will be



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE commissioned at a chemical industry for performance monitoring in actual working conditions. A commercial module of 200 kW size of PAFC was also tested under Indian conditions for an automobile. The demonstration of commercial model used Propane rich liquefied petroleum gas as the fuel. Under a program for the development of MCFC, indigenous procedures have been developed for making electrodes, matrix, and electrolyte tapes of size 512 cm². A MCFC was tested on pure hydrogen. The stack delivered an output of 250 W against the rated output of 350 W.

A scientific foundation has developed components and stacks of Proton Exchange Membrane Fuel Cell (PEMFC). The cell sizes up to 450 cm² have been developed yielding 300 mA/cm² of current density at operating voltage of 0.65 V. Several stacks of 5 kW size have been developed and tested under different climatic conditions including the including the harsh Antarctica region. Using compressed hydrogen in metal cylinders, two 5 kW size fuel cells have also been used in an electric vehicle. Hydrogen on board the vehicle is stored as compressed gas in metal cylinders.

The work on solid oxide fuel cells (SOFC) HAS BEEN GOING ON AT central Glass and ceramic Research Institute (CGCRI), Kolkata for past several years and achievements include development of fabrication process for electrodes and matrix. Kilowatt range fuel cell stack is being developed presently.

The Indian Institute of Science, Bangalore has been working component development for SOFC and direct methanol fuel cell (DMFC). In direct



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE methanol fuel cells, a proton conducting polymeric membrane is used and methanol is reformed with in the cell.

Under a UNDP/GEF project, a 'Fuel cell Bus' project is being executed through the R&D unit of Bharat Heavy Electrical Ltd., a public limited company. A fuel cell vehicle has been in operation with two PEMEC stacks in combination within a 120-voltage battery bank. The electricity drawn from a fuel cell battery bank hybrid system drives a 13 kW series wound DC traction motor. The vehicle is in operation for demonstration, awareness creation and for evaluation of its performance.

e. Present Government Policy:

The government policy on fuel cell development so far has been towards R&D and demonstration projects. The efforts on commercialisation are hazy, though plans are underway to define the policies and fiscal incentives that can lead to large-scale investments in fuel cells from private sectors and corporate giants.

Because of various workshops, a consortium of institutions has been created to develop various technologies. Organizations involved in fuel cell development are given in Table 26.7:

<u>Table 26.7</u>: Organizations involved in fuel cell related activities at present:

SN	Organization	Fuel Cell Type
1	Bharat Heavy Electrical Limited	Phosphoric acid fuel
	(BHEL), Hyderabad	cell





2	Spic Science Foundation (SSF),	Polymer electrotype
	Chennai	membrane fuel cell
3	Central Glass and Ceramic	Solid oxide fuel cell
	Research Institute (CGRI),	
	Calcutta	
4	Indian Institute of Science	Solid oxide fuel cell
	Bangalore	

f. A Wake up calls for the Industrialists and Government policy makers:

The industrial base in the country is yet to break the ground. Though several companies including battery and generator manufactures have shown interest in setting up manufacturing basis in India by way of technology transfer from leading manufacturers in USA and Europe, the industrial base is still a distant dream. The steps to address the major concerns of the prospective manufactures include lack of government policy on incentives for setting up industrial base, regulations on facilitating market development for fuel cells and demonstration of fuel cell technology. Private parties/ organisations are yet to make a break through in this field.

g. Present Conclusions:

Fuel cell development in India is taken up as an R&D and demonstration program involving research institutions and R&D division of an industry. The government, for developing efficient and cost effective fuel cell systems, components like reformers/processors, electrodes, bipolar plates, membranes, power electronics etc, is supporting research. Though there are



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE niche applications for fuel cells in India but the cost and identification of fuel or lack of adequate hydrogen production technology are the basic barriers for fuel cell development for commercial purposes.

Hence to drive a car on fuel cell needs to develop the fuel cell first and as mentioned above the cheaper hydrogen manufacturing technologies. In rest of the bodybuilding and other car parts and functions will have to develop according to the car design and development.

h. Special Recommendations for the future:

Hence, researcher would recommend here that indigenous giant private players like Tata, Bajaj, Mahindra, TVS, MRF and others or even the automobile Organisations and Institutes should take more interest in this, make it a success, and even commercialise this technology.

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CHAPTER 27:

BUSINESS OPPORTUNITIES IN THE CAR MODIFICATIONS USEFUL IN VARIOUS PROFESSIONS





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<u>Part 1:</u>

Which modifications do the professionals most commonly demand?

Many consumers feel that cars can be used only for the luxury and comfort. However, it is not so. A distinctive survey for the car users was carried out. It revealed that every professional or end user has his own professional demand from his product, the car. Infact if the car indigenously built then customers can suggest few extension points in the car so that it can be modified on those extensions for the desired purpose. Few examples are given below:

Table:	<u> 27.1:</u>	Profession-wise	Customer	demand	for	the	car
modific	ations						
mounic	ations.						

SN	Profession	Modifications Demanded	Additional
		by these customers in	Investment
		their cars	(Approximately)
1	Doctor	a. Ambulance	Rs. 25, 000/=
		b. Trauma/ Emergency	Rs. 25, 00, 000/=
		Surgery Van	
		c. Special place for the tools	Rs. 25, 000/=
		and equipments used by the	
		Surgeons	
		d. Special Medicines	Rs. 25,000/=
		carrying cars	
		e. Car fitted respectively	Rs. 12,00, 000/=





		with Eye, Teeth, or other	onwards
		specialised treatments	
		facilities for the particular	
		doctors.	
		f. Hypersensitive Tactile	Rs. 1, 00, 00, 000/=
		Sensitive Telematic	i.e.
		Sympathetic Telehaptic	Rupees One Crore
		Robotic Technology Trauma	onwards.
		Surgery of a Patient in the	
		monococ chamber fitted in	
		the Helicopter or in an Auto	
		Pilot Car.	
2.	Architects	a. Architects, Civil and	Rs. 25, 000/ =
	and	Mechanical Engineers want	
	and Engineers	Mechanical Engineers want their car having special	
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and	
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and blue prints, and his special	
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and blue prints, and his special equipments.	
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and blue prints, and his special equipments. b. Electronics and	Rs. 2, 00, 000/=
	and Engineers	Mechanical Engineers wanttheircarhavingspecialfacilities to carry maps andblueprints, and hisspecialequipments.b.ElectronicsandComputerEngineerswant	Rs. 2, 00, 000/=
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and blue prints, and his special equipments. b. Electronics and Computer Engineers want their cars fitted with every	Rs. 2, 00, 000/=
	and Engineers	Mechanical Engineers want their car having special facilities to carry maps and blue prints, and his special equipments. b. Electronics and Computer Engineers want their cars fitted with every kind of electronic gadgets	Rs. 2, 00, 000/=



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		equipments preferably made	
		in India, and so on.	
3.	Lawyers,	a. These customers have	Rs. 1, 00, 000/=
	С. А.	demanded that they are	
		interested in buying electric	
		or battery driven cars. The	
		main feature of the cars	
		would charge when it	
		remains idle or parked on	
		the Court parking area.	
		b. Lawyers and Chartered	Rs. 50, 000/=
		Accountant want the car to	
		be fitted with flat plate	
		computer screens and hard-	
		discs with every kind of	
		cases on it. This will help	
		them in referring cases	
		while going to court.	
4.	Teachers	They want computer to be	Rs. 50, 000/ =
	and	fitted in the car. It will be	
	Professors	loaded with the knowledge	
		they require.	
5	Students	They have mainly two	Rs. 50, 000/ =



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		demands one of which is	
		definitely for computer.	
		Other demand is computer	
		to be feed with knowledge	
		and the games.	
6	Consumers	The reach and high-class	Minimum
	demanding	people going to Dilip	Rs. 1,25, 000/=
	sporty look	Chhabriya (DC), a world-	
	or a	renowned car modification	
	innovative	expert from India have one	
	unique look	demand in common. Their	
		car must be uniquely	
		designed. Eighty percent	
		feel to give their car a	
		sporty, sleek, aerodynamic	
		having extraordinary looks	
		and features.	
7	Mobile Car	Used by the Doctors for	Rs. 100, 000/=
	Dispensary	special purpose of	
		treatments of the patients in	
		the rural areas.	
8	Mobile Van	As working people do not	Rs. 1,00, 000/=
	for Saloon	get time for their haircut	onwards.



.



			and well being in the hectic
			schedule this is a new trend
			in Metropolitan cities.
9	Mobile	Van	As working people do not Rs. 1,00, 000/=
	for	daily	get time for their haircut onwards.
	needs		and well being in the hectic
			schedule this is a new trend
			in Metropolitan cities.
10	Mobile	Van	Many companies even in Rs. 2, 00, 000/=
	for	Car/	India presently use it.
	Vehicle		
	maintenance		

<u>Part 2:</u>

Special case of modifications made by the Automobile Engineer and a Doctor (Surgeons) in the cars:

An Ambulance fitted with Robotic Technology for emergency operations.

[A part of this is published a Research Paper in The Institution of Engineers (India), Nagpur Local Centre, in Annual Technical Paper Meeting, on 19th October 2003.)

Title:

Telehaptic Telematic Remote controlled Robotic Technology Trauma Surgery in a car or in a Helicopter.



Description of topic in technical terms:

Hypersensitive Tactile Sensitive Telematic Sympathetic Telehaptic Robotic Technology Trauma Surgery of a Patient in the monococ chamber fitted in the Helicopter or in an Auto Pilot Car.

Key words:

Autopilot Car, Flexible Robotic Arms, Telematic Trauma Surgery, Feeling to Doctor while Surgery is the Sympathetic Telehaptic Sensation, Special Software, Intricate Reflexes will reach within few microseconds, Zero error Surgery.

Description of the Key Words:

Auto Pilot Car: A car driven automatically by the computers.

Flexible Robotic Arms: Mechanised arms controlled by the computer operations used for special purpose by medical or engineering team.

Telematic Trauma Surgery: Telematic means remote controlled. Trauma Surgery means emergency Surgery.

Sympathetic Telehaptic Sensation to Doctor: It is the actual feeling or sensation to the Doctor to their finger through electromagnetic waves and digital signals, while operating remotely from the distant place from the accident in case of emergency.

Special Software: It is required for the operation to carry out intricate surgery in the patient.

Intricate Reflexes reaching to the spot within few seconds: How so ever distant the patient may be the electromagnetic signals reach within few microseconds.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE *Zero Error Surgery:* Even if the Surgery done from the distance still it will be as perfect as landing a aircraft auto pilot on the run way. A pinpoint accuracy in this kind of surgery is the need of the hour. Thus, this technology can be used even in the spaceships or in the aeroplane or in the submarines kinds of places.

Taking Two Helicopters instead of one. While one helicopter will contain the paramedical team second helicopter will be fully equipped operation chamber as mentioned below.

Taking two vans/fully equipped cars instead of one: One with paramedical team other van will be fitted with the tools, equipments and instruments mentioned below.

Aim of the Project:

Every year only in India, 70000 people die on the road. Half of them for not reaching the proper medical help on the spot. If we adopt this project properly many lives can be saved.

Estimates:

Option 1:

In USA, One Robotic Human like Finger Costs \$6000. Therefore 10 fingers almost \$60000. In addition, Robotic Arms with software \$10000 plus special Ambulance \$10000. This gives spending of almost **\$100,000.** This is the Investment for the prototype. For mass production, it may be less.

Option 2:

2A. If monococ (Unitised) chamber of the CAT Scan and Robotic Surgery Arms are developed with all prerequisites technologies and services, which





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE can be fitted to any vehicle including emergency help helicopter and even in the operation van/ car or in the ambulance van/ car.

2B. In case two 911 or two emergency help-line helicopters fly to the trauma spot then one helicopter will be fitted with all these robotic technologies to take guidance from the Remotely placed Doctors while other helicopter will carry the Paramedic team trained and expert in trauma surgery activities.

Highlights of the Project Option 1:

1. Van of the size of 15 feet by 5 feet by 5 feet may be fitted with these technologies for the trauma operation. It needs following modifications:

Back seats will be replaced by operation bed,

- Robotic arms fitted with accurate specifications at both sides of the car and even few types of equipment are fitted at ceiling of the car.
- Voice Input and Output Devices for Police with Badge Number and for the Paramedics who will put the patient on the operation table with proper preparations.
- Blood Supply, Anaesthesia, Saline, Heart Machine, and Dialysis Equipments will be made portable enough to carry out the operation smoothly.
- Precision Placing of the equipments and the Multiple Robotics arms will be extremely flexible for the accurate adjustments. The arms will be fitted within the limited specified space with proper ergonomics and aesthetics sense for the operation.
- Scissors, Knife, and other important operation equipments will have auto clave/ auto sterilization option.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 2. Portable 3D CAT Scan, 3D MRI Scan technologies are fitted in the van or mono-coquette chamber. It will give complete diagnosis of the patient to the doctors after every possible examination.

- 3. Auto Pilot, Global positioning system (GPS) Remote controlled car can reach the spot within the specified time to save the life of the patient.
- 1. Robots will have accuracy of the order of few Microns (10 $^{-3}$ mm).
- 2. Time of specified action of each movement of surgery is few nano seconds to one second. It includes time to reach the signal plus time to carry out telehaptics hypersensitive robotic surgery with pinpoint accuracy and range of deviation precision.
- 3. The perfect touch sensation from the Tactile Sensitive Robotic fingers, which are actually operating on the operating table, will give complete sensation to the operating doctor giving orders or performing operation telematically. This is due to the Telehaptic Technology that is used on the Robotic Fingers to know or transmit the exact pressure to be applied while operation at every phase, at every event, and at every intricate step in the operation. *Haptics is a Science of integrating the sense of touch into human-computer integration.* [**Reference** Article-Midas Touch', Author-Sarath Kumar P. ; in the Magazine The Week (India) August 10, 2003]
- 4. If the surgery is complicated and challenging then Doctors will carry out simple operations to seal the wound to stop heavy bleeding and then final operations will be carried out in the Trauma Surgery department of the nearest possible hospital.



- 5. On the Legal Front:
 - a.As this kind of Intricate Operations Requires extreme specialisation. Only few experts having dealt with the Robotic Surgery will get the license to practice this Surgery.
 - b.All the transactions will be done on the speech, voice detection, figure prints detection, video mail on the mobile kinds of services including FIR, name of the patient video clip of the patient injuries, for the proof etc.
 - c. Insurance, different cost, different works, different languages, etc. will be taken care and analysed using distinctive Information Technologies with Proper Software and Hardware in the Computer.
 - d.As the Expert Paediatric Surgeons will carry out the surgery in the remote lab in their hospital, which will be actually carried out on the patient at the trauma spot. OR They will order the Robotic devices in the operation van to perform the work according to the needs by having a clear look through the cameras. However, the Consumer Protection Act (CPA) will be modified according to the emergency services while considering the Human error element and Machine and Robotic error element.
 - e. In case experts require help from the different branches of the Surgeons they will take guidance from the other listed registered Surgeons on the Web Camera or on the Video conferencing.



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- f. Nearest Police and the Paramedics team who know something about this kind of Trauma Surgery will be heading at the spot along with or behind this auto pilot trauma surgery van within the prescribed time.
- g. Either this vehicle will be developed with its own specifications **or** it will be a unique and registered vehicle, which will be developed according to the RTO specifications in that country. If laws are not specified in that country then Laws will be developed in that country for this very important technological breakthrough.

Highlights of the Project Option 2:

In the Monococ (Unitised) Operation Chamber having the proper 3D shock absorbers and levelling equipments. This chamber will have 3D CAT Scan, 3D MRI Scan, Robotic Arms which will be developed with prerequisites technologies and services (Ex. Examining the patient Remotely with Robotic Telehaptic Arms, Blood supply, Saline, Operation Equipments, Blood Testing, Blood Matching, Precise Suturing, etc.).

This chamber of particular size with proper technological features can be fitted in any vehicle, it can be Helicopter, or even it can be a Car. All the Legal side of the option 1 is also applicable to this project.

<u> Part 3:</u>

Business opportunities in these kinds of projects:

Every kind of these projects requires unique set up of its unique kind. These projects satisfy the customers needs and is also a very good business opportunity for the businessmen doing this business. Even if upper crest of



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE people are considered it comes out to be few lac people. It has turnover of more than ten crores in India and the trend is increasing day by day. Besides jobs to design engineers, job to skilled workforces, it adds selfreliance to India on the designing front of the car market as within few years many designing experts are developed while working on these kinds of projects first dependently and then independently.

<u>Part 4:</u>

Advantages of these kinds of projects:

The cars thus developed are meant of the specific purpose. These custom built cars can revolutionise the efficiency in the respective field of applications. While in this case the patient can be operated on the spot, in other cases it can be of similar help in those respective profession giving better and faster results.





CHAPTER 28:

CUSTOMERS' DEMAND AND BUSINESS OPPORTUNITIES IN THE SECOND HAND INDIGENOUSLY MADE CARS IN INDIA





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	hand car buyers	





<u>Part 1:</u>

The Second Hand Car Market Background:

Everywhere in the world second hand car market is almost 70% of the new fresh cars. In this chapter the chart of the price list of the second hand cars will prove how indigenously made cars will be cheaper and reliable. Still we'll go step by step.

Maruti is not a 100% indigenous car manufacturing Indian company. Even it never uses fully indigenous car manufacturing technology in its manufacturing unit and elsewhere. Suzuki of Japan has major 54.2% stake in the Maruti Suzuki venture and it has provided core technology to manufacture the cars in India as a joint venture. Still to explain the point of second hand car market few examples from various organisations including Maruti are given below.

However after the whole analysis it can be clearly known that if the car in concerned is better if its technology is from India, it is made in India, if its seller is from India and if that car is driven on the Indian road. Otherwise a simple communication gap can be a very big mistake in future of car driving. It is here can be proved that it is better option to indigenise the whole car technologies in India to ensure the safety and security of the car and the drivers and manufacturers as well. Hence, may not be today the whole transaction be only of made in India cars but in coming future if this project is carried out seriously more than 90% cars would be of the Indian made cars. As then only maximum customer satisfaction could be achieved.




E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE On 28th August 2003, Maruti Udyog Limited (MUL) announced its "True value outlet" second hand Maruti car-selling outlet in Pune, Maharashtra (Reference: 29th august 2003, Friday. Pp-11) it was inaugurated by Mr. Kinjo Saito, MD (Marketing) of Suzuki. The criteria, prerequisites and ease of the second hand car sell by Maruti-Suzuki is given below:

- a. The made should be Maruti-Suzuki,
- b. The kilometres reading should be less than 100,000 run,
- c. Selling price Rs. 1 lac to Rs. 1.25 Lacs, exclusive of price for registration etc.
- d.Warranty of One year,
- e. Three services free,
- f. No commission basis,
- g. Immediate transactions,
- h.Customer satisfaction,
- i. Safety and security of the customer,
- j. Single window transaction for Tax, Insurance, and other documents.
- k. To make the second hand sell hassle free for the loyal customers.

<u>Part 2:</u>

Why even the Suzuki-Maruti entered this second-hand or pre-owned or

used-car market?

- 1. Huge Customer Demand,
- 2. To enhance brand image,
- 3. Transparency in the business,
- 4. Immediate transaction,



5. Competition from various companies,

6. For providing original spare-parts to renovate the old car and improve its life and performance through companies own people,

7. To bring dealers, finance people, service station men, transport organisation people, and other work force and loyal customers together and build a rapport for the Maruti-Suzuki.

<u> Part 3:</u>

Why customer demands have increased for second hand car market?

Many Indian dream of owing a spanking new car- and this sentiment is driving the growth of the Indian automobile especially the car industry. However even more people find spending on a car a more practical solution to their dreams. Already, Indian car buyers have come of age only in the last decade as they finally have:

- 1. Choices to buy the car,
- 2. Increased disposal income,
- 3. Urban aspirations,
- 4. To be in the peer group of car owners.

<u>Part 4:</u>

How companies built up this second hand car business opportunity?

The companies provide complete buyers' and sellers' satisfaction in the following way:

- a. The catalogue of cars in sale,
- b. The list of different variants,
- c. How to get best value out of the car,

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- d. Bringing the buyer and seller in front of each other,
- e. What age of the car will suite,
- f. Completing transactions before buyer and the sellers over the single window.

Many company charge 5% of the transaction from each side however they provide a car which is as if new to the buyer.

<u>Part 5:</u>

<u>Tips provided by the experts for the Second hand car buyers:</u>

The major points while buying the second hand car are given below. They definitely will bring satisfaction to the buyers. The car market is the buyers' market, whether first hand or second hand. <u>To avoid the traumatic</u> <u>experience in buying the second hand car following are the tips:</u>

A. Prerequisites:

The first and foremost important point is never buy the car suddenly without planning,

Know what exactly you are looking for in the car,

Know what questions should be asked to the seller or sellers,

Plan according to your budget,

Know where are you going to buy and why?

B. How to prepare your self to buy second hand car?

Following are the points you must check before you buy the second hand car:

It's a daunting task, hence avoid the complications,

Filter out the junk floating in the market and try to get best buy,



Prepare budget for:

Cost of the car,

Insurance,

Tax,

Services cost,

Maintenance cost, etc.

After this budget is 'done' stick to this budget only so that further complications are avoided forever.

Try to browse in the market for the car fitting into your budget and other requirements,

Gather information from various sources like newspaper, magazines, advertisements, pamphlets, or other sources.

Make list of sellers to be approached.

C. Overlook/ Inspection of the second hand car:

This is a very big problem generally cannot be even finalised at the final moment of buying. Still know few points mentioned below from the experts' view so that buying becomes easier and hassle free:

- a. Know Age of the car.
- b. Know for what purpose it was used in the past.
- c. How much it is been driven in terms of miles. Remember many a times the mileage covered is less important but the purpose of use becomes important.



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D. Communication with the seller and the dealer of the second hand car transactions:

Charted below are the questions that should be helpful to the second hand car buyer. Few questions are to be asked to the seller to avoid the future hazards. It is always better to know person who owns that car many a times than the actual car as it may give more details about the car and its past. Hence, inquiries about the car from the owner should be honest and forthright so as not to conflict with the feel and experience you receive from the car when you test-drive it.

Make sure you get the test drive.

Also make sure you get the chance to inspect the car in road daylight. Any kind of refusal on seller's part to comply should be treated with suspicion, forget the deal.

The same could be asked to the used car dealer. In their case the more documentation the better, as this gives a better idea of the condition of the car than just word of mouth. Ask for the contact numbers of previous owners. A dealer's response or lack of it could lead to some interesting observations.

Table: 28.1: Questionnaire for the buyer against seller and dealer:

These questions can clear that it is always better to be car made in India, driven in India and the seller is from India other there can be communication gap which can be hazardous in future of the bought car while driving.



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Table: 28.1: Questionnaires for the Buyer:

SN	Compulsory	Points to look for/ Or the expected gist of the
	Questions	Answer
1	Why are you	The first query in any buyer's mind is also the
	selling the	beat one as user does not want to be left owing a
	car?	pile of junk on four wheels, unless that's to
		users linking.
2	How many	It is always advisable that avoid the 'to the moon
	miles are on	and back' car; it was probably towed back
	the	anyway. Mileage determines value inversely.
	odometers?	Although a car that is extremely low on miles
		covered should directly lead you back to the first
		question, unless the owner is migrating. When
		you eventually see the car, and the odometer
		reads significantly higher (or appears to be stuck
		on a number when you drive it), it's time to
		continue your search.
3	What is	It can be the first question as well. A basic
	condition of	query, the response to which should elicit
	the car?	confidence. Be sure to follow it up with inquiries
		on all aspects, structural and mechanical. If the
		actual experience with the car does not feel the
		same as quoted it's back to the drawing board.



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4	Does it have	Special features like air conditioning; pumped
	any special	up car stereos with Compact Disc (CD) players,
	features?	alloy wheels, leather upholstery etc. increase
		value. Check for defects in any of these
		according to the comprehensive guide provided.
5	Are you the	Single owner cars are preferred and are easier to
	original	check up on. If the owner is not the first one it
	owner?	may be difficult to determine the condition of the
		car before the current owner purchased it.
6	Was the car	Take heed; stay sharp because this is an
	ever	important area. Often accidents repairs
	involved in	especially to body parts cannot be determined
	an accident?	easily. This may also disguise possibility of
		future problems, which of course means extra
		service costs. These guiding questions and
		answers can give you details on how to recognise
		such a car. If the seller denies the case you
		yourself must check the car if you find the mark
		anywhere just walk away.
7	Do you have	A well-maintained record indicates that the seller
	services	has maintained his car well. These days the
	record of the	history of the most new cars can be acquired
	car?	from the dealers and the service stations' end.



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8	How	much	Always evaluate the worth of the car, comparing
	are	you	it with going market rates. Haggle over the price
	asking	for	without shame since you are the one footing the
	it?		bill. For a used car.

Now that you as a buyer are have to short-list your options.

Here after it is time to check technical details and/ or the technicalities:

The passenger compartment,

Floorboards,

The engine bay, and

The boot.

Not to mention but the core aspect- getting behind the wheels.

E. Mechanical Inspection Tips:

Before test-drive try for the mechanical inspection of the car.

When inspecting the car don't worry about soiled garments and such and remember to carry along a flashlight. This is where your trusted mechanic comes in handy. Let him inspect the car and make note of the problems encountered. Make and estimate of the cost of repairs, which can be used as a bargaining tool to arrive at a better price for you. Too many problems forget the car and look further. Look out for any accident mark or something like that under his expert guidance. Take care to notice/ locate the fake or duplicate parts fitted in the cars and if any try to get them replaced with genuine original parts before you buy the car. Here your familiar or family technician is very useful. Take full advantage of his consultations.



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SN	Some	What to look for? Where to look for? How to look
	key	for? Which part to look for? When to look for?
	points	
1	Under	Start inspecting systematically from one end and
	chassis	proceed to the other end so that there are no
		overlooked spots in between. Look under the car for
		any kind of damage or distortion especially to the
		suspension system. Use a flashlight for any kind of
		sign for rust formation. Rust generally builds up o
		the exhaust pipes, the frame, floor pans, and wheel
		wells.
		Look for the signs of leakage from the oil sump,
		coolant pipes, water pump, fuel lines, shock
		absorbers, etc. These parts are crucial to the working
		of your car and repairing of replacing these parts is
		expensive.
2	Tyres	Check if there is sufficient depth to the treads. A
		trick is to use a coin to check the depth. If the coin
		sticks well inside the tread and is the same on all the
		tyres, the set is in good condition. Tyre wear indicate
		bad alignment or defective suspension. Check for
		cracks on tyre sidewalls and any damage to the rims.

<u>Table: 28.2</u>: Inspection points for customer while buying a Car:





3	Electrical	Check condition of wiring as you could be in for a
	System	rude shock if you see smoke coming out from under
		your dashboard while driving. Ensure that all lights,
		horns and radiator fan are working. Check intensity
		and alignment of the headlight beams.
4	Engine	This is perhaps the most important area of
		inspection. Take a good look at the overall condition.
		Is the engine clean? Are there any oil leaks? Get a
		mental picture, because you'll want to look again
		after you take a taste drive.
		Look for the signs of wear and tear near the engine
		cover fasteners, which indicates that the engine was
		opened and worked out.
		Check for the cracks on coolant, fuel inlet and return
		and brake oil hoses.
		Get a feel on the fan belt, air conditioner belt, for the
		cracks or any other damage.
		Check fastening of the strut mounting; also look for
		signs of rust in the engine bay.
5	Doors	They should open and close with ease. While shut
		check the flush of the body panels with the doors. It
		should look and feel smooth. Uneven fit indicates a
		car involved in an accident.





6	Windows	They should open and close with ease. It should look
		and feel smooth. Uneven fit indicates a car involved
		in an accident.
7	Hood and	They should open and close with ease. It should look
	Boot Lid	and feel smooth. Uneven fit indicates a car involved
		in an accident.
8	Body	Look for any deformation, variations in the shade of
	Panels	body colour, loose bumpers and cracks. Rust signs
		are indicators of larger rust areas in future.
9	Tailpipe	Though sounds corny checking inside the tailpipe is
		a vital indictor of the condition of your engine. Globs
		of oily soot indicate serious problems with the
		engine, which could be in the form of worn out
		pistons, piston rings or defective valves.
10	Interiors	Check the interiors well, because this is the comfort
		zone. Avoid smelly and grubby interiors. Check
		condition of the upholstery, steering wheel play, and
		if the air condition is working.

F. Test Driving the Car:

Most of the test-driving of a car happens before the actual drive itself. Don't be in a rush to take the car for a spin round the block and see the boot overtake the hood when you screech to halt before a red light. It's a wise to inspect the car carefully, inch by inch. Take your own mechanic along to





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE help you. It's always preferable to have professional know-how rather than getting stuck with a dud.

On driving the car, you drive exhaustively. If you sense some hostility against this demand, be assured there is some serious flaw in the car. This will not only help you distinguish abnormal noises from the usual ones, but will also give you a good idea of the overall feel of the car.

Switch On the car. Does it start easily and run smoothly? Are there dense fumes from the exhaust on ignition? This indicates a problematic engine? Ease the car into traffic. Does it accelerate with sufficient power? Is the transmission slick or does it whine and grind? Is there any drift when you lift your hands off the steering wheel? How is the ride, is there too much bounce? Drive over some bumps and potholes. Do you feel in control of the car? If not you probably have to work on the Suspension system. It may increase your cost. Check for the brakes is it. Is the braking sharp? Or the braking is spongy? Does the front end drive too far in front or does it swerve under hard braking? If the brakes squeak you probably have to replace the pads. Last of all how are the seats? Was the drive comfortable or not? If your drive was smooth then only you go ahead for other finer and intricate mechanical inspections and the documentations.

G. Final Finer Mechanical Checks:

After you take a test drive you would like to recheck and inspect few points once again as finer check. If not make compulsion on yourself before sign the papers.





<u>Table: 28.3</u>: Key points to be inspect in a used car:

SN	Key Point	Finer final Checking for
1	Engine	Check levels of engine oil, coolant and battery
		water. Condition of hoses and belts, are there any
		cracks?
2	Headlamps	Stone chips mean a lot of miles. Check for any
		cracks in the glass and intensity of beam.
3	Windscreen	Chipped windscreen means a lot of miles covered.
		Also check for cracks as driving at high speeds can
		shatter the glass.
4	Suspension	Wallowing in the corners, failing to absorb bumps
		and grounding are a bad sign.
5	Windows	Do the windows roll down with ease? If sunscreen
		film is applied are there worn out patches? They
		indicate large distance covered.
6	Interiors	Is the overall feel comfortable or is it stifling? Are
		the seats worn and saggy?
7	Door Panel	Do they line up properly, and are the flush lines
		clean? Large panel gaps indicate a nasty bang up
		and repair job.
8	Paint	Is the shade same al over the body? If not they
		have been treated to a repair and repaint the job.
		Check signs of corrosion especially in coastal



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		areas.
9	Boot Badge	Make sure the model name on the boot is the same
		as that on the Registration Book.
10	Rear End	Look for the signs of accident damage inside the
		boot and the signs of rust.
11	Wheels	Uneven wear means a misaligned suspension. Are
		the tyres all the same brand? Differences could
		lead to misalignment.

After these finer checks only thing left would be checking the documents.

H. Documentation:

There aren't numerous legalities and loads of documentation to check up on. The basic documents to cover are:

1. Registration Book: This book is issued by the RTO and is the most important document. This book shows the date and address of the registration and also has a record of ownership. Prior owners' names and addresses are recorded in this book and is the easiest way to find out how many times have the car-changed hands. Make sure the current registration is from your state or the outer state, as transfer takes lot of time and are quite a pain. Ascertain the chassis number and engine match the numbers in the Registration book.

2. Taxation Book: The Tax Book/ Certificate shows the status of the taxes paid. Nowadays there is a 'One Time' Tax collected, but some state



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE governments still collect an 'Annual Tax', so make very sure which brackets your car fits in.

3. Insurance Policy: Make sure there is valid insurance coverage for the cars without which do not even test-drive the car. Also make sure the premium have been regularly paid or any dues are pending.

4. Valid PUC Certificate: It is important document nowadays as it checks the pollution under control for the car. It ultimately indicates whether the engine and the system of the car are working properly or not.

5. Warranty Certificate: If car is in the warranty period check it.

6. Original Invoice of the Car: It gives the actual price and buying date and address of the seller of the car.

7. Car Manual: It helps you learn more about your car. As ultimately this gives the owner the details about the machine your drive. Otherwise the non-technical person becomes helpless, about the technological jargons and about the car he owns.

8. A delivery note: This is to underwrite any future legal liabilities pertaining to the ownership of the car.

9.Transfer of ownership certificate: Form number 29 as it is called in the RTO is the transfer of ownership of the car from the pre-owned person to the buyer.

10.Insurance intimation note: It is the note that intimates the informing both the sale of the car and the transfer of ownership.

For hassle free transaction check out whether the RTO agent at a predestined fees is available for all these documentation.





I. Price of the car:

Used car prices vary across cities and also from dealer to dealer though few standard prices are there. Before buying check out for the financers if you require. Anyhow, the factors determining the price are:

Customer requirements, Availability of the cars, Mileage, Condition, Features, Customer Rapport, Conditions of the Financers.

Sample: Second-Hand Car Analysis for R & D over Technologies, Services, Selling Prices and Indigenisation of Car-Technologies from customers' demand point of view in India:

Table 28.4: Sample of Tata Indica Car to be bought in second hand car market:

Detailed analysis of this car in the second hand car market and suggestion for the improvements in the technologies from indigenisation of the Car technologies with respect to customers' requirement point of view:

SN	Aspect/	Performance
	Features	
Α	Positive	1. Good Looks
	points	





	2.Spaciour Cabin so called 'more car per car'.
	3. Most of the parts Indian made as the indigenous
	company Tata Motors have manufactured them.
	4.Most number of servicing points in India.
	5. Tata Finance provides easy loan facility and more
	number of services than any foreign company made
	cars or any collaboration made cars.
	6. Good family car.
	7. Good on road.
	8. Gives value for money if frequently driven.
	9. Fuel Economy is good.
	10. Spare parts are relatively cheaper than the other
	cars.
	11. Repairing of the car is easier than other cars as
	Tata's Technologies are known to even road side
	garage man as most of the technologies are made in
	India.
	12. Tata Motors have most number of trade-in
	outlets in the country.
	13. Generous warranty policy.
	14. Upgraded kit always helps in overcoming the
	teething troubles.
	15. Less payments for the Servicing.





		16. Tata Motors authorised dealers and services
		station gives you one-stop and that too single
		window payment destination kinds of high profile
		services.
B	Negative	1. Engine refinement has not reached the perfection.
	Aspects	
		2. Niggling mechanical problems.
		3. Excessive oil consumption.
		4. Rims give problem.
		5. Less resale value.
		6. When air conditioning is put on the speed gets
		decreased.
С	What to	1. Car must not be more than three year old.
	buy?	
		2.Try to get power steering car.
		3. Avoid buying from other players than actual Tata
		Motors outlets.
D.	Price to	1. 2001 model – Pay Rs. 1.70 Lakhs at the most.
	Рау	
		2. 2002 model – Pay at the most Rs. 2.00 Lakhs.
		3. 2003 model – Pay at the most Rs. 2.40 Lakhs.
E	Experts	The cars after the 2002 only be bought as by that
	Verdict	time the technological aspect got sea change in the



		Tata Motors for the Tata cars.
F	R & D	Remember second hand car market show the actual
	Suggestions	price of your Indian made car. From R & D in
	from	Technologies point of view the second hand car
	Second	market show:
	Hand Car	i. Why few parts, sub-assemblies and assemblies
	market	had a longer life. Analyse it.
	analysis	ii. It also tells shows why few parts, sub-assemblies
		and assemblies had to be frequently changed. This
		gives immense potential in R & D of indigenised
		technologies. Otherwise scope for the indigenisation
		of the technologies. The parts of such kinds gives the
		extra opportunities for the faster R & D over
		developing such parts indigenously in India thus
		competing with the foreign players.

Other Aspect of the Analysis: If the indigenisation of the cars happens then many a times the analysis of these foreign sources will have little stake in India. They do influence the buying behaviour of the customers a bit but once indigenous people enter into this field it will also be taken care of.



CHAPTER 29:

INDIGENISATION OF TECHNOLOGIES REQUIRED FOR THE SERVICING, MAINTENANCES, ROAD SAFETY, TRAFFIC MANAGEMENT, DRIVER SAFETY, AND DRIVEABILITY





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29. 1. Road Safety, Driveability and Driver habits and Driver Safety:

Let us see what is happening at this front around the world:

After few successful trials, in December 2003, Ford in its USA based plant has developed the advanced driving simulator that can help the researcher to investigate the driver behaviour and distractions he faces during the driving. The project name is <u>Virtual Test Track Experiment or VIRTTEX</u>; the computer-controlled simulator is mounted on six hydraulic pistons and houses one full-size model of a car or truck that is capable of making virtual movements like those of a real car on the actual road conditions. All the while the driver under test or even the volunteer driver feels as though he or she is barrelling down the highway. Trees and sign spots whiz past on a virtual display screen at the equivalent of around 50 kmph speed or more. These images span 180 degrees to the rear-approximately the range of the vision in a real car or truck.

Thus, Ford Along with National Highway safety are developing the safety standards and the equipment those can benefit the drivers and the passengers.

In India also drivers must be examined regularly their licences must be renewed at regular intervals at places other than the Traffic Offices. Of course these can be placed on the roads everywhere in the country on every roads at few hundred kilometres on the highways, which can be interlinked like the Railway Reservation systems.

Drivers must be provided with the advanced aids to deal with the heavy traffics and to avoid the fatigue or to deal with the fatigue.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE To deal with the driver safety and the road safety the drivers must be trained regularly even on the dhabas, petrol pumps, like locations or even at home service.

29.2. Traffic Management:

The following aspects are very important when we consider Traffic Management:

Speed: It is important factor not only on the city roads but also on the highways as well. Infact it is the major factor will be deciding future traffic on the roads in India.

Vehicle Volume: As the Indian economy will grow so will increase the volume of the cars and other vehicles. It definitely will be the major factor, which will have to be managed.

Parking: In the increase in volume of the vehicles parking will be the major factor. Parking Island, Parking Spaces, Parking Buildings, Parking Software, etc. has become practical experience of lot of people.

Photographic Traffic Control Technique: In many cities like Hong Kong, Chicago, New York and other big cities photographic traffic control techniques are used, in which a lot of vehicles is allowed to passed through from every side of road on the square. It has improved a traffic management in these cities. It may be a case very soon in India as well.

Traffic Forecasting: This is analysed from every detailed angles. The season, the time of the day, the events in the city, the population, the number of vehicles and the future needs. It has been observed that the statistical





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE analysis comes out to be true in many cases. An accurate forecasting has become talk of the Traffic Management nowadays.

Traffic Signs: On every major turning, On every blind road crossings, on every danger spots, near every hospitals, and such places Traffic signs has to be placed. The crossing signs are also need of the day. Most important thing is government of India Traffic Police; many municipal corporations are trying to put this signs at proper places thus equally benefiting children and the older persons.

Road Markings: Like Black and White road crossing belts are often placed so as to ease the crossings of the walking people. Such kinds of road crossings are been regularly developed and marked at proper places by the authorities.

Traffic Control Aids: Barricades, Signs in the hands of traffic police, the whistles, are always needed to control the traffic at the rush hours.

Regulation of Traffic: Traffic regulation has become easier with the introduction of signals in the squares in many cities in India. Apart from that traffic police also deal with strong hand to avoid any misbehaviour from the citizens. In future also automatic signals with the cameras to regulate the traffic will be there in India.

Street Lighting: In the foggy or rough whether or in the night streetlights guide the traffic well. Only kind of research needed is putting light with high intensity but at low electricity consumption.

Highway capacities: On every highway you'll observe the speedy vehicles passing by. However, the tonnage carrying capacities, the number of



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE vehicles, the regulation signals, the road dividers etc. are still need of the day in India. It will be more important once the east-west corridor, the golden quadrilateral kinds of expressways start operating.

Trauma Surgery Highway Hospitals: In spite of all the measures been taken accidents do occur. Hence, to deal with this kind of emergency well-equipped highway hospitals are becoming need and government must solve this problem at earliest.

Strict Traffic Test and distinct licence for driving on express ways: To drive at the speeds of more than sixty kilometres per hour needs a special test to be passed. Government must deal this kind of situations more seriously. The Licence procedure must be made very strict.

Traffic Simulators: In the Regional Transport Offices or the District transport offices where the Licences are offered this simulator test for every driver must be made compulsory. If it takes more time then twenty-four hours simulation test and number system may be followed.

Distinct Transportation planning for each city: Each and every city needed to be planned with the separate transportation planning. Like heavy traffic only in the nights, for office goers time must be specified, for school children time must be specified, for each city according to the culture.

Economic Evaluation of the Transport Plan: While evaluation of the transport spending, maximum factors must be considered. The factors which have the direct impact on economies are petrol pump allocation, location of the office areas, location of the industrial areas, civilian localities, location of the railway station, location of the bus stations, existence of the mass transport





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE in that city, cost of the petrol, cost of the diesel and other petroleum required to move the vehicles. This can decide the economic factor of the transportation plan then critical path method, and other methods can choose the best alternative.

Vehicle Operative cost: People will drive the vehicle only if it is affordable. The distance between their office and home, cost of spare parts of the vehicles, location petrol pumps, and the income can decide the affordability of the vehicle.

Accident Costs: As mentioned earlier in the hospital section, if the accidents are frequent then it needs to be handled well. First of all the hospitals must be present at every few kilometres distance with ambulance and trauma surgery facilities. At the same time, all the drivers must be trained for the first aids; all the citizens must be allowed to help in case of emergency at the humanitarian cause. If more than seventy thousand people are dying on the Indian roads every year in more than three lac accidents then it is a prime concern of the authorities to train people for the same. Also it important for the people to learn to avoid accidents and if accident occurs then they must know what the next steps should be including first aids and or calling the emergency crew, to save the life/ lives of the people suffering in the accidents.

Traffic Congestion: To avoid this important happening every government should take care of not developing only few parts of the country or the city or the places. These developed localities or the facilities should be evenly placed so as to avoid the traffic congestion. If the vegetable market, office



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE places, daily needs places, hospitals, and such other needs are concentrated at few spots in the city it causes the traffic congestion. It happens with the cities like Mumbai, which has more industrial areas than the other cities. Thus the best solution can be development of developed areas in number of stratified places in the country. It is the same case with the cities as well. If in the cities more such developed areas less will be the traffic congestion in that city.

Traffic and Environment: Pollution from the vehicles has become the very important talk of every country. It is causing more dieses and deaths than other disease. Hence, R & D should be given more chance to develop cheaper catalytic converter types of pollution eliminating the pollution from the vehicles. Alternative fuels like hydrogen driven vehicles, CNG driven vehicles etc. should be encouraged. Masked Helmet should be developed for the two wheelers, which should be made compulsory as well. PUC norms must be made strict and awareness among the public must be improved.

Fuel Management: Places of the petrol pump, fuel consumption per litre of the vehicles, driving habits of the drivers, and purity of the fuels has direct impact on this factor. It must be judiciously planned and implemented. Also the Fuel storage should be placed at very good places in/ near the cities like near Khapari near Nagpur. It happens to be the best plan. Such plans are showing the success in the cities like Nagpur.

Computer and Information Technologies for the Transportation: As mentioned earlier in many cities advanced technologies are used for the control of the traffic on every road. With the advent of the Information Technologies Global





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Positioning System (GPS) has been fitted in every car in the USA, to show the place of the car in the city. It also gives the solution and the nearest path to go to the place of desire to the driver. It also tells the driver through talking mode on the interactive screens and mikes, which can be the easy road with less traffic to reach the destination. Thus, lot of R & D on this front is required in India.

Motor Vehicle Act and the Transport Offices: Motor vehicle Act- 1988 as amended in 1994 surely needs a re-look for the advancements in the technologies. Also needed are the advancements of the Transport Offices for the technologies again for the safety and security of the citizens of India.

Lastly, are we going to ask for the advanced technologies also at this front? We must come out of this dependency factor on the technological front. We must lead the technologies in this aspect and not follow the technologies developed by the advanced countries.

Another thing in this is that the instruments, gadgets, equipments and technologies used in the safety, servicing, and traffic management has lot of spin off factor. Means they can be used in various ways in other fields too.

Hence strong R & D force has become need of the day. Though PCRA, NEERI, ARAI, and other bodies are looking at this front more efforts are needed from the private and individual sources to tackle this huge problem of present and future.



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CHAPTER 30:

MANAGING INVESTMENTS FOR THE TOTAL INDIGENISATION OF CAR SECTOR



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE At present many organisation like IDBI and others are providing loans and even technical know how through organisations like SISI, MEDC, are helping people to get loans. However, whenever there is this kind of project, in India no one comes forward.

30.1: Few possible methods for raising funds are as follows:

1. Involving many players so that contribution to each person may be reduced. In one idea if each millionaire take part in this activity then only 50,000 millionaires can indigenise the car in India. It is better to take help from Indians first than asking for FDI. The major reason being India has already seen the crooked methods adopted by East India Company in 19th Century, to set up their rule in India. Hence, it is the only word of caution, here.

- 2. Co-operative car manufacturing: It has been never adopted anywhere in the world. However in India this procedure has done exceptionally well in the agricultural field in western Maharashtra and in Punjab and Harayana. Researcher has put this idea before the Mahindra and Mahindra, an indigenous vehicle manufacturing company in India.
- 3.Own your Car and the Tractor Concept in the Agriculture dominated region.
- 4. Uniting all indigenous Indian Car companies to manufacture all the car products, technologies inside the car and even manufacturing its most complicated technologies.
- 5. Encouraging the manufacturers to carry out extensive R & D.

- 6. If they do and prove their mettle then they must also get heavy concession over the foreign built cars and car technologies and products while selling.
- 7. Encouraging the Engineering and Technical Colleges to carry out this result oriented approach to manufacture a singular part of the car and within the span of five years India can generate its own luxury cars.
- 8. Otherwise setting up state-of-the-art ultramodern R & D labs for the unit wise car designing, manufacturing and testing.
- 9. Building a chain of SSI indigenous car components manufacturing units. This way each car will have as many distinct parts to be out sourced that many SSI. Hence, can become a strong force in the world. China is adopting this tactics to thwart away the foreign car and technologies invasion. Also they adopt low prices tactics due to this SSI mightiness.
- 10. From foreign direct investment (FDI) it is put in the foreign investment chapter.
- 11. From foreign collaborations it is put in details in the foreign collaboration chapter.
- 12. Distribution of work to number of institute to produce world-class products indigenously.
- 13. Own your indigenously built car and tractor scheme for the rural areas with subsidies on the petrol and diesel.
- 14. Even if each luxury car driver thinks that if he'll manufacture only one part luxury car he drives that too indigenously in India then cohesively these all the rich people of India can indigenise the whole car sector.



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30.2: Few more important aspects:

There is finance option available from private sources like Multinational Banks, and other organisations. Even there is a finance option from the government sources like IDBI, SBI and alike. Also there is a guidance and consultancy option available from these same sources. Thus most importantly for every phase of the car life cycle there is a finance option for the:

R & D in the car technologies,

Technology up gradation in the factories,

Designing of the car components,

Manufacturing the every part of the car,

Buying the car first hand,

Maintenances of the car,

Services related to the car,

Buying the car second hand, and even for

Scrapping out the car.

Thus, if somebody wants to enter in this field investment option is open to him or her. Only thing needed is the courage and confidence of every individual involved in this to indigenise every part of the ca. Thus, part-bypart the total car can be indigenised in India.





CHAPTER 31:

HOW TO BUILD GIANT INDIAN CAR M.N.C. AT PAR WITH GM, FORD AND TOYOTA?



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31.1: Unified answer can solve this problem:

Every giant personality in India has his own solution over this problem. However, the questions prior to their integrated, unified, amalgamated, multiple but fused for the national cause kinds of answer over these problems are discussed below.

<u>Table 31.1</u>: Major Questions arising in this regard:

SN	Basic Questionnaire
1	Can Indian Automobile companies withstand the pressure posted by
	the foreign Car MNC?
2	Can existing indigenous Indian Automobile companies transformed into
	Car MNC?
3	How can the Indians build the Indian Car MNC through Quality?
4	How can the Indians build a resilient Indian Car MNC?
5	What are the strategic dimensions to becoming Indian Car MNC?
6	How can Indians enhance competitiveness through quality initiatives
	such as Six Sigma, Kaizen and other tools and techniques of
	operational excellence?

31.2: Answers provided by the Indian Luminaries and Experts in the

Technological fields:

1. Honourable President of India Bharatratna Dr. A.P.J. Abdul Kalam: He feels that there must be a 'Can Do' Approach. He feels that if somebody else can do it them Indians can also do it. In fact he has come out with more



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE fascinating idea of making India a developed country by the year 2020. Thus he has faith in our resources.

2. Dr. K. Kasturirangan, DRDO Chief India: He supports the presidential approach stated above. He also feels that the bodies like CII, FICCI should play pioneering role in industrial entrepreneurship and building Indian MNC.

31.3: What other experts say over this matter:

1. Dr. Hiroshi Osada, Japan: From his Japanese experience the Quality guru pointed out some highlighting attributes of 21st century MNC, they are

Business performance and social interest go hand in hand,

Sustainable Growth,

Satisfying Stakeholders,

Differentiation,

Positioning in the Value Chain,

Practical Strategic Planning and Implementations.

2. CEO of Bharat Fritz Werner Limited: Helping Indian industries break the shackle of import bondage should be our first aim. Simultaneously, develop the best machining technologies in India and then see the results.

31.4: Simple and brief Highlighting Aspects to be considered in this regard:

Also considered would be unique examples and case studies. Unique in the sense these are only few companies that have made their mark in the international market.





1. Are the Indian companies spirited lot?

When Reva electric car example is considered the answer comes yes. Yes Indian companies are spirited lot. They are raring to go.

Example:

Unique Case Study of M & M for this aspect:

Another example for the spirit of the Indian company is the Mahindra & Mahindra (M & M) Tractor Division, Nagpur. Infact, M & M is the pioneer in making and developing strategies for turn around management. M & M had introduced Tractors to make India self reliant on the Tractor Technologies and thus making self-reliant by bringing green revolution. Mr. Sudhir Pathak the GM, M & M Nagpur (The Hitavada, Saturday, 29th November 2003, pp10) has come out with the following aspects due to which they could achieve this success. It did this by adopting following aspects:

M & M introduced TQM concept in 1990 where the focus was on supplying defects free products.

The period of 1994 to 1999 was promotional phase for the company. M & M mainly concentrated on breakthrough productivity and quality improvements.

M & M received ISO Certification in 1994.

QS 9000 Certification in and Kaizen concepts were introduced after this certification only.

Still, in 1999 M & M faced a tough competition from the three MNC, each of which had individual profit more than the turnover of the M & M. Still M &M survived due to following measures:



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- M & M concentrated on service area by adding 350 outlets for slogan 'breakdown maintenances any time would be immediately repaired'.
- Still in 2000 global recession many ancillary and M &M itself went into shambles. The trade unions realised to survive in the market company must perform well. They united planted individual tress as token of oath to work well. This created bondage among the company and the employees.
- Workers were working with the formula- 'What to do, why to do and why to do'. Now the Quality, Services and Production have improved a lot. Company is manufacturing 100 Tractors per day. It has sold 45000 Tractors in 2002-2003 sessions. Thus it not only surviving but also making profit as well.

For this M & M received the Deming Award of 2003. M & M is the only Tractor Company in the world to receive the prestigious Dr. Deming Award. Thus, M & M can aptly show the spirit of the Indian companies.

2. Are Indian companies prepared to become MNC of the kinds of GM, Ford and Toyota?

When this question is put before the experts they come out with the following points:

- To become global the path to the success starts with car companies becoming best in their class,
- Next step is to export the car models significantly with India as the base,



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- Then the company must set up the offices and assembling units in the foreign lands,
- Finally going global with manufacturing facilities all over the globe and recruiting people from different countries with extensively different culture.

Example:

Unique Case Study: Bharat Forge:

In 2003, Bharat Forge, the Indian company bought Carl Dan Paddington Hose company of Germany. The company is going work as Bharat Forge from the 1st January 2004. Bharat Forge invested \notin 28 Million (1 Euros= Approximately Rs. 45/=) in this transaction. It stands almost Rs. 153 Crores in the Indian currency. The bought company is 100 years old. It supplies raw material, spare parts, to world's biggest Automobile companies like Daimler-Chrysler, Audi, Volkswagen, Volvo and alike. This company has Rs. 620 Crore turnover where as Bharat Forge has turnover of Rs. 690 Crores. This, transaction has made Bharat Forge the second biggest forging

company in the world. The Thyssen Krupp of Germany presently acquires first number in the world. At present Bharat forge is exporting most of its parts (23%) to USA based companies. With this deal Bharat Forge will be capturing some of part (16%) in Europe.

Thus, Bharat Forge is the unique but the best example in the Indian Automotive market. Earlier it made its mark in the world market by quality products and good services to the customers and now it is becoming global. It also made its mark in India first show the result to the domestic





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE customers and now it s second biggest company in its class. It is expected from some other companies to follow this path to become Indian MNC in the World Car Market.

3. How to achieve it and how is the path?

This path looks simple on paper but it requires three main factors to be mastered with which are very much required in this field:

Accurate market intelligence,

Ethical Issues in different countries, and

Ability to deal with different and alien cultures.

<u>4. Are Indian companies capable enough to innovate the car designs</u> and develop it?

Experts in Indian Automobile field give the example of Tata Indica Car. Tata Indica car, though not a totally Indian developed car still shows the capability of the Indian car experts, scientist and engineers. Then Tata Sumo, Tata Safari, and Mahindra & Mahindra Tractors are the examples in Automobile field what Indians can do. Thus, they can design and develop the cars can be the conclusion.

Example:

Unique Case Study: of Dilip Chhabriya India Ltd. (DCIL):

Mr. Dilip Chhabriya is synonymous with the unique car and automotive designs in India. His success can be guessed from the fact that even Ford and other world giants have accepted his designs as the world class and has provided the same to their latest cars.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Also, Indian software experts and designing software from various worldwide companies are providing software for design to Mr. Dilip Chhabriya, as per his needs.

His success story lies in the fact that many well-known personalities in India have designed the cars from him. Even MNC and people from other countries come to him to get customised design get done for their cars. Thus proving Indian capabilities to design the vehicle.

Another important thing is that by now our design engineers working in the domestic factories have gained momentum in designing the engine parts and thus proving the capabilities of the Indian engineers.

5. Are people capable enough to build the global organisation of the kind of GM, Boeing, and Microsoft in India?

Human Resource will be the major factor in this project. India has the second biggest technical workforce in the world. India has the work force capable enough to develop the missions like trip on the moon through Advanced GSLV programmes, the team who can develop the Param Super computer, the machines as advanced as the electricity generator plant, and a lot. Hence the factors, which are to be dealt with judiciously, are:

- Encouraging the innovation,
- Welcoming the value creation logic,
- Building the capabilities of the human resources to cope with challenging needs of global customers in the car market,
- Talent Management,



Knowledge Management as every kind of knowledge about every car technology are available on the Web and in the books. Simply collection and implementation is the only criteria which will be left, Employment brand creation for the indigenous car company,

Trust and Cultural Sensitivity also can help coming closer to customer around the world.

In short the competency model, which is still in evolving phase in India, can help the Indian car organisations in preparing itself to face the global challenges with regard to people competencies.

Example:

Unique Case Study: Sunderam Fasteners:

Sunderam Fasteners is the organisation, which implemented Yoga and Zen education compulsory to their employees. It is the first company in India to be called by the Ford like world car giants for developing their few parts for the cars. The people are from India thus showing their class. Hence it proves Indians are capable enough.

Recently, 23rd November 2003, Sunderam Fasteners has bought Data Spicer Europe Limited (DSEL), Kramlington, England. It is one of the three biggest forging companies in Europe. Its products are Heavy-duty precision forgings like gears, power tools, tractor parts, earth moving machine parts, parts of the passenger buses, and cars. The company also is also involved in the business of designing and metrology.

The achievement of the Sunderam Fasteners can be guessed from the fact that DSEL is a 100 years old company having \pounds 10 Billion (\pounds 1=





Approximately Rs. 65/=). The company is spread in 30 odd countries in the world. The company is registered in New York Stock Exchange. Bharat Forge is also registered in the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE).

Few more companies are making mark in the world their results are shown below thus showing capabilities of the Indian people.

Table: 31.	2: Capabilities	of the India	n Companies	seen	Worldwide:	2003
Results						

SN	Indian	The Foreign Company	Transaction
	Organisation	it has brought	
1	Bharat Forge	Carl Dan Paddington,	Rs. 153 Crores
		Germany	(28 million
			Euro)
2	Sunderam	Dana Spicer,	Not Available
	Fasteners	England	
3	Reliance	Flag Telecom	20 Crore USD
4	Tata Tea	Tetley	Not Available
5	Asian Paints	Berger International,	Not Available
		Singapore	
6	Aditya Birla	Nifty Copper Mine	Not Available
	Group		
7	Indo Agro	Mount Garden,	Not Available
		Australia	





8	Tata Motors	Daewoo, Korea	Rs. 535 Crores
9	Bock hart	C.P. Pharmaceutical,	Not Available
		U.K.	
10	United	Now Agro	Not Available
	Phosphorus		
11	United	BASF	Not Available
	Phosphorus		

6. Is the Social Infrastructure matured in India?

It is also in developing phase in India. Though above examples show that it is at the fast pace. Still lot of efforts are needed at his front. About this matter, sometimes with little people support government excels, some times same is the case with people as well, without government support people can get successful. Hence, what matter most is the dedication to the assigned task, which is required in this total indigenisation of cars project in India by both government and the private sector organisations.

7. Is the Education System Competitive enough to tackle this project?

This part is discussed in the 'upgrading' the skills chapter. Still in the gist it can be put here that education system needs a practical TQM approach with exposure and practical interaction with the industries.

8. How about the Government Factor?

People forms the government hence inspired of any ruling party the sole aim of the people in power should be to enhance the positive growth in the



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE industries and developing socio-techno-economic self reliance through such indigenisation projects.

31.5: Few more suggestions from the experts in the industrial field are:

1. Swami Sukhabodhanandaji: He feels that life of the indigenising force should be growing through spirituality and they must add life to years and not aging out by adding years to life. Thus he feels that business organisations must connect the business with the spiritual development of the individual employee. Thus, any aim becomes achievable.

2. K. N. Shenoy Past President of CII: He also feels that many companies in the world are adding spiritual touch to their working culture and hence succeeding well.

Thus, to be precise, Indian Car companies must first become domestically competitive in the liberal economy. This way they will compete with the global cars and car components at domestic fronts. Simultaneously what happens is they achieve substantial export target due to tag of 'Made In India' becomes familiar with quality car products around the world. Thus, it is a kind of becoming true global players by making yourself strong at domestic front. As already more than eighteen global automobile giants are in India. Hence to survive against them in the Indian market Indian companies need to become strong at all the levels at all the fronts at all the phases in the car technology, car market, its human resources. It becomes the long-term asset for the nation. Thus the huge Indian conglomerates or the chain of indigenous Automobile globally competitive car giant can be developed. This also





CHAPTER 32:

ADVANTAGE INDIA: MAKING INDIA SELF RELIANT ON THE TECHNO-SOCIO-ECONOMIC FRONT





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32.1: PRIMARY ANALYSIS:

The Research and in-depth analysis of the car industries shows that the Indian spending will be less than the actual spending today done through the foreign MNC if the total indigenisation of the car sector takes place due to following reasons:

Investments are less when done by the Indian companies,

It is more profitable to the customers,

It conserves more resources,

- It also can manage the sustainable development of the native country as it has bond with the indigenous land.
- Even if you invest Rs. 50000 today the payback time almost two years at the present day conditions.
- Audit of Automobile activities and spending show that most of the money is spend on the foreign technologies and most of the money is stayed back in India on the servicing and maintenances. Thus, showing tremendous dependency on the foreign technologies.

How far Indians are going to remain dependent on the foreign technologies? How far the Indian seniors are going to watch the wastages of resources so that there would be no resources left for the next generation.

When Information Technology has put every kind of knowledge on the Web when are Indians going to capitalise on it? Is the knowledge and learning only children's job? Knowing the kinds of activities the Ford Company, which has recently rolled out 300 Millionth cars, Researcher felt that Indians are simply slave of their technologies developed there.





32.2: What are the results of Indigenisation of car technology?

Point 1: Background: For this we shall consider only main latest technological units in the car. India is not manufacturing totally indigenously all these parts for the latest cars and with the latest technologies. There is a substantial amount of loss to India. It is suffering loss at financial and other resources front. The main parts of car considered here are, the Gear Box (GB), the Engine, the Axles, the Steering Gear Box (STB) and others autotronics and mechatronics parts and assemblies.

<u>Point 2</u>: Analysis of the parts of the cars Indians presently manufacture:

Table and Graph: 32.1: (Independent survey report):



Interpretation of the table:

Out of these thirty thousand plus parts India is manufacturing only others section at present with world standard for some domestic vehicles.

Thus on the other major half India is losing almost Rs.25000 crores every year.



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Point 3:

<u>Table: 32.2:</u> Result of implementation of the small car indigenisation

project: (Independent survey):

S	Machine	No of	Present	If India	Result of the
N	unit of	Parts	Situation	starts	Implementation
	the Car	in it		Manufactu	of this
				ring it	Indigenisation
					Project
1	Engine	10000	India is	There will	1.There will be
	Unit and	+.	not	be as	mobilization of
	whole	(Ten	manufact	many as	resources.
	Assembl	thousa	uring	parts as	2.Direct
	у	nd	more than	number of	Employment
		plus)	five	SSI,	generation per part
			thousand	Vendors,	is around two
			parts	Ancillary	hundred, i.e.
			required	Units,	overall, generation
			in the	Dealers,	of around two
			latest	Service	million at least.
			Indian	Stations,	3.Supporting
			and MNC	Garages,	services will
			cars.	and	generate around
				Supporting	eight million jobs.





				Services.	4. Revenue loss of
					Rs. Fifty Billion i.e.
					\$1Billion, as
					Foreign exchange
					will be saved every
					year.
					5. <u>Divert the same</u>
					<u>money to our</u>
					<u>indigenous set up;</u>
					<u>India will be self-</u>
					<u>reliant in every field</u>
					of technological
					<u>base</u> .
2	Gear Box	500+	India not	There will	1.There will be
	Unit and	(Five	manufact	be as	mobilization of
	Whole	Hundr	uring	many as	resources.
	Assembl	ed	even half	parts as	2.Direct
	у	Plus)	of the	number of	Employment
			parts	SSI,	generation per part
			required	Vendors,	is around one
			for the	Ancillary	hundred, i.e.
			gear box	Units,	overall, generation
			in many	Dealers,	of at least one





			of the	Service	million jobs.
			MNC cars	Stations,	3.Supporting
				Garages,	Services will
				and	generate around
				Supporting	eight million jobs.
				Services	4. Revenue loss of
				will be	Rs. Twenty Five
				developed	Billion i.e. \$500
					million as Foreign
					exchange will be
					saved every year.
					5. Divert the same
					money to develop
					our own
					Automobiles and
					India will be self
					reliant in the
					automobile
					technology.
3	Rear	100+	Same as	Same as	Same as above
	Axle	parts	G.B.	G.B.	mentioned Gear
	Assembly		above.	above.	Box.





Interpretation of the table:

1.Please remember that the Engine and the Gear Box are the major components of the Car or any other Automobile. They together need a set up of the industries that ultimately can manufacture ultimately ninety percent of the basic parts of the machineries existing on the earth. May it be a small screw, a nut or may it be complicated parts like carburettor and fuel injectors and their sub parts. As we have seen in the befitting example part of this chapter. 2.Every distinct parts needs distinct and unique kind of industrial set up.

3.A car has almost thirty thousand components right from the small screw to the body and axles.

Point 4:

These Befitting Examples prove the need and the advantages of the car indigenisation:

Let us see examples in the charts in details, why at all the Car Engine forms the major component of the basic technology for the following cases:

a. The Engine of the car also forms the basis of the power generation from the Generators, which manufacture the alternating current of Electricity that is used in every household devices and devices of the industrial houses,

- b. The Dynamos for the direct current,
- c. The Compressor for the air conditionings and cold storage devices,
- d. Hydraulic devices used in power lifting or braking,

e. Pneumatic devices used for the lifting, elevating and braking,

f. The Elevator Technology also based on few techniques used in the Automobile Engines,



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g. X Ray machines use this technology,

h. All the Electricity manufacturing Power plants, Atomic Reactors, and all Vehicles,

i. Medical Devices like artificial hearts and Anaesthesia Doctors use the kind of devices, which use this technique,

j. The technique in the Gas Cylinder, Mixer Grinder, and such all-household devices also use some or the other similar kind of technique or kinematics as used in the Automobile Engines,

k. Part time Generators and Dynamos used in the houses, machineries and the big industries,

1. The pollution control measure taken for the exhaust fumes from the Automobile Engine also forms the basic of Environmental Technologies used in varied fields of the Industries such as Powerhouses, etc.

So there is no end to this listing.

32.3: Advantages of developing Indigenous car and its technologies according to customer needs:

Table: 32.3:

SN	Advantages of building car technologies indigenously
1	Flow of money towards India
	More Revenue Generation due to repeat orders, due to customer
2	satisfaction.
3	Employment Generations are in millions
4	Huge Industrial Development





Self Reliance at the Technology Front form the basic to the higher

5 end.

6 Supporting Services get the moral booster

7 Research and Development supports higher end Technology

8 Patriotic Feeling among the users

9 Communication is much easier if the technology is locally made

10 Service Centre Network has easier access

Development of Technically Skilled people is faster as happened

11 with Bajaj

12 Cheaper access of the Car to more and more people

13 Cost of spare part is lesser than the foreign made cars

Complaint if any can be conveyed immediately in the national

14 language to the local people.

15 Immediate action and implementations inside the nation.

16 All local country Factors considered while developing the vehicle

Profit to indigenous company is utilised inside for further

17 development

Timely availability of reliable spares, related technology and

18 services by Indian Indigenous technicians

It can achieve cost reduction and ensure timely supply of parts

and components through encouraging domestic manufactures

19 and supplier may Just In Time.

20 Saving of Foreign Exchange



Developing more advanced technology in car sector which can be

21 used else some other allied fields as well

Contribution towards expansion, diversification, R & D and

22 stricter Quality norms among the domestic industries.

India having huge domestic resources and expertise in every field.

Indigenisation of small cars with respect to customer behaviour

23 will mobilise these resources.

24 Circulation of money inside India only

Satisfied customer becomes loyal customer and thus remains

25 Brand Loyal for the longer time.

26 If exported it will built 'Made in India' brand image.

Education system will become more result oriented, due to better

27 interaction with the domestic as well as MNCC and MNC.

Interpretation of Table: It is an independent survey.

1. The car customers supposed to be most quality conscious, service conscious, and time conscious so when Indigenous resources with indigenous product provide them these they will feel the King customer consciousness. So more Indian Indigenous customers will buy the same car and thus circulation of he money inside the country will give tremendous boost to the Economy.

2.Genuine efforts of the Manufacturer and the supplier, service industry, R& D sector, Quality and Finances will be strong enough developed to compete the MNC domination in the market.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 3.Even MNC took more than forty years to get on to these stages.

4. If few parts are suffering Quality aspect then they will be taken care of and will be made to the befitting soon with the efforts of Research and Development.

5.More awareness programs like seminars, pamphlets distribution, Research and Development projects, advertisements, monthly reports, articles in the journals, etc. can make every kind of customers including those who only once watch the advertisement can improve the required indigenisation program a boost.

6. All old and new measures for cost effective technology building like Total Quality Management, Reengineering, Business Process Reengineering, Operation research, will be generate interesting industrial results.

7.Standardisation of the cost estimation and pricing will give the transparency in the industry.

8.Joint effort of the SSI, MSI, will bring cohesiveness in the industry increasing bench marking and exchange of ideas through practices and thus improve the industry.

9.Government and the industrial bodies will seat together and solve the problems as if it is the national problem.

10. Huge employment generation will be there as each part out of thirty thousand odd parts of the car can generate almost two hundred odd jobs and thus generating at least a million jobs. This is discussed later.

11. Service industry will get the boost.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 12. Vending and sub vending will percolate the technology know how among the local and indigenous people thus even road side garage can repair the car in emergency.

13. Huge foreign exchange will be saved as a part of indigenisation all resources will be Indian only. So circulation knowledge and money and services will be of Indian origin only.

14. Customers and hence Indian citizens will be of prime concerned in this project.

15. Fast services means more customer satisfaction.

16. Profit generation will be percolated in the society or may be invested in other projects, which will have ultimate destination India only.

17.As local strategic managers and board of director means indigenous people on the higher posts and even at the worker level will benefit the indigenous people only.

18. Least exploitation of Indian resources from the foreign body.

19. Indian education will get the face-lift. As there will be more industryinstitute interaction. These interactions will among the domestic industries as well as the MNCC, which have entered into the Indian market.

Let us see more views on this from the bosses in this field who are masters in their field.





32.4: CONCERNED SHOWN BY THE BIG PLAYERS OVER THIS ISSUE:

Reference:

1. Indigenisation of IAF conference OCTOBER 2000- 2001, Ahemedabad.

2. Excerpts from program conducted on Swadeshi i.e. Indigenisation, from various Daily News papers.

3.Advertisement of various auto industries like Mahindra and Mahindra and Tata Engineering.

S.	Name of	Industry	His remarks over
N.	the Big	&	indigenisation with respect to
	player	Occupation	market forces/ Benefit to
			Nation/ Customer behaviour.
1.	Mr. Ratan	M.D. Tata	He has claimed Tata were the
	Tata	Engineering	first to start indigenisation in
			the steel and has invested in
			2001, almost Rs.1600 crores to
			indigenise his company's small
			car Tata Indica.
2.	Mr. Keshub	M.D.	He has claimed that when
	Mahindra	Mahindra	U.S.A. was invaded by the
		and	Japanese car giants all the big
		Mahindra	players in U.S.A. like GM, Ford
			came together and fought till

TABLE: 32.4: CONCERNS SHOWN BY THE BIG PLAYERS IN INDIA:





			they win the war of
			indigenisation of small car and
			giving boost to their indigenous
			product.
			Same thing is expected from
			Indians too.
3.	Air Chief	Chief of	He categorically states that
	Marshal Mr.	Indian Air	concept of self-reliance and self-
	A.Y. Tipnis	Force (IAF)	sufficiency is need of the hour
			for the Indian Industries. The
			reason being Indians have the
			most modern weapon but not
			indigenous and every now and
			then it has to look for the foreign
			help.
4.	Mr.	Former	He claimed that in the present
	Kasturirang	DRDO chief	political scenario, economics of
	an		liberalisation, globalisation, the
			vision of indigenisation should
			be looked from the broader
			outlook. This gives the boost
			other supporting industries in
			India. He also wants that every





			indigenisation partners should
			come together to overcome the
			obstacles right from Research
			and Development to post
			manufacturing services.
5.	Mr.	Indian Army	He had a vision in the hitherto
	Padmanabh	chief	in predominance of
	am		indigenisation through reverse
			engineering should be overcome
			by indigenisation with
			de-novo designs, incorporating
			advanced state-of-the-art,
			technology. He stressed
			especially on the Tank
			technology and other supporting
			technologies.
6.	Mr. Naval	Director of	He is most concerned about the
		Automotive	funds.
		Research	He pointed out that political will
		Association	for the funds building or
		of India	financial commitments from the
		(ARAI)	Government is also most





			essential part of the indigenous
			endeavour.
7.	Admiral	Chief of	Navy chief pointed out that
	Nadkarni	Naval Staff	during indigenisation of frigate
			building Indian navy began,
			ideally at the induction of all the
			new technology itself – the grand
			collaborative efforts first and
			developing technology later. Now
			India is self reliant in this
			technology and has built INS-
			Delhi, INS-Mumbai, etc.
8.	Mr. Vadhra	Escorts	Indigenisation will enable
		India Ltd.	modernisation of indigenous
			resources and technology and
			timely availability of the
			manufactured vehicle in India
			itself.
9.	Mr.	Kirloskar	Indigenisation of advanced
	Kirloskar	India Ltd.	machinery including small car
			engine, will avoid concentration
			of Economic power.
10.	Mr. Munjal	CEO Hero	Indigenisation of vehicles in





		Honda,	India will generate lot of	
		Honda	employment in India. Indian	
		Motors	Engineers and others would not	
			find it difficult to find new jobs	
			in the market.	
11.	Mr. Firodiya	Kinetic	He said it will give reasonable	
		motors Ltd.	rate of return on the Capital.	
12.	Mr.	Air Marshal	He finds it to be an opportunity	
	S.S.Gupta	Of IAF	of micro level interaction	
			between IAF and the Mechanical	
			Engineering and Automobile	
			Industry, which will open new	
			vistas for developing a mutually	
			beneficial relationship and will	
			go long way in achieving the goal	
			of	
			self- reliance	
13.	India Ratna	Scientist	He is the biggest supporter of	
	Dr. A.P.J.	and Now	indigenisation of Technology in	
	Abdul	President of	India. When asked he strongly	
	Kalam	India	put forth his vision about	
			indigenisation:	
			1. To use weapons which are in	





			the middle of their life of are at	
			the fag end India needs to	
			develop its own indigenous	
			weapon systems,	
			2. Big weapons' spare could be	
			bought only from foreign	
			sources at exorbitant cost, so it	
			has forced India towards its	
			indigenisation program,	
			3.To develop technology of	
			complex and high valued items	
			India needs to design and	
			develop some simple technology	
			first.	
			4. In the 21 st century	
			Operational efficiency, reliability	
			of technology, sustenance of	
			Indian Industry, and	
			indigenisation are the key words	
			to lead the nation towards the	
			prosperity and world leadership.	
14.	Mr. Rahul	M.D. Bajaj	He claims that Bajaj has already	
	Bajaj	Auto Ltd.	indigenised the Two wheeler	



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				sector and he is of the opinion to			
				indigenise totally the small car			
				sector as more middle class			
				consumers are moving towards			
				the small cars.			
				Then he also mentioned that			
				this will lead to more			
				improvement in fast moving			
				consumer goods sector, small			
				scale industry, cottage industry,			
				middle scale industry, leading to			
				more job generation and more			
				fluent marketing dynamics.			
				Thus Indian economy can be			
				stabilised.			
1	15.	Dr. P. V.	Ph.D. in	He believes it is the			
		Desai	Managemen	indigenisation, which is the			
			t and UNDP	perfect, reliable, and quality			
			Fellow	substitute to the import of			
				weapon system and other			
				technology.			

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			widespread growth of indigenous		
			economic wealth of India having		
			long lasting assets and results.		
16	Mr. Mohanti	Command	Indigenisation leads to:		
		Indigenisati	a. Development of Customer		
		on Officer,	care centre, Maintenance centre,		
		Maintenanc	manufacturing centre, which		
		e command	ultimately leads to help in		
		Nagpur.	dispersal of economic activity,		
			b. It remove regional imbalance,		
			c. Leads to proper distribution of		
			wealth,		
			d. Stratified distribution of		
			industrial area,		
			e. Offering a good spring board		
			for new breed of entrepreneurs,		
			f. It acts as a catalyst of overall		
			development of the economy of		
			the country.		
17.	Mr. George	Defence	Indigenous products should		
	Fernandez	Minister in	have high security of sales and		





	,	Indigenisati	must have high freedom from	
		on program	marketing plus sales related	
		at Nagpur	problems in its own land.	
18	Dr. H.R.	Honorary	India is fast becoming global	
	Bhojwani,	Advisor to	hum of R & D. Already 150 MNC	
	(Reference:	Council of	have established their R & D	
	The	Scientific	bases in India. As India is	
	Hitvada,	and	cheaper its scientists are more	
	City Line	Industrial	creative and above all has vast	
	page 8,	Research	scientific and technological	
	dated 12 th	(CSIR)	base. Automobile is one among	
	May 2004.)		the many fields where R &D is	
			taking place. One among many	
			'Advantage to India through R &	
			D bases' car R & D has big	
			share. Both expertise	
			experimental as well as	
			theoretical India is becoming	
			preferred destinations due to	
			vast talent base. He feels that	
			Globalisation of R & D has now	
			become a common phenomenon.	
			Countries like China, Russia,	





			Israel, Singapore are still threat		
			to India and hence needs to		
			improve on its technological		
			alliances. He also believes that		
			Techniques as well as the		
			Technologies are equally		
			important.		
19	Dr.	Director,	He added to what Dr. Bhojwani		
	Sukumar	National	said above about the automobile		
	Devotta	Environmen	technology R & D, that process		
		tal	could not be called a technology		
		Engineering	and added that if there is an		
		Research	innovation it must be tried		
		Institute,	practically and not merely be		
		Nagpur.	kept on papers. The technology		
		(NEERI)	should be developed for the		
			welfare of the mankind.		

Interpretation of the Table reveals the Objective of the above topic:

The main objective of the indigenisation of car industry with respect to customer behaviour is multi purpose. It is aimed towards

- a. Self Reliance in the prescribed field,
- Enhancing reliability of indigenised product and support for development of the domestic industry,



- c. Saving foreign exchange for the same technology and in turn earn foreign exchange by exporting the indigenous product here the car,
- d. Cost reduction,
- e. Mobilisation of the resources,
- f. Generating the employment potential,
- g. Developing national economy.
- h. Bringing Synergy in indigenises resources for self-reliance.
- Supporting domestic organisational collaborations for mutual benefits.
- j. Streamlining procurement, policies, and approval procedures.

32.5: EXPERTS' EXPECTATIONS:

Table 32.5: Growth in the Car Industry indicates the nation's

Economical and Technological growth: (Independent Survey Report)

	DO YOU AGREE on the following aspects			
SN	about the CARS?	YES	NO	REMARK
1	Car Industry is still the biggest in the world?	YES		
	India can Design, Develop; Manufacture its			
2	own car with its own resources?	YES		
3	US industry thrives on car industry?	YES		
	India can develop at faster growth rate, if it			
4	can produce its 100% own cars?	YES		
	India can generate most employment through			
5	complete set up of own car industries?	YES		





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	US have contributed most in the Research			50%
6	and development of the car industry?	YES	NO	Japan
	Italy has the best designers in the car			
7	industry?	YES		
	Continuous improvement in the Quality has			
8	upgraded the car industry?	YES		
	Better versioning in the car industry is still	-		Price
9	possible in the car world?	YES		concern
	Should Various impact tests be made			
10	compulsory in India?	YES		
	Should Strict Quality tests be conducted			
11	every year in India for every car segment?	YES		
	Should the Service industry in car segment			Very
12	be upgraded?	YES		much
	Will you expect a completely computer	-		
13	controlled Autopilot driven car in future?	YES		
14	"Car is the best invention of man"?	YES		
	Complete set up of car industry forms the			
15	basis of higher end space-technologies?	YES		
	Automobiles form the backbone of			
16	Transportation Industry?	YES		
	Number of small cars shows the Economic			
17	growth in middle class people?	YES		





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Small car is mostly driven by professionals			
18 like Doctors, Lawyers, Engineers, etc.	YES		
Executives must be provided with car and			
19 fare or car and petrol facilities?	YES		
Cars having price more than Rs.5 Lacs, have			
20 less chances of growth in India?		NO	
Like Japan India can also manufacture			
21 Quality cars in India itself?	YES		
In coming 20 years India can have at least			
22 one Car Giant like GM, Ford, Toyota?	YES		
Should Engineering and Management people			
23 come together to develop Industries?	YES		
			If it's
Should India develop Cooperative Car			basic
24 Industry for Indigenisation of Cars?	YES		need
Should Unemployed youth be utilized for the			Engineer
25 Indigenisation of car Industry?	YES		S
Can Public Sector Industries develop the			Like
26 better cars in India?	YES		BHEL
Price of a car in US is equal to lowest salary	-		
27 of one month in US?	YES		
Can the prices of the cars in India be brought	•		
28 to the level the US has?		NO	




	Should Hyundai, Daewoo and other MNC			
29	cars be 100% Indianised?	YES		Must
	MNC should be allowed to manufacture cars			
30	only if they Transfer the Technology?	YES		
	Indian cars can capture Chinese and Third			China
31	World car market?		NO	Price
	RTO,DTO must be very strict while allotting			
32	the Licenses for the cars?	YES		Must be.
	Traffic manners, licensing and the car must			
28	be directly linked?	YES		
	Should alternative fuels like Methanol, CNG,			
29	LPG, be allowed in the cars?	YES		
	Should the car industry and other industries			
30	be given special privileges?		NO	
	Should any restriction be brought on			
31	importing cars to increase domestic cars sell?	YES		
	Should the Indian car industry be thoroughly			
32	revived?	YES		
	Should the Indian car and transportations			
33	norms be revised?	YES		
	Should the Indian road conditions and the			
34	signals be synchronised?	YES		
35	Should the Indian Traffic Management be	YES		



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revised and Motor vehicle act be revised for	
the new technology?	
Indian middle class has increased from 300	
36 million, can't one tenth buy car?	YES

Interpretation of Table:

The table is quite elaborative and self-explanatory. It covers almost every point related to car industry market and customer and traffic, and the nation's economy.

Experts believe in thorough revision and modification of the car industry and related matters and they believe in India's strength of survival of the weakest and growth of the toughest economy in the world, through this indigenisation of car program.

Only on these technologies all the MNC are ruling the business world. Which proves that only indigenising the technologies can solve every kind of economic problems India facing.

It is always the need, which influences man to work hard to achieve it. By following the customer needs car technologies can be advanced in India. The spin-off in the same technology can bring revolution in the other fields too. It can generate huge job potentials in India. It can upgrade the lifestyles of the Indians. It can keep Indian Economy pulsating to fulfil the demands of the customers. It can put the technologies always advancing due to perpetual hard work of the people concerned with it.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE This procedure has helped USA and Japan achieve Techno-Socio-Economic stability in their country. Same thing is possible in India as well.

Infact it was the wish of the Hyundai employees to indigenise each and every part and all the machineries for distinctive activities in their plant. It reduced cost of manufacturing and it also improved their skilled work force. This improved confidence among the employees. Customers started asking about how the material is manufactured? How the things can be assembled? The chain increased and slowly Hyundai the Korean firm started manufacturing the cars and the ships. Korea has captured 15% of the world ship market and now has become the biggest ship manufacturing company in the world. Every week it completes one ship and one ship requires eight months to complete its manufacturing. Thus Hyundai shipping yard has become the biggest manufacturing ship building premises in the world. Adjacent to it are Hyundai Cars, which made the beginning of all this ventures. Thus, small indigenising of technologies efforts has become the giant USD 4 Billion-turnover Company in the world. The company is improving its R &D in the field of Cars, Ships, and the electronics goods. What ever are the requirements in the cars and the ships, Hyundai tries to manufacture indigenously in their parent company Hyundai in their motherland South Korea.

32.6: TECHNOLOGICAL ADVANTAGES OF THIS PROJECT:

Indian Self Reliance: India can become totally self reliant on the technological fronts, due to following reasons:



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Luxury cars need mastery over basic and middle ware technologies, where worldwide turn over is more than USD 500 Billion. Thus, Indians can fetch big share from the world market by producing latest products. Electronic Equipments and Gadgets like LCD screen monitors, mobile phones, Electronic Feed Back Systems, etc. Mechanical Equipments and Gadgets including Wrench, Elevators, etc. Chemical Technologies used in petroleum and oils and paints, Civil engineering marvels like manufacturing plants and world-class infrastructures, Robotics Assemblies used for variety of purposes in the manufacturing and assembling plants. R & D labs, Industries, Education Institutes get mutually benefited. They can bring future version of cars based on Fuel Cell Technology, Battery Operated Vehicle, etc. Even they can solve the problems of the individual industries through consultations. All these things can bring revolution in the Indian socio-techno-economic world.

Technology Spin-Off: In the Technology spin off we may find that technologies used in the cars are also used in many other fields, with some kinds of modifications and/ or with modified supporting technologies. Infact technology spin-off itself means if the technology is used unintended in some way or other in some other field in positive manner to help the human kind in long run. In the other chapter we have seen that there are few technologies, which were adopted in car technologies where as there are some technologies, which are used in the cars first and then adopted elsewhere. Hence, the technology-spin-off, and few industries which will get the boost, is as follows:



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Electrical Equipments used in many fields like Generators, Alternators, Dynamometers, Wiring Harness, Switches, etc.

•Electronics equipments such as the Sensors, the LCD screens, the T.V. screens, the Radio receivers, the Mobile instruments, the Internet technologies, the automated car technologies, etc.

•The Metallurgical Industries gets the exposure to the advanced alloys of Aluminium, Iron, Copper, used in various ways apart from the Luxury car Engines and Body parts.

•Manufacturing Systems having Robotics Technologies in the Car plants are also useful in the other allied fields or even distant fields like Pharmaceutical Industries.

•The CNC, NC, PLC etc. are now a day used in every industry, which have origin in the Cars industries.

•The Designing aspect gets the boost. As the New Models, Vehicle Devolvement labs use it while versioning of various parts of the Luxury Cars.

•The Chemical Industry finds it challenging to develop the petrol additives to suit the latest Euro Norms engines. The prolonged list may also include the rubbers, the paints, the plastics, and various chemicals used while manufacturing, or even while servicing and maintenances.

•Material Quality and Process improvements can bring few more revolutions in the Technological fields.



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32.7: SOCIAL ADVANTAGES:

Job generation, increasing technical workforce and improving living standards:

Mainly the Job generation is huge with this kind of project.

a. As to every car part 200 jobs are related luxury cars can generate at least 200 X 70,000 = 14 million jobs – 5,00,000 (jobs in small cars at present) = 9 million jobs (actual generation).

b. Generation of huge skilled work force as percolation of technologies to even the roadside garages.

c. Exposure of many people and experience and suggestions in these technologies can generate R & D in the allied fields. Thus, triggering the development of the technologies in India itself for the future generations.

d. The education system will be changed towards modern trends in the market and for research and developing the innovative technologies.

e. One more dimension to social Advantage is that today's society is a knowledge driven and significant knowledge management. In the present world, as reported by Mr. Bell, the trend is from pre-industrial societies to industrial societies to post-industrial societies. Post-industrial society is based on services, and hence is content between persons. What count are not only muscle power and energy but what count most is information, knowledge and technology and information technology.

As applicable to our project, such a society has got following five dimensions when it comes to indigenisation of car technologies is concerned.



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<u>Table: 32.6</u>: Five Dimensions of Social Development through this

project:

SN	Dimension	Its effect on society as a social driver
1	Socio-Techno-	It will shift to Quality manufacturing and Quality
	Economic Sector	education and Quality Services Economy.
2	Occupational	Emergence of highly skilled and semi skilled
	Distribution	technical work force
3	Axial Principle	Knowledge focused society brings creativity and
		innovations all the times.
4	Future	The R & D and Quality control brings ever-new
	Orientation	technologies through proper assessment and new
		plans for the future.
5	Decision Making	Computer and Information Technology are bringing
		new technologies like fuzzy logic and artificial
		intelligence, which are helping in decision-making.
		Thus, the creation of a new technology having
		computer and Information Technology (IT) as the
		prime tools can bring social upliftment on earth. It
		can bring harmonious changes in the other world,
		which are getting developed in space, on moon or
		other planets and other parts of the universe.



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32.8: ASPECT OF FINANCIAL AND ECONOMIC ADVANTAGES:

- i. Look at the Hierarchy of the human financial achievements:
 - a. Scooterette or Moped,
 - b. Scooter,
 - c. Motor Bike,
 - d. Small cars,
 - e. Middle cars, and
 - f. Luxury Cars.

The more the sell of all these vehicles, the more is the vibrant economy. Above all in this hierarchy, the Luxury car stands at the top of the ladder. **ii.** In the October 2001, The Week, Magazine, Indian edition, in the article

the great Indian Middle Class following fantastic points have been mentioned:

- a. Improving life styles of the millions of people. Thus, at present only
 5000 people are going up the ladder of the hierarchy of the Financial
 Achievements to buy the Luxury Cars from their middle car segment.
- b. Even if this happens 5000 X 15 lac makes Rs. 750 Crores plus Servicing, Maintenances and Spare parts turn over of minimum USD
 2 Billion or Rs. 1000 Crores in the luxury cars sector.

iii. Mastering the technological front can improve the Exports. It can fetch at least few more orders for the Indian SSI, MSI and even LSI from all over the world:

iv. At least 5% part From the Turn over of USD 500 Billion in Cars,





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE v. At least 5% part From the Turn over of USD 500 Billion in Car spare parts,

vi. At least 5 % part From the Turn over of USD 500 Billion in Services, Maintenances, and Infrastructures.

vii. At least 5% part From the Turn over of USD 1 Trillion in the cars sector. When it happens India will definitely standing at the door of the developed nation category.

vii. More Revenue Generations due to repeat orders and thus keeping the Economy always pulsating.

viii. More R & D investments can bring more returns in the versioning of the car and other industrial parts, equipments, assemblies.

32.9: Business and Job Opportunities in this project:

a. **How**? How it can be done? This is also a part of Opportunity. As R & D and Consultation for the Technical and Engineering aspect forms the Major Part of the Indigenisation. Businessmen even don't know that there is a business in R & D and in manufacturing few patented parts, which can earn them millions. Infact, this is the complaint of Indian Patent Organization, Nagpur chapter.

b. Marketing Advertisements and Management Consultancies.

c. **Job Consultancies** for skilled and unskilled work force even for the top brass Technocrats.





d. **Beurocrats:** They just have to search which part to manufacture from the Internet. (Go through the patents in the car technologies on the Web and the Businessmen can find the business of his interest.)

e. **Technocrats** like us have to master their own field and capitalize for the sake of the country.

f. **Economists** have big opportunity to prove that:

*Indigenisation is the best way for import substitutions.

* Falling value of Rupee = High cost of import,

* Due to different commercial practices in the world it can avoid different kinds of sanctions for the various countries.

* India's restricted and inadequate shipping and cargo capacity in variable demands can pose problem either of Luxury Car imports or for its spare parts.

g. Financial people can convince:

* Long Transport time for the latest vehicle in demand having foreign origin, is a costlier affair.

* Any Calculations prove that manufacturing local technologies cost lesser than its foreign counter parts.

* Versioning has posed a major problem. In every three years every part goes sea change. This can be a problem in future.

h. Engineers and Technocrats:

* At Basic Technologies level: Research, Designing and Development of the smaller parts to the latest international standards. So as to capture the local Indian market and not allowing other world competitors to capture this



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE field. The mastery over this field can help Indians to capture at least some part of the USD 500 Billion-world market in this field.

*Mastering the Middleware Technologies requires mastery over the Basic Technologies level. China has acquired it. Now China has posed a serious threat of Cheapest but Quality Technical products to the world market. The best example would be India is no more the only option for the Cheaper Bikes, Buses, and Trucks, in Nepal. China has snatched away India's 40% share in the Nepal's Vehicle Market.

* Infact, though India claims that it has all the knowledge of Missile and Super Computer and other Military Technologies still more than 60% various parts are imported and assembled in India, which we call indigenous development. Infact it is like assembled Personal Computer (PC). Choosing the best among the computer parts assembles PC. No need to say about the Super Computers also. It is highly impossible that the nation, which can manufacture Super Computer, cannot manufacture or commercialise the PC technologies in this country.

* Engineering Economics has proved that all the facilities given while selling the cars, like discount sales or gifts, financial supports provided at reducing interest or reducing Equal Monthly Instalments (EMI) ultimately helps the MNC conglomerates gain more profit than by simply selling the cars. As profit earned by a whole Conglomerate is always better than profit earned by the single company. Mutually they benefit each other.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE g. **Management Experts**: They can bring in notice about the successful measures taken by the Chinese, American, Japanese, Korean Government or Organizations during the same kinds of market threats. To be precise:

i. *Chinese* adopt very cheap product and services tactic in the world, which no other can adopt. This is proving to be threat to every kind of business including Auto giants all around the world, the civil engineering giants, the IT giants and telecommunications around the world.

ii. American adopts few Pilot Projects before fighting with the actual Few Examples: Corporate fight between Pepsi and Coca Cola. threats. Corporate fight between Sun Micro-system and Microsoft, General Motors and Ford Motors ultimately these giants crush between them all the other competitors around the world. The Money and Management power these companies use are unmatched around the world. Whichever power comes between them like Kea Motors or Daewoo Motors of Korea or even the giant Economies like Mexico, Argentina gets crushed. For Example: In 1992, Japanese cars pose a serious threat to the American Cars in American market. General Motors (GM) suffered a loss for the first time since last few decades. GM secretly joined hand with other American Auto giants and manufactured 'Saturn' Cars as a Pilot project. Every new kind of management trick and technology was used. Cheaper cars at very high level of Quality Standards, which even Japanese could not think of, were adopted. American took a leader's step in setting up Standards even better than ISO standards. So once again, American carmakers started making huge profits from the year 1996. GM made USD 1.2 Billion Profit that year.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE iii. *Koreans* are the real spirited force in the world. When Japanese, American Cars were making profits in Korea they developed there own technologies through Hyundai, Daewoo, Kea Motors. They manufactured quality cars at cheaper costs with shareholders facilities to the customers. It was such a huge revolution that all other, world car giants got shaken up. It also proved that no force in the world is unconquerable in the Technical and Financial field. Of course later on what happened to Daewoo Motors and Kea Motors everybody among us knows it well. Few of their plants were sold to Ford Motors few of their plants were closed. Few got crushed between the Ford and GM.

Thus it is huge opportunity for Management Experts to keep companies always alert against the tricks of these smart big giants in the world.

32.10: Making it the nation-building project:

Certainly. Only thing needed is to know the following facts about your national situation in details.

a. Is there any demand for this project?

Leave aside small cars even luxury car people feel aren't they part of India? Aren't they highly influential in their field? They are also demanding indigenous cars.

Recent Economic Times Survey shows that high import content of Skoda-Octavia, Ford-Mondeo, Hyundai-Sonata, has resulted in piquant problems in their companies. Same thing happened with the Daewoo Cielo earlier and we know the fate of it.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE a. This made to rise in prices in the spares, particularly crucial body parts and their availability has been a constant problem for the Indian customers. b. These cars have limited network where as the dealers and authorized service stations had to handle large customer base.

c. So in premium, luxury and super luxury car customers are also demanding the India's own indigenous cars with the supporting network.

b. Project with Unlimited Opportunities

•Thus the customers delight for the high-class influential customers is the only option of this project. To achieve that there are many opportunities

•As you know to delight anybody needs hands on services, hand ot hand delivery, quality product, continuous improvement in the product, in time delivery, 24 hours services, etc.

•The Luxury car must have the best Aesthetic and Ergonomics besides latest technologies.

•The Technology aspect, R & D, Quality, Mechanics, Management, Marketing, Finances, Economics in every field unlimited opportunities are there.

Thus, the dream of our Honourable President Dr. A.P.J. Abdul Kalamji, Prime Minister Mr. Atal Behari Bajpeyiji, former Prime Minster Rajeev Gandhiji and others that is making India a Developed Nation by 2020 can be achieved with these kind of projects, if taken seriously and implemented with judicious planning.



CHAPTER 33:

NEW IDEAS AND FUTURE NEEDS IN INDIA FROM THE INDIGENISATION OF CAR TECHNOLOGIES AND SUSTAINABLE DEVELOPMENT POINT OF VIEW



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33.1: NEW TECHNOLOGIES IN THE CAR SECTOR: THE BACKGROUND:

For the past two decades since the advent of the computer as the fantastic machine, many companies have been focussing on the product development process transformation mostly in product design, investing in 2D and 3D Computer Aided Design (CAD) and Digital Manufacturing Units (DMU) tools. It is need of the day as well. Today there is a strategic need to define, simulate, validate, and optimise the entire product lifecycle including manufacturing disciplines for companies to increase their agility to sustain competitive advantages in the global market. Infact it has become easy to plan, simulate and build a manufacturing process in a completely digital environment.

Following are few such projects, which have been, approved various companies as a viable projects for their respective products.

33.2: NEW TECHNOLOGY 1:

DIGITAL PRODUCTION AND MATERIALS MANAGEMENT (DPPM):

At present no such technological name exists in this field but amalgamation of many technologies can form this technology. Hence the efforts to put this technology from various aspects existing and which are yet to be developed are given here. Important thing is, it has been observed that with the advent of the Information Technology and super advanced software using the Virtual Reality it is possible to create the simulation of the whole Project. Right from the first step of designing to its three dimensional animation till the actual working and out put of the product. Everything can be put on the





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE digital network. It can visualise, tested for the flaws and can be used for the up gradation of the technologies.

The major reason behind this development has been manufacturing industries are under great pressure in terms of creativity, production scalability, and cost effectiveness. Above all the physical prototyping and multiple alterations, sequential engineering flow between design and manufacturing and conventional methods of production planning are not adapted to the latest market challenges. Digital manufacturing allows simulations of production scenario enabling users to check manufacturing feasibility studies and production flow totally in a digital environment before the products are made.

The solution over the burden of high quality, productivity, costing and customer satisfaction can be solved using following techniques. Together they form what is known as the Digital Production and Materials Management.

Digital Production and Materials Management (DPPM) involves following steps:

Step 1. Product Design,

Step 2: Process Planning,

Step 3: Time Measurement,

Step 4: Layout Planning,

Step 5: Ergonomics and Aesthetics,

Step 6: Robotics and Programmable Logic Circuit (PLC),

Step 7: CNC simulations and



Step 8: Quality Assurance,

Step 9: Factory Flow simulations,

Step 10: Feedback and Corrections.

These technologies are beneficial in every kind of manufacturing sector. However, again it is Cars manufacturing plant where it will be used first. Infact sub part of this project in the form of Digital Factory is been designed and is developed by Delmia corporations for the Mercedes cars and will be functional in the year 2005.

Most important thing is Indians have to master this technology from future point of view. Many factors are been discussed in details in this chapter. The factory of this kind always has following key aspects, which will be worth observable:

A. Product Life Cycle Management (PLM):

In the broader perspective Product Life has following steps with overall consideration of Product Life Cycle Management (PLM). It is a relatively hot topic now a day. While the three dimension drawings are most commonly observed in the Civil Engineering field internal customers of the factory like scientists and engineers are trying to develop this technology in the factory as well. Three-Dimension (3D) geometry of the products and digital mock-ups to PLM, which helps companies, make products at the right time at affordable cost. To optimise the entire product lifecycle in a digital environment, resources like robots and workers, and processes have to be taken into consideration in the product design. Thus, processes, resources, solutions over the technical problems are part of the PLM.





B. Benefits of developing such virtual factories before the production starts:

In the automotive industry companies face increasing challenges to sustain competitiveness in the global market. This means more car programmes in a given timeframe, cost reduction requirements, higher efficiency of production line, and shorter time to market. It has reduced this time up to 10 months from earlier 3 years with manual and semi-automated production systems. What happens is to overcome such challenges; manufacturing teams have visibility in the cost structure as well as investment decisions and to reuse proven best practices instead of starting from scratch. Much iteration can be made digitally in earlier development stages to avoid costly and time-consuming rework and changes in the later development.

C. Justification for the huge investment requirements for this project:

In the one paragraph survey over this project CIM a consulting firm along with the Delmia and Dassault firm has published the advantages of this technology. It states that digital manufacturing technologies can on an average reduce time-to-market by 30%, design changes by 65%, planning process by 40%.

SN	Factor/ Aspect	Advantage
1	Time-to-market	Get reduced to 30%
2	Design Changes	Get reduced by 65%
3	Planning Process	Gets reduced to 40%

Table:	33.1:	Advantage	of	digital	manufacturing	DPPM:



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4	Production Out put	Gets increased by 15%
5	Overall Production cost	Gets reduced by 13%

Other few advantages include that many companies stated that they are achieving or exceeding both initial objectives and benefits expected from the technology is helping original equipment manufacturer (OEM) complete the tasks that could not be accomplished otherwise.

D. A viable project for total customer satisfaction: Recently three companies have shown very much interest in this project. They have collaborated with the Delmia Limited, Japan for this project, which provide complete solution over this kind of project. These are excerpts from the detail interview of Mr. Bertrand Saint-Martin, President of Delmia Limited, Japan and Takatoshi Negishi, Toyota Motors Japan appeared in the Search Magazine, October, 2003, in it's the industrial sourcebook section and in particular IT focus section.

a. Daimler Chryslers for USA and Germany plants: Daimler Chrysler (DC) has launched the digital the 'Digital Factory' project using Delmia solutions. This project would be fully operational by the year 2005. By then no production facility will be planed constructed or operated without being digitally verified first. In short, no digital car would be approved before being 'produced' in the digital factory. Through this project DC aims at reducing the production planning cycle considerably and achieving better planning quality. This will give total customer satisfaction even at the virtual production level. If achieved then only the actual production would starts, thus achieving actual customer satisfaction level.





b. Toyota Motors for Japanese plants: Toyota is thinking about profusely investing in this project for customer satisfaction. As one of the most advanced digital manufacturing customer, Toyota Motors has been deploying its digital assembly project called V-Comm (Visual and Virtual Communication) using again Delmia as a core solution. According to Mr. Takatoshi Negishi, General Manager (vehicle planning and production engineering division) of Toyota Motors, this project has brought significant results like shortening lead-time from styling freeze to production launch by 33% achieved at 13 months level at the end of last century, for a particular car development programme. Hence, Toyota is planning to accelerate its 'Digital Factory' project by deploying digital engineering in process planning, plant layout, work-cell simulation, and material handling with Delmia solutions provided for the Production Planning and Resources (PPR) hub as key infrastructure.

c. China Motors Corporations (CMC) of Taiwan: CMC has announced that it would deploy Delmia Solutions to digitalise the entire CMC manufacturing process, from body in white, paint, power train to final assembly.

d. Technological Spin off: These kinds of factories are very much successful venture and viable ventures for even the heavy industries as well. Hence apart from Original Equipment Manufacturers (OEM) of the car companies it is also been seriously considered from the other small to heavy industries in Asia.

Samsung Heavy Industries,

Mitsubishi Heavy Industries for Shipbuilding,



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IHI for nuclear facilities,

Daikin for air conditioners,

Sumitomo Wiring Systems supplier of OEM for the Cars, and

Sanyo Machine Works.

33.3: NEW TECHNOLOGY 2:

SHREDDER AND ZERDIRATOR PLANTS:

Shredder is a machine that transforms complete derelict motorcars and miscellaneous scrap into clean dense and small piece shredded scrap, which becomes a valuable raw material for the steel industry in the phase of recycle. While Zerdirator is also the same kind of machine having wider range of applications.

At present there are very few companies, which manufacture these machines having different processing capacities. The size differs from 6 to 200 Tonnes per hour. This time includes the time needed:

- a. For the charging of the material to be processed,
- b. For separating,
- c. For De-dusting,
- d. For Transportation of shredded products.

The Shredder machine can convert the car scrap into recyclable material in various fields.

Shredder produces reusable scrap having:

High Density.

A specific bulk weight of 1-2, 5 Kg/ cubic dm.



Uniform pieces of an average size of 50-150 mm.

High quality and Cleanliness.

Shredder has applications in the following fields due to technological spin off:

- i. Car bodies in to recyclable scrap as a master application,
- ii. Miscellaneous scrap in to recyclable scrap,
- iii. Sheared car bodies scrap into useful slabs,
- iv. Light Bales,
- v. Aluminium Scrap,
- vi. Electric Appliances,
- i. Electric Motors Scrap,

ii.Big house hold appliances scrap,

Of these Shredders, which are having smooth, closed housing bottom. Shredders are particularly suitable to handle mixed scrap and derelict motorcars into reusable recyclable scrap.

Zerdirator has very wide range of applications:

- i. Car bodies in to recyclable scrap as a master application,
- ii. Miscellaneous scrap in to recyclable scrap,
- iii. Sheared car bodies scrap into useful slabs,
- iv. Light Bales,
- v. Aluminium Scrap,
- vi. Electric Appliances,
- iii. Electronic Scrap,
- iv. Railway Sleepers and Rails Scrap,

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- v.Electric Motors Scrap,
- vi.Incineration Scrap,
- vii. DSD collection scrap,
- viii. Big house hold appliances scrap,
 - ix. Small house appliances scrap,
 - x. PVC windows waste scrap,
 - xi. Plastic scrap,
- xii. Dross material scrap of various metals and non-metals.

Zerdirators Constructions:

Zerdirators are more sophisticated and advanced technology. Its construction can be given in the simple way as follows.

1. Zerdirator has grids at the top and at the bottom. It also has grid cover at the top. Due to this they can process:

- a. Wide range of materials,
- b. Wide range of densities of the reusable scrap,
- c. Without time consuming option of grid changes.
- 2. Then there are feed rollers for controlled feed of charged scrap,
- 3. Then there is a Anvil for the first tearing-off and fragmenting,

4. For further fragmenting the baffle plate edge are provided with precompaction,

- 5. There are baffle plates provided for controlled compaction,
- 6. Then there is a dust extraction system,
- 7. There is a ejection door for the non-shred-able parts,
- 8. Next provision is Vibration conveyor for evacuation of shredded material,

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- 9. Then there is a bottom grid for the material discharge,
- 10. Top grid cover always provide regulation of density,
- 11. Then there is additional movable grid provided to regulate the density.

The major parts of the Shredder and Zerdirators are:

- a. Hydraulic Anvil Clamping Devices,
- b. Hydraulic locking of rotor bearing,
- c. Hydraulic locking for housing,
- d. Top movable hydraulic grid,
- e. Rotor Lifting device,
- f. Caps,
- g. The hydraulic devices to disassembly of the hammer axles,
- h. The control unit for ergonomically perfect and effective production.

Major parts of the huge Shredder/ Zerdirator Plant used for the Car

Scrap are:

- 1. Feeding Chute with tilting table,
- 2. Tilt-able Foldable Shredder,
- 3. Main drive motor,
- 4. Vibration absorber,
- 5. Hammer dismantling devices,
- 6. Control Cabin,
- 7. Vibrating Conveyor,
- 8. Belt Conveyor,
- 9. Separating Drum,
- 10. Magnetic Drum,



- 11. Steel Discharge belt,
- 12. Dust belt,
- 13. Dust discharge belt,
- 14. Non-Ferrous metal sorting belt,
- 15. Dust Extraction equipment.

33.4: NEW TECHNOLOGY 3.

DEVELOPMENT OF TECHNOLOGIES USING CLEAN AND LIMITLESS HYDROGEN FUEL IN THE CAR:

Carbon is great stuff, an essential ingredient in diamonds, trees, petroleum, and you personally. The trouble is, when carbon compounds oxidize they give off all kinds of bothersome chemicals. In automobile engines, the HC and CO of combustion can be dramatically reduced by means of accurate controls and thorough catalysis, but how about CO_2 ? It's a necessary part of the carbon-burning process, basic to the equation. Fortunately, it's not toxic, but that's not to say it's harmless. While the brutal cold of the '93-'94 winter may have relegated it to the back of your mind, global warming is still a real concern. Some authorities consider it the biggest environmental threat of all. And that ever-thickening blanket of CO_2 we've been stuffing into the atmosphere is definitely not helping.

Petrol is very cheap right now -- when you take inflation into account, cheaper than it was in the fifties -- so you probably haven't been thinking much about alternatives. All those POPULAR SCIENCE-type articles that appeared during our artificial petroleum shortages have started to seem



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE almost silly for example 'converting water into petrol- a successful venture', etc. So, why bother talking about something as far-out as hydrogen? The reason is that sooner or later the axe is going to fall on Petroleum. Hence we must face it with proper preparations. Petroleum is a finite resource. It may go for long enough to keep those of us who are middle-aged mobile, but what about our children? Or theirs? Because of that and the environmental issues, an alternative to fossil fuels, to transportation based on the carbon cycle, must be found. Soon violent upheaval both economic and political has to be avoided.

What it's like? :

Hydrogen's characteristics are intriguing, and hint at both its advantages and drawbacks as a fuel. It's the most abundant element in the universe, and also the lightest with the Atomic number 1. As you'd expect, it occupies lots of space per Btu -- at atmospheric pressure, 3,000 times more than Petrol -- so it's only useful as a fuel in concentrated form. Its high heat generation per volume of air and small ignition energy requirement make it good for lean burn, but a very fast combustion speed (2.7 meter/second vs. Petrol's 0.38 m/s) translates into a miserably low octane number.

When it comes down to its environmental qualities as something to burn, hydrogen's very name says it all: The French root, "hydrogen," means, "water generating." What could be more benign than that? You couldn't even kill yourself by running a car in your garage. You'd just get wrinkled skin from all the moisture.



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Pros of Hydrogen Fuel:

Hydrogen fuel brings us to a list of its considerable advantages over other burnable energy sources:

a. Next to no harmful emissions, and no CO₂, either. All you get at the tailpipe is water vapour, as already mentioned, with just a trace of NOx (x= number 1, 2, etc.) and a whiff of lubricating oil (even a loose engine that uses a whole quart between changes would be the equivalent pollution-wise of a vehicle that gets 24,000 miles per gallon). H2-powered cars will certainly have no trouble meeting California's ULEV (Ultra-Low Emissions Vehicle) standards. And the ZEV (Zero Emission Vehicle -- only electrics qualify) standards could be eliminated if ULEV's were prevalent.

b. Providing it's produced from water by electrolysis using renewable power (solar, wind, and eventually fusion), Middle-East types in burnooses won't have any influence on the U.S. economy anymore. There'll be no need for oil scraps like the Gulf War. Hey, we've got as much water as the next guy, and we'll be spewing it back into the atmosphere anyway.

c. Electricity generated off-peak, and when the sun shines or the wind blows, can be converted into a storable, portable, easily useable gas.

d. Each hydrogen-powered vehicle will amount to an urban vacuum cleaner that'll actually purify the air it ingests.

Cons of Hydrogen Fuel:

Now for the inevitable cons (lots of these right now):

a. What engineers euphemistically call "irregular combustion," meaning severe pre-ignition, intake backfire, and detonation, is a given with



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE this fuel when used in an unmodified piston engine. A wide ignition range, a low ignition energy requirement, and a poor octane number are the culprits.

b. A much thornier problem is the built-in energy crisis, somewhat the same as with electric cars. We can lick the engineering challenges of getting a vehicle to go down the road on either form of energy, but how do you carry enough of it with you to travel any significant distance? Petrol is amazingly energy dense; diesel even more so. On the other hand, hydrogen is only 1/15th as heavy as air. At atmospheric pressure, it takes over three cubic yards to store same energy as in one quart of Petrol. Come to think of it, this limited range situation may have a positive side for the fitness set: It would probably do you good to stop for half an hour or so to refuel while you're on that trip to grandma's. You could jog around the pumps.

c. Then there's what I like to call "The Hindenburg Factor." To say the burning of that German zeppelin over Lakehurst, N.J. in 1937 was a disaster is a spectacular understatement. That grainy newsreel image is lodged somewhere in everybody's brain, and it makes the mere mention of hydrogen a shock (the U.S. had the only supply of Helium, and wasn't about to sell any to Hitler). But that's not fair or realistic, as we'll see.

d. Where can you get it? A switch like this will require a whole new energy supply infrastructure. And existing natural gas lines can't be used because they couldn't carry the volume and their seemingly sound joints would leak like crazy when confronted with such a thin gas.





Technical Solutions:

Let us deal with the possible solutions to these drawbacks in an orderly manner beginning with out-of-control internal combustion.

Here's the scenario: As long as there are no hot spots, Hydrogen can be drawn into the cylinder without detonating. But as soon as compression begins detonation occurs and huge sound is heard. Then what to do?

a. External Mixing: With the relatively simple and inexpensive External Mixing type of Hydrogen injection (the Mercedes-Benz version is reminiscent of Bosch K-Jetronic), the gas is fed into the intake manifold, and the engine receives a homogeneous mix. Several means can be enlisted to control the undesirable combustion phenomena already mentioned: lean burn, special spark plugs, EGR, and water injection to keep things cool. According to Mercedes-Benz, the best combination its engineers found was lean burn at partial load and Water (H₂0) injection in the upper load ranges. Super- or turbo-charging keeps output reasonably close to that of the Petrol-burning version of the same engine.

The external mixing system Bayerische Motoren Werke (BMW) is using on its 3.5L six jets liquid Hydrogen through a valve body and an insulated pipe, and uses a heat exchanger to evaporate it. A central electronically- operated "dosing" valve controls the quantity of fuel delivered to the six injection jets. A very lean mix is used for minimum NOx production and high efficiency without pre-ignition and backfiring, but it takes a toll in pep. A centrifugal supercharger brings power back up somewhat, but it's still 30% lower than the gas version's 208 hp, which sounds sufficient for many scientists.





b. Internal Mixing: Beyond external mixing is internal mixing, which can be incorporated into an engine developed specifically for hydrogen. Like a diesel, the power plant would draw in air only, then Hydrogen would be injected during compression. This would produce considerably more power while eliminating combustion irregularities, but would also require a high-pressure gas feed system and the blend won't be very homogeneous when rpm is wound up.

c. Made for each other: The most elegant approach is Mazda's (I'll bet the Hiroshima company's engineers always suspected they'd get some side benefit out of refining Dr. Felix Wankel's engine into the useful, durable power plant it is today). It seems that the rotary just naturally lends itself to hydrogen. Unlike a piston engine, the working chamber of a rotary is continually changing position within its trochoidal housing. That means temperatures don't rise where gas intake occurs because the processes of intake, combustion, and exhaust happen in different places. Also, since intake duration in a rotary is 1.5 times longer than that of a piston engine, it has more leeway in terms of the time required to charge air and hydrogen separately. First, air alone is fed into the chamber, which cools it, then the intake port is closed and hydrogen is injected during the initial stage of compression. This not only prevents backfiring and knocking, it also increases intake efficiency. Another factor is that the surface-area-to-volume ratio (S/V) of a rotary is relatively large, effectively cooling the flame and moderating Hydrogen's fast burn to a manageable rate.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE With direct Hydrogen injection, the Mazda rotary achieves a specific power output on hydrogen only 10% less than on Petrol.

Handling and Storage of the Hydrogen:

There are several ways to handle the on-board storage problem, none of which is particularly satisfactory. The simplest and most straightforward is to contain it compressed to 4,350 psi (300 bar) in super-strong composite tanks. Fine, except they'd have to be 15 times as large as a regular Petrol tank to hold the same amount of energy. Where would you put them? Pull them behind like a train, perhaps?

Next is cryogenic storage as a liquid, which yields high energy density. One gallon is equal to 4.546 litres and one mile is equal to 1.609 kilometres and one kilogram is equal to 0.456 pounds (lbs). BMW has a 25-gallon tank that weighs 132 lbs. keeps HYDROGEN at 72.5 psi (5 bar), and allows a range of 250 miles (then it takes an hour to fill). But the negatives are formidable. Liquification requires a tremendous amount of energy input for initial refrigeration, then the liquid must be kept at (get this) -423 deg. F. (-253 deg. C).

I've never been fond of alternative power sources that require that something be kept either really hot (sodium-sulphur batteries for electric cars at 600 deg. F.) or really cold (cryogenic Hydrogen storage). It just seems terrifically wasteful and impractical. Don't you ever want to leave your car for a few days, or a week? Maybe you'd like to go on a cruise or an air trip. Also, no matter how highly evolved the tank, there's a 2% boil off loss per day as heat infiltration causes venting through safety valves. I consider metal hydride





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE storage a more sensible approach. Here, the Hydrogen is integrated into the crystalline structure of an alloy as a hydride by means of a reversible reaction. The charging process gives off heat, and when the alloy is subjected to heat the hydride breaks down releasing the H2. The alloy of choice right now is based on titanium, vanadium and manganese (TiZrVFeCrMn to you metallurgists) and has a hydrogen capacity of 1.8% by weight.

Weight:

Speaking of weight, how about 25 times as much (and seven times the volume) of a Petrol tank with the same energy content? Mazda, for one, has managed to add 660 lbs. (about the same as a small block Chevy V8) of hydride tanks to its normally lithe and light-footed Miata. Compare that to 110 lbs. for the stock tank full of Petrol. These things take up the whole trunk, too, add four seconds to the 0-60 time and only provide about 100 miles of range.

Filling and Capacity of the Tanks:

Filling requires a special cooling system, but takes just 15 minutes, and then engine coolant is used to heat the hydride and extract the flammable gas. Hydride storage is intrinsically safe. If a tank is breached, the endothermic reaction of escaping gas chills the alloy thus stopping the release of Hydrogen. Also, there are few restrictions on shape, so tanks could be integrated into the vehicle's chassis, bodywork, whatever. By the way, the Mazda tank can take 100,000 km's worth of cycles. There are other possible solutions to the fuel capacity problem, namely adsorption storage





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE using activated charcoal, and the release of Hydrogen from sponge iron as it rusts (honest), but both are in their infancy.

Safety Aspect:

How about that pesky safety question? Contrary to popular opinion, Hydrogen just happens to be a pretty safe substance to have around, only explosive when there's a relatively rich mix present (4% as opposed to 1% for Petrol fumes), and, being so light, it disperses almost instantly when there's a leak. So far, BMW has only been able to induce an explosion by helping it along with artificial turbulence or external ignition. It will be necessary, however, to incorporate various safety features into Hydrogen cars. For example, since you can't see or smell that gas (although colorants and odorants could be added), sensors will be employed to detect leaks and automatically ventilate the vehicle by popping the trunk lid, opening the sun roof, etc. to lean things out.

It's high time to go for this project:

Any useful discussion of the establishment of a hydrogen infrastructure could easily fill volumes. There are all kinds of issues: Where will we get the juice for electrolysis? How should pipelines be handled? What kind of regulations should be in place? Who'll pay for what? Will we subsidize fleets to switch? All I'll say here is that production and distribution will demand the concerted efforts of the energy industry and government on all levels.

What do the car experts and makers feel?

Finally, how far in the future is this huge shift from carbon to hydrogen? That depends on the synergy of numerous factors, including the convoluted



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE infrastructure situation. So, I'll just mention some expert opinions and let you think about it:

a. BMW says in a technical paper that Hydrogen is clearly (a fuel) whose practical potential lies in the distant future."

b. One senior auto company engineer was a little more specific, guessing the latter part of the next century.

c. On the other hand, DOE estimates that a changeover to an H2-based economy would only take 20-25 years; hence it is high time to start this project.

d. Mazda, which has a leg up on everyone else with its rotary, says that technological obstacles will block the road to widespread use of hydrogen cars until at least 2010. That's not many years away!

33.5: Special Note: Technical Jargon made simple:

a. Supercharger:

Essentially, a pump that compresses air delivered to an engine into a denser charge, which can thus combine with extra fuel to produce a more explosive air-fuel mixture and thus increase engine power. A supercharger may be driven mechanically by the engine (usually via a pulley off the camshaft) or by using the energy in a portion of the exhaust gases, in which case it is technically a turbocharger. Mechanical superchargers are traditionally of two types: centrifugal, in which air compression or boost is accomplished via a turbine, and the Roots type, in which two small rotors take in air from one side of a housing and discharge compressed air from the opposite side. The



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Roots type's main advantage over a centrifugal supercharger is relatively high boost at low rpm. Unlike a turbocharger, a supercharger does not require any "lag time" before it starts to operate because it is, in effect, constantly operating. However, being mechanically driven, it does consume a certain amount of engine power when not providing positive boost (i.e., an air charge above normal atmospheric pressure).

b. Detonation: Excessively rapid burning of the compressed air-fuel charge in an engine, often resulting in a noise called "ping" or "knock." Detonation is caused by auto-ignition of the "end gas," that part of the charge not yet consumed in the normal flame-front reaction. It occurs when piston motion and compression raise the temperature and pressure of the end gas to the point where it auto-ignites. The pinging or knocking noise results from intense pressure waves in the charge that causes the cylinder walls to vibrate.

c. Backfire: Premature combustion of the fuel-air mixture exploding through an open exhaust valve and into the exhaust system, or violent combustion in the exhaust system itself. Furthermore, ignition of the fuel-air mixture in the intake manifold by flame from a cylinder, possibly cause by a leaking intake valve.

33.6: New Technology 4. Electric Cars: Example: Voltswagens:

Imagine an ideal car that gets rolling instantly in any weather and goes about its business as quietly as a refrigerator, all the while polluting the air about as much as your VCR and, potentially, using up no non-renewable





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE resources. As dependable as an electrical appliance, too, with no rings to wear, valves to burn, oil to leak, rod bearings to knock, fuel injectors to clog, or spark plugs to foul.

The first electric car that was tested was the Elcar in the mid-70's. It made the top of list as the worst contraption anybody had ever driven, making a lowly Trabant seem like a Ferrari in comparison. As many felt that as the driver pressed on the accelerator, switches cut in more cells, so they used got hammered in the jerkiest acceleration/deceleration ever achieved. It was so slow and unwieldy that taking it out on any public road was downright suicidal. Silent operation? Hardly. The whining and whirring could drive you crazy. However, things have come a long way. Today's electric prototypes are quiet, reasonably fast, and provide smooth speed transition. As long as you don't want to go very far in one day, they verge on the acceptable. And they can only get better.

Legislation is the impetus behind the current (I'm really not into puns) flurry of attention and activity on the subject. The California Air Resources Board (which yields the clever acronym "CARB") is requiring that every carmaker selling 35,000 or more cars annually in that state produce ZEV's (Zero Emission Vehicles) to the tune of 2% of sales between 1998 and 2000, 5% in 2001 and 2002, and 10% from 2003 on. Other states are contemplating similar laws, and electrics are the only motorized conveyances that qualify. Then, the cover of GM's Impact electric car press kit shows a beautiful nature scene with mossy rocks and a perfectly clean waterfall. It's pretty to





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE look at, but does it have anything to do with the environmental effects of electric cars?

That depends. If they're going to get juiced up from coal-fired generators (the U.S. has lots of coal), they might result in more air pollution and greenhouse-effect carbon dioxide than would be produced if each car burned Petrol (plants could be located far from urban centres, however). Nukes are a possibility, but what about the spectre of meltdowns ala Chernobyl and radioactive wastes that'll have to be safely stored and guarded for maybe a hundred thousand years? That's twenty times longer than recorded history. And this disposal problem is just the same for the newest fail-safe reactors as for a primitive, dangerous unit like the one that caused the Russian catastrophe.

The sun, wind, waves and tides are certainly attractive means of generating electricity, and are feasible on a limited basis. But none has been shown to be very practical on the huge scale that would be necessary to keep the earth's burgeoning population mobile. For lots of reasons, the potential expansion of good old hydroelectric is limited, and geothermal has serious problems of its own.

Never. It looks like fusion, whenever we get it to work. There'll be no radioactive waste and a China syndrome scenario is impossible because if anything goes wrong, the reaction will simply stop. But right now it looks like we can't expect to get this burn-the-rocks-and-water power source on line for at least half a century.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE The requisite infrastructure is an issue most people don't even think about. Not only will utilities need to build more generating capacity, but also how will all those amps be distributed and delivered? At-home charging will require the installation of accessible 220-volt outlets, which isn't a big deal, but will the grids and the 100-amp service of a typical house is able to handle the load?

What kind of filling stations will be needed when you're on the road and the percent-of-charge meter says you're about to run out of juice? The towing business will enjoy a boom, and parking meters might take on another whole dimension as charging opportunities. But just try to imagine the investment necessary to put in all that wiring.

Then, of course, there's the perennial battery problem. Nothing yet developed can even begin to permit the kind of transformational freedom we're all so fond of. Range is severely limited, and cost terrifically prohibitive. Realizing that a thousand-pound pack of even the most highlydeveloped lead-acid batteries can only hold the same amount of energy as is contained in a measly half gallon of Petrol should give you a realistic perspective on this old "couple" (as two dissimilar metals used for a battery are called).

In spite of this low energy density and an inability to survive deep discharges, lead-acid has some practical advantages: relatively low cost, the ability to release energy rapidly (called "high specific power"), simplicity, and the familiar characteristics of something that first appeared in 1859 (the original electric car, circa 1882, carried its energy in such batteries).





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Invented by Ford back in '65, sodium-sulphur can store about three times as much energy as lead-acid per unit of weight. But talk about drawbacks! Not only does its interior have to be kept at 600 degrees Fahrenheit but sodium is corrosive and potentially dangerous, and the price of a useable pack may be about the same as that of a loaded Taurus.

Chrysler says a nickel-iron battery will add over \$6,000 to the price of an EV, and it might take eight hours to charge it even with 50 amps at 220 volts, during which process it produces lots of explosive hydrogen. At least longevity is estimated at 100,000 miles and you can get about twice the range of the same weight in lead-acid.

Sodium-nickel chloride has good energy density, too, but a practical-size pack will run maybe \$20K and won't last even two years.

Ni-Cads (nickel-cadmiums, as in your cordless drill) pack over two times the energy density of lead-acid, but they won't take a full charge unless they're run down completely, and cadmium is a toxic substance.

I could go on with other experimental couples, but none so far paints a rosy picture. Research is now being done at an unprecedented rate, however. For instance, there's the USABC (United States Advanced Battery Consortium), a \$260 million joint effort among government labs, domestic automakers, and the electric utility industry's EPRI (Electric Power Research Institute), with half the funding from the Department of Energy and the remainder from the Big Three. This and other programs public and private, U.S. and foreign, mean better batteries are bound to be invented, but how much better? The big scientific breakthrough that's been talked about for decades





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE may never happen regardless of the money, talent, and sweat that's put into the quest.

Lean and clean internal combustion

In contrast to the battery's built-in energy crisis, a tiny turbo-diesel or one of the two-stroke engines now in development could probably deliver a pretty clean 100 mpg in a light, slippery car without the problems of limited range, as yet untested or undiscovered technology, prohibitively expensive batteries and infrastructure development, and additional generating capacity by environmentally questionable means. If you could wait long enough for this sort of green machine to make up the bulk of the vehicle population (a big gas tax would sure speed up the process), it would be possible to cut fossil fuel use and greenhouse gas production by maybe 75%, air pollution even more. Those benefits, however, won't be enough to satisfy the zero emission requirements of our smog-choked cities.

Hybrids with a small IC motor cranking a generator could take care of the range problem, but what about the weight, cost, and space consumption of double running gear? As an engineer said to me years ago on the subject, "Remember the amphibious Aquacar? It was a lousy car and a lousy boat." And they can't qualify as ZEV's, either.

Hydrogen as a fuel is another possibility has been already put up. It's not difficult to get an engine to run on it, and steam is the only tailpipe emission. But there are terrific practical.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE So, it looks like the electric car is a logical place to expend R&D money at this juncture after all. What *various top companies in the world* are doing in this field is put in details below.

General Motors (GM): USA:

What are the carmakers doing right now? Since it's received the most publicity lately, I'll start with GM's Impact. This good-looking two-seater's front wheels are powered through 10.5:1 planetary transmissions by a pair of 57 hp AC induction motors (90-95% efficient!) that spin 9,500 rpm at 60 mph, and it can reach that speed in a sporty eight seconds. It'll do over 100 mph, but it's governed to a more socially acceptable 75.

With total weight kept down to 2,200 lbs., a slippery 0.19 CD (Coefficient of Drag, a measurement of aerodynamic efficiency) and easy-rolling Goodyear P165/65R14 tires pumped up to 65 psi, inertia and resistance to movement on the road and through the sea of air we live in is extremely low. Efficiency is further enhanced by regenerative braking (the motors turn into generators on deceleration, a feature of most modern electrics) and a sophisticated electronic controller. These motors are called as the Dynamotors. Even so, practical range is only about 80 miles per charge, with a maximum possible 120 miles at a steady double-nickel cruise. That's because GM opted for proven and relatively inexpensive lead-acid batteries instead of one of the exotic big bucks new-tech types with higher energy density. Not that the engineers haven't worked hard to improve this venerable means of storing electrical potential. The 870 lb. Delco-Remy battery pack is of the recombinant variety (the electrolyte is immobilized, and the moisture level is





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE maintained by forcing the hydrogen and oxygen to recombine into water) and comprises 32 10-volt units wired in series for a total capacity of 42.5 amp hours, or 13.6-kilowatt hours. Given a 220 volt source, the on-board computer-controlled charging system can boost the cells to full potential in less than three hours, which is quite fast. Estimates on the price and life span of the battery pack vary, but \$2,000 and two years are commonly quoted.

Unlike the dozens of prototype alternative-fuel vehicles you may have seen featured in magazines like POPULAR SCIENCE over the years ("Amazing Vegetable Car Goes 600 Miles On a Bushel of Tomatoes!"), Impact is actually happening. Manufacturing sites have been chosen. Delco-Remy plants in Indiana will make the batteries and motors, Hughes Aircraft (a GM subsidiary in California) will design and build the electronics, and the car will be assembled at the Reatta Craft Centre in Lansing, Mich.

As Bob Stempel, still the company's Chairman at the time of Impact's intro, stated in a speech, "With the understanding that the electric vehicle is part of an array of technologies we think will be used in the future, I want to emphasize that GM is serious about EV's."

Ford: USA:

Ford has also been busy with a real-world EV program. Its Ecostar was the first modern electric from a U.S. automaker to actually be distributed to customers (mostly electric companies). Based on the popular European Escort van, its front wheels are driven by a 75 hp/56kW three-phase AC induction motor that draws its power from 800 lbs. of sodium-sulphur





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE batteries hermetically sealed in a double-wall stainless steel thermos. Curb weight is 3,100 lbs., 50 mph can be achieved in 12 seconds, and range is 100 miles in FUDS (Federal Urban Driving Schedule) conditions, or 200 miles at a steady-state 25 mph. It takes five hours for a recharge on 220 volts, or 20 hours on 110. A hybrid version is also available that uses an IC engine-driven 22 kW generator to extend range to 250 miles.

In my opinion, the prize for the neatest-looking, most cleverly designed electric passenger car should go to Ford/Ghia for the Connecta. Build around Ecostar running gear, it looks like a practical, desirable family vehicle, and its range and performance are better than those of the van because it's lighter and more streamlined.

Chrysler: USA:

Chrysler's big effort is the TEVan, actually a Dodge Caravan/Plymouth Voyager with a 35 hp continuous/65 hp peak DC motor and 1,800 lbs. of nickel-iron batteries (that results in a ponderous two-and-a-half-ton curb weight). Range is 100+ miles on an overnight charge, and maximum velocity is 65 mph.

Two formidable negatives are painfully slow acceleration -- 0 to 60 in 25 seconds -- and an unbelievable \$100,000 sticker. But a new motor and controller are being developed in conjunction with Westinghouse that are expected to halve 0-60 time and double range. It's the first FMVSS (Federal Motor Vehicle Safety Standard) certified electric ever sold.

A few years ago, then Chrysler Chairman Lee Iacocca said in a speech to IMPA (International Motor Press Association) members, "I've spent some





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE time driving the TEVan and I can tell you it's no golf cart. It's no Viper either, but you can't have everything!" True enough, Lee, but how about something?

Nissan: Japan:

No overseas manufacturer has put more effort into the concept than Nissan. Its sleek FEV (Future Electric Vehicle) sidesteps the range problem with the Super-Quick Charging System, which allows the 444 lb., 280 volt nickelcadmium battery pack to take on a 40% charge in six minutes, a full charge in 15 minutes -- providing an industrial-strength 440 volt outlet is available, which brings us back to that pesky infrastructure question.

The combination of light weight (1,984 lbs., thanks in part to an expensive aluminium chassis), a 0.19 CD, tires with 50% less rolling resistance than regular radials, high-efficiency 15,000 rpm AC motors at the front wheels, and a sophisticated controller allows a range of 100 miles at 45 mph with that small, light Ni-Cad pack. Top speed is 81 mph. integrating a 300-volt crystal silicon solar cell neatly into the roof is a nice touch, but it would take five weeks of beautiful weather to get a full charge out of it.

Mazda: USA:

Mazda is more excited about its hydrogen-fuelled rotary engine HR-X concept car than about electrics, but the company has been researching the latter for 30 years and has developed a Miata with nickel-cadmium batteries in conjunction with Chugoku Electric Power Co. of Hiroshima. Few details are available, but range is said to be 112 miles, and max speed an excessive



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 87 mph. The trouble is, the engineers have managed to get this tiny, normally nimble and light-footed roadster up to a leaden 3,000 lbs.

Mercedes-Benz: Germany:

While Mercedes-Benz comes in under the 35K-per-year sales requirement of the first round of regulations, the company has taken the responsible stance of investing heavily in electric car development, a significant portion of the \$700 million it has promised for environmental research over the next several years.

The latest experimental version looks just like a production 190E sedan because that's what it is. Except, of course, that the internal combustion running gear has been supplanted by 726 lbs. of sodium-nickel chloride batteries in two packs (one under the hood, the other where the gas tank used to be) and a pair of compact high-torque external-rotor DC motors just a little bigger than a differential mounted between the rear axles, each peaking at 22 hp. This logical layout allows five-passenger seating and a useable trunk. Also, unlike most prototypes, this one meets safety standards. Top speed is 71 mph, and range is about 150 miles at a steady 30 mph, or 90 miles cruising at 50 mph or in urban traffic.

Bayerische Motoren Werke (BMW): Germany:

BMW has been ambitious. Its good-looking four-passenger E1 received rave reviews from Germany's motor press because of its performance, style, space utilization, and fun-to-drive quotient. AUTO ZEITUNG said, "The E1's performance is a most pleasant surprise," and MOTORILT stated, "I certainly like this 'electric egg' so much that the sooner I see it on our roads, the





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE better!" The tiny car's sodium-sulphur battery is good for 155 miles "under ordinary driving conditions," and can provide enough juice to propel the car to 75 mph. Now there's the E2, a larger version tailored to the U.S. market. Price? I'd hate to speculate, but Ross Perot might be able to afford one -- if he financed it.

In perspective: Why all these technologies be mastered and indigenised?

Technology by legislation is at best unrealistic. On the other hand, something positive will surely come out of this particular regulatory exercise because of the pressure it's created to develop not only improved Batteries, Digital Factories, Zerdirator, Shredders and other above mentioned technologies but also all manner of alternatives to the wasteful, earth-killing means of transportation we luxuriate in now. Face it. Big changes have got to come. And if we want our children to inherit a liveable world, we as a society had better, get started.





CHAPTER 34:

ROLE OF INFORMATION TECHNOLOGIES ON INDIGENISATION OF THE CAR TECHNOLOGIES





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34.1: Problem:

Our Vedas, Puranas, Geeta, Mahabharat, Ramayana, Vimanshastra, etc. shows we were the Knowledge based society and Rushis and Scientists were the most revered and respected people at that time. Now that respect has shifted to politicians and rich men. This has resulted in priority change of the nation; hence our techno-socio-economic situation is suffering lack of leadership syndrome. All the true leaders have been seen hiding, due to current situation. If it continues within few years we'll left mere followers in every socio-techno-economic activities in the world. We shall be aping the foreign technologies and culture behind it. Car Technology is one among them.

34.2: Solution:

I. T. and Knowledge explosion are two sides of one coin. Only thing needed is to capitalise on the open and free knowledge available for twenty-four hours on the World Wide Web (Simply Web), which can make Indians leader.

IT: **Information Technology (IT)** does not only means the Internet. Infact the whole communication system is a part of the Information Technology. It includes the telephone system, the mobile system, the Internet, the video conferencing, the audio-video replies on the World Wide Web (WWW), the audio-video communication on the cellular phones, etc.

IT has exposed losses of India due to foreign dependency on the car technologies: The latest figures displayed on the communication WEB (World Wide Web, Internet, Mobile Network, Communication Network) of the car sells and motorbike sells figures in India.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Maruti Udyog Limited (MUL) has sold nearly 37000 cars in one month. It is growing day by day.

Nearly 1,15,000 motorbikes like Hero Honda, Yamaha are sold every month in India and it is growing day by day.

Its financial calculations are huge. Before we move further let us see the value of Dollar. USD 1 Billion = Approximately Rs.450 Crores, if One dollar is taken equivalent to forty-five Indian rupees.

If one Maruti on an average costs Rs. 3,00,000/= then the sells figures are whopping it comes out to be Rs. 1000 Crores. The loss in one month comes out to be Rs. 543 Crores (Stake of Suzuki is 54.3% in Maruti-Suzuki). This comes out to be nearly Rs. 7000 Crores every year. It is going to Japan.

Similarly on the two wheelers section India loses nearly Rs. 200 Crores every month and Rs. 2400 Crores every year.

Now, let us see the direct losses posed on the WEB, which Indians are incurring due to these:

 On Maruti-Suzuki venture Indians are losing 54.3% (stake of Suzuki in Maruti) directly to the Suzuki of Japan, which comes out to be nearly Rs.
7000 Crores as mentioned above.

2. On the Patented Technology production and royalty over that India loses nearly Rs. 1000 Crores on the Suzuki Cars.

3. Technology provision for manufacturing these cars was nearly Rs. 25000 Crores, which Suzuki is trying to get through various means.

4. On the export front as well Maruti-Suzuki exported nearly 86000 vehicles to various countries. Here also India loses almost Rs. 100 Crores.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 5. Every year on upgrading and maintenances of the manufacturing technologies in the Suzuki dominated plant of Suzuki-Maruti, India loses Rs. 100 Crores on an average.

Are these losses less? Aren't Indians are been exploited by the foreign companies in their own countries? If it happening in any countries likes India, it is a loss to that country which is depending on the foreign technologies.

Knowledge and Car Technologies Explosion on the Web:

Internet is full of knowledge any body trying for the generic technologies try to put the name of the technologies in the search engine it gives almost one lakh sites on it. You type 'car' word in the search engine and you'll get it. Thus, there are web sites for every car organisation in the world. The General Motors, Ford Motors, Rolls Royce, Renault, Toyota, Suzuki, Mitsubishi, Hyundai, Tata Motors, Hindustan Motors, Fiat, Mercedes, etc. On these web sites the knowledge of technologies is also there in following distinct forms:

1. On the R & D front:

Manufacturing,

Chemical Technologies,

Robotic Technologies,

Safety Technologies,

Environmental friendly and alternate fuel Technologies,

Human and Computer Integrated Technologies,

Autopilot car technologies,



Designing Technologies,

Customer Interaction Technologies, etc.

2. Manufacturing Technologies:

Fully Automated Digital Manufacturing factories,

Semi automated,

Manual.

3. Servicing and Maintenances Technologies,

4. After sales and Presales customer interactive software,

5. Software technologies to satisfy customer at every phase of life cycle of the car, etc.

Thus, you name it and the customer is provided with the technologies. Thus, many of the technologies now a day are developed according to the customers' requirements. In few cases even individual customers get the customised technologies for his purpose.

Knowledge of all these technologies is freely available on the World Wide Web. In few cases only you have to pay for getting more details about the individual technologies. Of course to manufacture it, you need to contact the patent authorities for further details.

34.3: Few Car Techno-Business Aspects:

There are few things, which are worth mentioning here are:

- Every day at least one technology is been added on the Car technologies on the Web.
- Since, the Motor Vehicle Act 1988 was modified in 1994 there are more than one lakh terms added in the Car Technologies.



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- E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE India due to its limitations at that time already has losses the bus of making Car industry as the engine of growth. In 1960s and 1970s it was the peak time when these car technologies were developing very rapidly. If like the Atomic commission, Space Organisations, DRDO, the automotive research were stressed forward India would have been giant in this field. However we losses the bus due to our stress given to Agriculture sector and Infrastructure and basic industrial development.
 - Is the knowledge Explosion on the Internet meant for the students only? Or for the Theoretical Research only? What the manufacturers are doing? What the businessmen are doing? Why can't the businessmen bring at least 10% of the global One Trillion Dollars Car industry into India?

34.4: Decision time for India- Whether to become a Leader or the Follower in the Car Technologies:

There are following aspects, which Indians will have to think seriously. They are:

1. Whether they want to be leader or the follower in the car technologies front,

2. Whether Indians want to be a part of the innovative and creative breakthroughs in the technology R & D or simply like to remain the dependent on the foreign R & D and thus always on the losing side.

3. Whether India wants to be the heart, soul and the brain of the global R & D network in the car technologies or simply dealer, service providers, and marketing men for the foreign technologies.





34.5: Few Experts: It is due to under utilisation of resources:

In spite of the India being the second biggest technical workforce in the world, in spite of one of the biggest marketing person in the world, in spite of the readymade home market of the 600 million prospective car customers, in spite of the fact that one million engineers are unemployed, in spite of the one or two crores unemployment in the commerce faculty are there. If they are given training of at least six months they can become force to reckon with. It is thus due to under utilisation of the resources that India is lagging behind.

34.6: Generic Audit of technologies for spending in the Car Sector:

1. Indian car companies spent less than the foreign car companies do.

2. Many foreign car companies have turnover more than the one third of the GDP of India.

3. Top three GM, Ford and Toyota have individual yearly profit more than all the Indian companies put together.

4. On the plant setting up investment is less when the Indian firms do it. It is more when the foreign companies do it.

5. When investment is done by the Indian firms Indians get less cost products including the car.

6. When Indians manufacture in India they can conserve more resources and mange the sustainable development as well.

7. Even if India invests Rs. 50, 000 Crores today the payback time for this money is three years at the rate of present sales.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 8. The turn over in the Car sector is far more than the indigenisation of the Space Technologies, the Defence Technologies hence it has to be taken into consideration very seriously by Indians.

9. Audit of Automobile activities and spending show that most of the money is spend on the foreign technologies and most of the money is stayed back in India on the servicing and maintenances. Thus, showing tremendous dependency on the foreign technologies.

34.7: Do we have Talent?

YES. Ample.

•You'll be surprised to know that General Motors has set up India Science Laboratory for the car research at Banglore only due to the vast talent reserves/ availability in India.

•Our software giants are behind the Dollars than the indigenisation appeals. Why AutoCAD from the AutoDesk and not the Info-CAD from the Infosys, or TATA-CAD from the Tata Consultancy Services, or the Wipro?

•Lakhs of talented engineers having dealt all these project searching for the job. If they are put into one giant project broken into small fragments can become a force to reckon with.

•We have masters in the field of Engineering, Accounting and Finance, Software, otherwise India wouldn't have been the preferable destination of the Car MNC.

•India has talent pool working or have worked in the GM, Ford, Mercedes, BMW, Fiat, NASA, and Microsoft, AutoDesk etc. kinds of firms. When are we going to utilize their experience?



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE •Even there are few talented engineers who are unemployed but are master in designing, software development manufacturing, R & D, and such other fields.

Thus a Talent hunt is required for the existing talent in India, which is under utilised.

34.8: How to materialise Car Technologies available on the Web:

•First and foremost thing is IT does not mean only Internet and Computer. Infact whole communication system of India can be the part of the IT.

•Huge R & D Labs, Huge indigenisation centers like 'Indigenisation cell of IAF' must be there in every technology firm in India.

•Industry-Institute interaction must be compulsory and every Lecturer and to put efforts in it along with the students. In addition, every firm must develop their product and services up to global standards within the specified time span. IT will help them due to all these knowledge available on the Web.

34.9:Should we stop or Move forward and catch the Car Technologies?

Technology development is faster and the technologies, which are yet to be mastered in India but are available on the Internet, are:

1. Flexible Robotic Technologies of manufacturing the car indigenously,

- 2.Computer controlled fuel injection system,
- 3. The software of total designing and development of the cars,
- 4. The catalytic converter for exhaust pollution control,
- 5. PUC checking machines for above EURO-II norms vehicles,
- 5. Carburetor and fuel atomizing Technologies,



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE 6. Shredder and Zerdirator to scrap the cars into recyclable materials. One million cars per year can generate at least one-lakh cars in scrap per year.

7. Many electronic systems in the car by which machine and human interaction is possible.

The list is unending.

34.10:The Giant Car Companies in the world versus India:

Earlier in 1960's, Indians stopped the development of the car technologies as it was thought car is meant for the classes. Indians stopped the technology development up to Ambassador and FIAT-Premier Padmini. By this time, car technology and business became engine of growth in top eight to nine developed countries.

The giant companies made the car industry and the car technologies as a separate engine of growth:

1.R & D: In Product, Process, Quality, Finance, Costing, Marketing, Customer Satisfaction Index, home delivery, 24 hours services, customer requirements,

2.R & D in the country they entered for the marketing their cars. It includes Government policies, Cultural studies, Market conditions, local customer requirements, and

3.Finance was their last option as they thought once they invade that country by any means they could penetrate their market by classical marketing strategies.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Thus, all these and many more are distinct departments in all the giant car companies. In India, it is happening phenomenon due to its developing economic conditions.

34.11:Truths and Facts about Indigenously manufactured cars-

<u>A worldwide review:</u>

•True that nowadays it is said that no company manufactures all the parts on its own. However, how much do they manufacture in India? Not even 0.5%. Doesn't it mean their fellow citizens are manufacturing 99% parts? GM, FORD does allow manufacturing from the ancillary units but most of them are from USA. If they are from Japan or Germany, then citizens of USA complain about that; and the Japanese and Germany people have to compensate for these technologies by some other deals. It happened during Saturn Car project of GM. As before that GM suffered a loss and had to close 142 plants due to Japanese car invasion. Later on, all the Car companies in USA united and then they showed their might in Japan. Infact they bought few stake in Japanese companies. It was 2% to 7% stake earlier. Later on in other companies, the percentage was increased and it is even higher than 50% in other countries.

•On the other hand USA do not allow more than 3 to 7% stake in the USA owned organizations that too in USA.

Thus, it is wrong to say nobody manufactures every car part totally indigenously.

Remember it is a calculated risk and efforts of the nations like USA, Japan, UK, Germany, Italy, Canada, and Sweden. They meant business for their



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE nation. Ultimately it can be said that, it is not the GM, which is working in India. Infact it is the USA made or conceived car with its culture and resources working in India; for the sake of the profit of their nation. Thus, the war is not fought only by the soldiers but also by the people in the corporate sector for the sake of these developed nations as well. It may be called as the united effort.

Thus, the giant car companies:

1. Manufacture patented car parts,

2. They patent their parts in their own countries' patent office,

3. The Royalty goes to their inventors,

4. Car manufactured by these giant car companies fetch the profit back to their countries,

5. They carry out maximum core R & D in their own country,

6. If these companies carry out R & D in India still the patent remains with these giant companies. Thus at lower wages of Indian standards these giant car companies earn Billions of dollars of American Standards over their billions of turn over around the world.

34.12:Contribution of Information Technologies (IT):

First and the foremost thing is that IT has exposed every giant company in the world. Nothing remains hidden right from the working culture to the business strategies to the technologies. Thus, following efforts can make India true global player:

•Almost every major technology is available on the Web. What is required is the knowledge management in every company.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE •Another thing required is the Task force, which can manage the Finance and Investment sides.

•Japanese people did it after Second World War. Nobody knows totally how he or she managed the huge investments, which is a perennial problem in India. R & D is required on this front only. Thus, IT has exposed every technological feature on the Web, on Cell phone, and other communication medium. Only thing required is the grabbing this opportunity for the cause of the nation.

34.13:Few Indian Facts:

People say Tata Indica is fully indigenous car. Now know the facts:

•1. Its fuel injection system and air conditioning is made up of Hitachi-Japan,

•2. The IDeA of Italy designs it.

•3. All the electronic parts are imported.

•4. It manufacturing Technology is brought from Italy, Germany, USA, and Japan.

There are still more parts not made in India, which is beyond scope of this thesis.

Now can you claim that the total technology is indigenous for any company in India? No.

34.14:Only one Total Indigenous Example:

Where as there are few cars in the USA and in Japan and Germany as well which are totally indigenous.



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Take example of **Mercedes E320** it is totally made in **Germany**. Not a single part is made elsewhere and still it is the car of its class.

34.15: I.T. has exposed working culture of the Multinational Giant Car Companies (MNCC):

To understand and to make the working culture of MNCC easy to know the following few and concise steps are formulated in an innovative manner. The most conceived fact is that MNCC is composed of cultured and civilized band of human resources who understand the business as well as the human values.

•**First Step:** All the MNCC carry out R & D at every front at every level, for every phase of life cycle of the product and procedure keeping in mind the customer satisfaction or the delighted face of the customers internal as well as the external customers.

•Second Step: They (MNCC people) hire excellent human resources, pay good salary and perks, and give due respect and facilities to them.

•Third Step: They manufacture quality product/ products,

•Fourth Step: They provide quality services for 24 hours,

•**Fifth step:** On good result, they award individuals for their good job or research or any contribution towards the organization.

•Sixth step: They keep an Array of customers for the future.

•Seventh step: They get a feedback from themselves and other internal and external customers and make the advancement in technologies for their satisfaction.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE •**Eighth Step:** They try to allot maximum jobs in their own countries and thus keep their technological domination over the world.

•Ninth Step: While developing technologies they invest huge on R & D and patenting what ever they develop with their own country Patent Office.

•**Tenth Step:** On every step, they advertise well and keep their market updated and customers tune to their services.

•Eleventh Step: Every service is available on the Internet and Mobile for 24 hours. In turn, technologies of these mobile phones and other communication systems are also developed in their countries. Thus, they are manufacturing maximum number of technologies patented in their own country that too in their own country. Doesn't it prove that they are developing their indigenous car technologies? It is.

•**Twelfth Step:** In addition, it is observed that the technologies used in the car are been spin off, that is, used in the modified versions in other sectors as well.

•**Thirteenth Step:** They allot maximum of their executive and highly responsible job and higher up jobs in the hierarchy to their fellow citizens and they develop mostly the conglomerate of the parent companies.

•Fourteenth Step: Results, Profit, Quality, Productivity, Kaizen, TQM, ISO, QS, Continuous R & D, Leadership in the market, are not mere words for these companies but are practices. They mould their employees and groom to get the desired result from them. It becomes he corporate culture to talk and give positive result at all the times. It becomes habit of giving customers what they want, 'The Delight in services'. In turn, these customers give them





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE back they sow with so much planned hard work the 'profit and delight of doing the best kind of work'.

Examples: Hyundai Conglomerate of Korea, General Motors Conglomerate of USA, Ford Motors Corporations of USA, Toyota Of Japan, Mitsubishi Motors of Japan, Daimler-Chrysler of Germany (Mercedes-Benz), etc.

How about costly Future Car Technologies?

How about depletion of the fossil fuels?

Hydrogen fuel driven cars, Fuel Cell driven cars, Solar-power driven cars? Are we again going to look at these giant companies?

As India entered into the indigenous technologies for Atomic age, Space age and Super Computer age India must also enter the Indigenous CAR age as its turnover is more than all these technologies put together otherwise the financial and technological dependency will throw Indians into intellectual dependence in future.

Hence, to conclude with one thing is certain that IT can be used for the Knowledge Based Economy in future in which indigenisation of technologies especially Car technologies involving Billions of Dollars will play major role. As technology, spin off and benchmarking can improve the other sectors too. Thus in true spirit India can become a stable developed nation on the Socio-Techno-Economic front.



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CHAPTER 35:

INDIGENISING THE MAINTENANCES MACHINERY FOR HAPPY MOTORING



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Happy Motoring is possible only if the vehicle, the driver and the supporting conditions are favourable. How to make these things favourable from the technological, servicing and maintenances and from human point of view for Happy Motoring is what is put into this chapter. Adding flavour will be the indigenously built car and indigenously built supporting technologies for their cheaper cost and maintenances.

35.1: Needs of Indigenously Built Ultramodern Garages and Service Stations:

The General Motors, The Ford, The Daimler-Chrysler, The Toyota, The Mitsubishi, The Hyundai, The Suzuki to name a few but it is certain that lot of world's giant manufacturers are coming out with modern technologies in India as India is one of the fastest growing market in the automobile sector. Infact, from the year 2007 more than one million new vehicles will be running on the India roads, every year, having different grades of technologies. Still in the broader perception, in the recent past purely Mechanical technologies ruled the Automobile world. However due to explosion of knowledge and its application in the electronics field purely mechanical assemblies in the automobiles are getting replaced by the fusion technologies in the form of electro-mechanical devices and assemblies. Thus, the days of roadside garage repairs are over. Now, in this era of autotronics and mechatronics it has become essential to maintain vehicles with modern technologies through modern set up of service stations. Hence, if these technologies are indigenised then it can reap rich harvest for India. Take example of the microprocessor controlled CRDI and very high-pressure





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE petrol injection system, having requirement of modern technology to maintain them to get maximum efficiency and cost reliability. The power windows, the electronic gadgets, the power steering, and the automatic transmission made from foreign sources all require the ultramodern technologies to maintain.

From 2007, due to strict environmental and technological norms, it will be essential especially for every car owner to maintain it from the dealer, service station having ultramodern technologies. In all modern garages services stations equipped with latest technologies are the needs of the day in India to get following results from the desired vehicle/ vehicles:

Maximum Efficiency,

Maximum safety,

Maximum comfort,

Maximum luxury,

Maximum life,

Maximum resale value,

Minimum pollution,

Minimum maintenances cost,

For better servicing, and

Ultimately for the Total Customer Satisfaction.

35.2: Awareness between Internal and External Customers:

Here internal customers refer to the employees of various automobile manufacturing units and even the employees of the dealers, the service stations, the garages and other employed in the supporting activities. On



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE broader perspective, the external customers are those who actually use the product- the vehicle.

Since past decade automobiles, their equipments and supporting technologies used to be made up of three major technologies:

Mechanical Assemblies,

Hydraulic Assemblies, and

Few Electronic Assemblies.

In addition, these technologies could be easily distinguished from each other being the distinct assemblies. However since the amalgamations and fusion of technologies have started, these independent units are vanishing and autotronics and mechatronics equipments and assemblies are replacing most of the distinctive hydraulic and mechanical assemblies.

Hence, a huge awareness drive is required to identify these technologies to tackle the emergency conditions.

35.3: Indigenisation Needs:

Another important aspect is lots of investments from the foreign brands are coming in the form of either foreign direct investments or in the form of collaborations. This also is bringing ever-new technologies in the car market. Lot of people survey and carry out R & D still very few foreign technologists and investors understand the Indian technological and human resource needs. In India the factors those have direct impact on the customer satisfaction through proper services and maintenances are:

Road Conditions,

Quality of fuel,



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Environmental Aspects,

Driving Habits,

Population of the vehicles.

Many could not understand and hence are packing up in spite of having latest technologies with them.

35.4: How to built awareness:

Many foreign technologies fail in India for not considering these factors as happened with the cars like Montana, Standard 2000, Feat Weekender, Maruti-Suzuki 1000; which could not deal in better fashion with these factors. Hence, a huge awareness drive is required. Even for the indigenous car like Tata Indica also needs huge awareness drive. It may happen through:

1. Service Advisors or the mechanics of the Service Stations,

- 2. The Advertisements,
- 3. The pamphlets, posters, and published booklets,
- 4. Magazines, newspapers,
- 5.RTO/DTO,
- 6.NGO and educational and other Institutes,
- 7. The marketing personnel, etc.

Especially during the free services and maintenances period, this should happen. As during the paid services customers hardly understand why he is paying how far he must pay and for what purposes he is paying the money. He must understand:

Value of paid services,

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Value of Scheduled Maintenances, and

Value of each and every phase of product life cycle.

In addition, it has been observed that there are few services, which cannot be planned, but one has to do more frequently in India and that too on war footings some times. Few of them are:

Scratch repairs, denting and paintings, and

Puncture repairs/ Vulcanisations.

All these things can make customer understand his car/ vehicle thoroughly.

35.5: Types of Maintenances:

Services and Maintenances can be broadly categorized as:

Preventive Maintenances:

The Everyday check ups like tyre pressure, fuel level, oil level, water/ coolant level, etc.

The Weekly Checkups: The tyre pressure, the fuel level, the coolant level, the fuse and electrical connections, etc.

The Monthly Check up: Servicing due date, steering controls, indicators, etc.

Yearly Check ups: The Insurances due, the yearly check up of the vehicle.

2. Breakdown Maintenances: These are done only after accident or breaking of few parts/ assemblies of the vehicle. Many a times it occur due to human failures only how ever the preventive maintenances can definitely reduce this factor if combined with good driving habits.




35.6: Phases of Maintenances in the vehicle life cycle for Happy Motoring:

Broadly the phases of the servicing in the vehicle life cycle can be categorised from the customer's point of view in the following manner:

1. Pre-purchasing inspection with test drive,

After Purchasing: The buyer should put his vehicle up to date by putting few value added safety and essential parts and accessories into the vehicle. It helps to run the vehicle under control on the roads:

Compulsory parts: Mud flaps, Matting, Number Plates, Reverse Horn, Side Beading, Front Guards, Seat covers, Additional Screw Jack, etc.

Parts for Safety: Front guard, Rare Guard, Under Bay Coating, Teflon coating, Sun Films, Side Guards, etc.

Beatification Accessories: Alloy wheels, Wheel Caps, Roof Rails, Stereo systems, Perfumes, Lighting, Spoiler kit,

Post Purchasing but Free Servicing Period: Free Servicing up to some 25000 kilometres or to the extent of six months which ever is earlier. Even few companies are offering free Teflon coating to protect the paint. Few also are offering the under coating to protect under-chassis from rust, stone chipping and drowning noise of the vehicle. Rest of the things like cleaning washing and tuning of the vehicle up to its optimum level is obviously offered free.

After Free Services Phase: Here actual maintenances starts, which have, direct impact on the pocket of the customer. Hence, from customers point of view it essential to know the each and every aspect of his vehicle





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE and its maintenances aspects. Infact the service advisers and the customers should be very conscious to know and each and every details so as to maintain proper schedule of servicing to get maximum out put from the vehicle at minimum cost and efforts. Here the experts' points out that there are following four factors, which directly affects the vehicle maintenances:

Fuel: Which is required to be adding externally. Its quality control is beyond control of the common man. Hence, it is advisable to fix the petrol pump having positive quality results. Remember, Quality of the petrol can be improved by adding additives. For the better fuel economy following are the recommended tips from the automobile experts around the world:

Drive slowly and steadily,

Keep engine healthy,

Use brakes sparingly,

Avoid over driving of clutch,

Clean air-filter regularly,

Change fuel filter regularly,

Maintain correct tyre pressure,

Stop fuel leakage,

Stop engine at long waits,

Use correct fuel,

Use correct lubricant, and

Use correct additives.

- *Oil:* One should use branded and recommended oil with proper quality and prescribed standards.
- *Road Conditions:* Tyre is the only part of the vehicle, which remains always in contact with the roads. Hence Tyres and tubes should be as per the schedule given by the company with proper quality norms. Suspension system works well if this aspect is well satisfied. It adds the comfort level.

Tips to maintain Tyres:

1. Maintain Wheel Balancing and Alignment schedule strictly. You must align wheels when:

Vehicle pulls to one side,

Steering return ability is poor,

If there is uneven and excessive wear and tear on the tyre, Noise comes from the tyre while driving particularly while turning,

Steering feels hard while turning.

Keep tyre pressure as recommended,

Reduce friction losses by driving the vehicle according to the road conditions,

Alloy wheels dissipate the heat hence their using improve the ventilation of the tyres thus reducing the heat and hence the losses,

Follow strict suspension checks,



Try to overcome the problem of puncture through proper vulcanisation and through using the modern equipments like automatic tyre changer.

Wheel Balancing is recommended if:

Steering wobbles at high speeds,

Vehicle vibrates at high speeds,

Tyre wears in uneven patches.

If all these tips are followed well then it gives the following results:

It saves tyre from excessive wear and tear,

It saves fuel,

It keeps the dynamic stability for the vehicle up to its mark,

It gives the passengers and driver a smooth and safe drive,

It increases the bushing life,

It increases the bearing lives,

Thus it increases the life of the vehicle and improves the safety and health

of the vehicle, as well.

Driving Habits: Good driving habits are those which are very good from the

every angle and from every point of view:

For the vehicle, For the driver, For the passengers, For the owners, For the servicemen, For the traffic management,



For the driving in the city,

For the long driving,

For the transport officers,

For the roads,

For the maintenances mechanics,

For the pocket of the owner,

For the environment,

For the health of the people,

For the Automobile industry,

For the Automobile Market, and thus

For the every concerned entity.

That too from preventive maintenance point of view and from the breakdown maintenance point of view as well.

So following are the good driving habits:

Avoid sudden braking and accelerations,

Run vehicle at recommended economical speeds,

Avoid frequent changing of the gears,

Avoid changing gears on sharp turns,

Try to maintain second or third gear while turning,

If there is insufficient space, avoid the overtaking,

Keep sufficiently low speeds at the rough roads,

Strictly keep all the required documents updated in the vehicle,

Avoid smoking, drinking, use of mobile phone while driving,

Avoid overloading of the vehicle,



Take proper safety while reversing the vehicle,

Keep safe distance while driving,

Use dimmers while crossing the vehicles at night,

To stretch further this issue of good driving habits, following are the tips

to keep these habits updated even on the long distance drives:

Check the vehicle from the authorised service stations:

A week before,

Just a day before and

Before the actual journey starts.

Especially check:

Fuel lines,

Cables of the indicators,

Fuel level,

Conditions of the brake drums, brake pistons and brake

liners/ pads,

Night lights,

Horns turning indicator horn, reverse horn,

Functioning of turning lights,

Deeper,

Tyres, Stepney, and try to keep extra tube,

- Keep the tyre pressure as recommended for the recommended loads,
- If their is extra load then proper extra air pressure is recommended,



Check the jack conditions, even if it is okay extra jack is recommended,

Keep First Aid Kit ready for any emergency,

Check drive belts,

Check hose pipes,

Check the working of each electric wire in the wiring harness,

Keep an electric kit with extra fuses, wires, and tapes.

Keep an extra can/bottle of fuel additives,

Keep tool kit up to date,

Plan the route not from the distance point of view but from emergency help, refuelling, service stations, and road conditions, roadside garages and from lodging and boarding point of view.

Thus it may be concluded that the Happy Motoring is possible only when every person concerned with the vehicle i.e. the driver, the passengers, the mechanics, and service men are made aware about the maintenances schedules and the way to use the vehicle and the indigenously built technologies. A well-planned course of actions can only make it happen. HAPPY MOTORING.





CHAPTER 36:

SERVICES AND SAFETY FEATURES: EXPECTATIONS OF THE SENIOR CITIZENS IN INDIA WHILE INDIGENISATION OF CAR TECHNOLOGIES





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tabular form	
	Title Problems of senior citizens and suggested R & D solutions for indigenisation put in tabular form





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Usually senior citizens suffer a psychological setback due to lack of reflexes and other physical constraints. They find it very difficult to move on the roads especially due to the chaos created by sheer number of vehicles, haphazard traffic and pollution. To make the life of every citizen easier seniors have made number of classical suggestions and several practical solutions, which are put into this research paper. For few engineers these are R & D challenges and for others these are business opportunities. Priority to Senior citizens, Well Planned Services at the doorsteps, Strict Pollution Control Norms, Disciplined Vehicle traffic, Stricter Rules and Regulations, Eco-friendly easy to understand advanced technologies. Percentage proportions of senior citizens in population are growing many folds in 21st Century. They have expectations from the Architects and Civil Engineers, Manufacturing Experts, RTO, Traffic Management experts, Lawmakers, and Service Industries in the Indian automobile industry. Most important is there are business opportunities in this direction.

Here a factor worth noting is that these are the observations of the senior citizens having at least thirty years of driving experience. Few are civil engineers, few are mechanical engineers, few are lawyers, and few are common citizens having power to shake the demands being highly influential customers in the automobile world. These important aspects can guide the future of advancement automobile technologies.

The problem mainly start due to decline in the reflexes of the senior citizens and hence the constraints over the movement. Hence, they have come forward with some solutions.



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<u>Table: 36.1:</u> Problems of senior citizens and suggested R & D solutions for indigenisation put in tabular form:

SN	Problem	Suggestions R & D Solutions for indigenisation
1	Problem	Probably this is the biggest job generation
	in Home	criterion in future.
	Services	Many senior citizens feel that if the customer
		oriented services are at the doorstep then it can
		generate large number of jobs in every field. Infact
		senior citizens can be the starting point of these
		types of services ending with all people in the
		society.
		The range of the home services can be
		multidimensional and multidisciplinary as well.
		However, if few senior citizens are satisfied it can
		literally capture this huge untapped market and
		supportive automotive technologies. Hence a
		suggestion is that there must be a well-paid
		service member or technician who will check the
		conditions of the vehicle at regular interval in the
		house of the senior citizen and if required he will
		take the decision to fix the problems in the
		vehicle. E.g. If vehicle has the starting problem he
		will fix it.





2	Parking	Mostly in the flat system there is dearth of space
	problems	for the parking system. One of the reasons is poor
	in the flat	planning of the flat system itself. Another factor is
	system	improper FSI structure allotted by the
		Corporations. Hence, the civil engineers, the
		architects must convey this problem to the
		municipal corporations and due parking space
		must be provided in the flat systems.
3	Of not a	Many senior citizens complaint about footpaths
	space	getting encroached and hence they have no place
	meant for	to walk safely on the roads. Few more compliant
	the them	that on few roads even there are no footpaths,
	on roads	there are no crossing lights; there is no place for
		slow walkers.
4	Of no	This refers to the fact that for senior citizens
	special	special three wheelers be provided like used by
	RTO rules	the handicapped people.
		There are special spaces for the senior persons in
		the public transport however many a times the
		authorities and the junior citizens overlook this
		issue. Hence, an awareness drive and a special
		due must be there if junior citizen overcomes this
		rule after senior citizen's request to seat.





		There has to be 'seniors first' or 'handicapped
		first' rule in every transaction of RTO like License
		renewal only on humanitarian ground due to
		their physical constraints.
5	Of	Many senior citizens look after little children.
	carrying	However carrying these children on the road has
	children	become problem as there is no space for carrying
	with them	these tiny composure on these vehicles on the
		roads. Hence, special attention must be given to
		fit such special carriages on the two wheelers
		even in four wheelers, which can save few of the
		accidents.
6	Of	Few handicap senior citizens have suggested that
6	Of handicap	Few handicap senior citizens have suggested that there must be few emergency and first aid kits
6	Of handicap ped senior	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions,
6	Of handicap ped senior citizens	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places.
6	Of handicap ped senior citizens Of public	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places. These people always ask for the identification
6 7	Of handicap ped senior citizens Of public transport	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places. These people always ask for the identification card while buying the ticket of special provisions.
6	Of handicap ped senior citizens Of public transport	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places. These people always ask for the identification card while buying the ticket of special provisions. Why can't the senior citizen's record be updated
6	Of handicap ped senior citizens Of public transport	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places. These people always ask for the identification card while buying the ticket of special provisions. Why can't the senior citizen's record be updated and kept on the network of computers in India?
6 7	Of handicap ped senior citizens Of public transport	Few handicap senior citizens have suggested that there must be few emergency and first aid kits provided at every major squares, toll junctions, and such prominent places. These people always ask for the identification card while buying the ticket of special provisions. Why can't the senior citizen's record be updated and kept on the network of computers in India? Another aspect is trains, buses, and other public
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		doorstep of the bus or train it departs. In the
		crown it becomes impossible to even go through
		hence a special provision or the coach must be
		there for these kinds of senior citizens.
8	Road	Obviously municipal corporations, road
	conditions	development departments need to maintain the
		roads so that their fatherly elders get benefited.
		This good practice if well maintained can fetch
		them good senior citizens' life as well. Even the
		road signals, the marks, if maintained well can
		ease the life of the senior citizens.
9	Parking	Parking islands, Parking spaces should be
	spaces	increased in every town and cities. Every major
		building should have parking spaces pre-planned
		and if insufficient place of parking is there the
		plan should be out rightly rejected.
10	Vehicle	Every year at least one million vehicles will be
	Populatio	added on the roads however the roads are not
	ns and	well planned to face this condition. In USA roads
	following	were planned at least fifty years ago and that too
	the rules	for more than four lanes. American made
	and	automotive industries as the engine of growth
	regulation	hence they new American dream is complete only





	s on the	if the citizen owns his own car. Thus, now they
	roads	are benefiting from this good planning of
		multilane roads and strict safety norms. Even
		though population is increasing, Americans are
		already prepared for any kind of crisis. All the
		citizens are well aware about this fact. They follow
		every rule and regulation. Where as in India very
		few citizens follow the rules and regulations.
11	Vehicle	The vehicle prices are increasing day by day. All
	Prices	the vehicle prices are as comparable to the
		American and European standards. However, the
		technologies provided are not at par with these
		countries. Even the services are also not at par
		with them. The qualities of the fuel, the quality of
		the services, are also not at all comparable.
		Hence, senior citizens expect that the prices
		should be brought down so that at the time of
		retirement he must be able to buy a vehicle of his
		affordability and maintain it. If special provisions
		are made its well and good, otherwise senior
		citizens feel neglected at this front as well.
12	Vehicle	This is reference to the Service Stations.
	Maintena	They must device a particular plan for the senior





	nces	citizens like every month on 15th to 18th they will
	Schedules	allow only senior citizens.
		They must give at home services to these senior
		citizens on these dates.
		They must keep alarms/ alerts for the senior
		citizens' schedules so that senior citizens can
		plan their maintenances schedules and convey
		properly to the service stations.
		They must keep honesty and sincerity with the
		senior citizens over this matter.
13	RTO	Still in India there are no RTO symbols especially
	Symbols	meant for the senior citizens. Take example if
		senior citizen indicate the full vertical hand raise
		at the vehicle he is driving every driver behind
		him must realize that the driver must not be
		disturbed while driving being a senior citizen.
		Another symbol can hand raise with the bag in
		the hand. It means the senior citizen needs a help
		to cross the road.
		These are few possible symbols only thing needed
		is proper planning and implementing of these
		rules and regulations and making every Indian
		citizen aware about it.





14	RTO	Many RTO rules are meant only for the young and
	rules,	stout persons. Hence, it needs a through look
	regulation	from the senior citizen's point of view.
	s	
15	Yearly	There are following suggestions over this issue:
	Insurance	There should be computerized automated credit
	and other	card size insurance policy at least for the senior
	document	citizens. It must be renewed on special counters,
	updating	like ATM outlay of banks, on proper remuneration
		being feed up in that counter. It will ease the
		efforts and will save the much-required time.
		All the general insurance companies must start
		these kinds of 'at your doorstep' services. This will
		not only generate millions of jobs but also make
		these senior citizens feel secured. Similar can be
		the case with the other documents like tax
		renewal, the license renewal, etc.
16	Pollution	It has been observed that in India rules are made
	through	but are not implemented strictly. Here is the case
	the	of vehicular pollution. Many senior citizens have
	vehicles	complained about the pollution through two
		wheelers, the auto-rickshaws, and the heavy
		vehicles, which make them uneasy,





		uncomfortable to walk on roads from dawn to
		dusk. Many feel giddiness, many suffer headache
		on reaching home after travelling from the heavy
		traffic mainly due to pollution. Main suggestion is
		at home services to the vehicles. Why should
		consumer go to check the pollution? Government
		or private businesspersons should reach
		consumer for these kinds of activities by charging
		nominal services fees.
17	Modificati	On 10th October 2003, one senior citizen was
	ons in	carrying a child on the two-wheeler. Suddenly the
	vehicles	boy fell down, senior citizen could not control his
		vehicle, and he too fell down in one of the major
		squares in Nagpur. May be it has happened
		number of times in many towns and cities in
		India. Incidentally being familiar with us, that
		person knew we were automobile engineers. He
		requested us to device such safety gears fitted in
		the two wheelers that will help the children as
		well as the senior citizens.
		After through research it is found that this can be
		a very big market for the engineers. Modifications
		should require minimum space but having





		durability and reliability. Say a well designed
		baby sitter with proper belts and jerk dampers
		are fitted on the two wheelers then it can avoid
		accidents of many kinds.
18	Stoppage	As mentioned earlier the town planning hereafter
	Signal	will have major impact of vehicular traffics. The
	Planning	town planners must consider following major
		factors while devising a plan for the cities. They
		are:
		Synchronized signals for every city according to
		the required speeds. Take example of Mumbai; if
		a vehicle is running at constant speed of say for
		seventy kilometres per hour then it must pass
		every signal without stop. Thus all the signals
		must planned for the red and green signals.
		In the yellow light itself no fresh vehicle should be
		made to pass the stopping line. Hence there must
		be some kind of barrier be made on the road.
19	Walking	On every road including highways, town roads,
	spaces	city roads, villages there must be walking spaces,
		walking ways for every one especially for the
		senior citizens. Encroachment of any kind should
		be avoided on these ways by any means.





20	Driving	The suggestions from the senior citizens are in
	Habits	this regard are like below:
	and	The walking from left,
	following	The cycle driving from the left hand side,
	RTO rules	Walking on the footpaths,
	and	Following the signals or traffic police men's order
	regulation	should be imbibed from the early childhood
	S	only.
		Parking vehicle on the proper places,
		Following proper signalling,
		Avoiding overtaking,
		Avoid sudden braking and accelerations,
		Run vehicle at recommended economical speeds,
		Avoid frequent changing of the gears,
		Avoid changing gears on sharp turns,
		Try to maintain second or third gear while
		turning,
		If there is insufficient space, avoid the
		overtaking,
		Keep sufficiently low speeds at the rough roads,
		Strictly keep all the required documents updated
		in the vehicle,
		Avoid smoking, drinking, use of mobile phone
		while driving,
1	1	





		Avoid overloading of the vehicle,
		Take proper safety while reversing the vehicle,
		Keep safe distance while driving,
		Use dimmers while crossing the vehicles at night,
		Apart from this, on longer drives proper
		professional help must be taken while planning
		itself.
21	Mixed	a. It is always said that Indians drive their
	Traffic	bullock cart and the luxury cars on the same
	and	roads. The reasons are many still no proper
	Traffic	implementations of the rules and regulations and
	Managem	planning is the major bedrock.
	ent	b. Another factor is ignorance of the traffic rules
		among masses and even negligence of the traffic
		rules in some case has direct impact on the traffic
		management.
		c. Many people do not know that traffic
		management involves the factors right from the
		roads designing and constructions till the vehicle
		designing. Few factors which are considered in
		the Traffic Management are:
		-Vehicle pollution factors,
		-Town planning,





		-Places of hospitals with rules and regulations			
		like no horn/sound zone and signal placing near			
		it,			
		- Traffic signs like Zebra Crossings, speed of			
		twenty only, etc.			
		-Building and every gully planning, etc.			
		Thus, it is huge task. However if tuned well with			
		the awareness drive it can give better results.			
22	Quality of	Many senior citizens have complaints especially			
	the	not from the original equipment manufactures			
	Technolog	but from the dubious spare parts business and			
	У	related services.			
		Another aspect is few foreign technologies are			
		better but have costly repairing and replacing			
		costs should be taken into care.			
		Another factor is the cost associated with it.			
		The major problem lies in the fact that many			
		technologies are foreign made and their			
		awareness among masses is very low. Hence in			
		the emergency the driven cannot locate even the			
		simple fuse, or the battery wire or the hosepipe.			
		Here seniors feel that they neglected the R & D			
		and indigenisation of the vehicle sector hence			





		many of today's problems have generated. Hence,			
		the new generation must consider this factor very			
		carefully to make the automobile sector every			
		flourishing and booming from Indian perspective.			
		Let it be the engine of growth in future.			
23	Lack of	Less said about this matter is better. Even top			
	awarenes	class automobile experts lack awareness about			
	s	rules and regulations and the about the latest in			
		the technologies, leave aside the non-technical			
		people. However it is possible to build the			
		awareness if right from the students age weekly			
		awareness drive program is pursued or the			
		messages are conveyed to masses through proper			
		sources.			
24	Special	The side view mirrors pose the biggest problem to			
	Design of	the senior citizens as they get hit many a times.			
	Vehicle	Hence, vehicle designers must plan these mirrors			
		in such a fashion that it will not stretch the width			
		of the two-wheeler or the four-wheelers.			
		Another suggestion is that the location of the			
		battery connections, spark plug, magnetos, and			
		such general but frequent problem makers must			
		be made to see the senior citizen if ask for. Even			





		they can be marked over the vehicle of the senior			
		citizens to locate them in emergency.			
		There must be no extreme corners and edges in			
		the vehicle, which can wound the senior citizens,			
		disable persons, and the children.			
		The A, B, C of the vehicle i.e. Accelerator (A),			
		Brakes (B) and Clutch (C) controllers must be			
		near steering wheel in the proximity of hands so			
		that the senior citizens and the needy persons get			
		the benefit of those facilities thus posing little			
		threat to the traffic as well.			
		In north India heaters, defrosters should be the			
		part of the vehicles.			
		The battery charging should be easier option for			
		the senior citizens.			
		The puncture-proof tyres are need of the day.			
25	RTO	If RTO starts the doorstep services for the license			
	Services	renewal not for the senior citizens but also for the			
	at your	busy working class then it may fetch RTO at least			
	door step	rupees two crores every year only from the city of			
		one million.			
		This will also reduce the unwanted practices in			
		these kinds of services.			





		Another possibility is that automatic credit card				
		size license renewal facility must be there for the				
		senior citizens.				
26	Insurance	If General Insurance companies start the				
	Services	doorstep services in our case for renewal of the				
		insurance, it may grow their business to the				
		extent of almost twenty five percent every year.				
		Senior citizens and the employed class will be the				
		people who will get benefited most.				
		Another possibility is that automatic credit card				
		size insurance policy renewal facility must b				
		there for the senior citizens.				
27	Keeping	Many senior citizens have a notion that there				
	updated	updated record must feed in the computers.				
	records of	These computers must be interlinked throughout				
	the senior	India. There access must be at every nook and				
	citizens	corner or at least at the desired locations such as				
	on	RTO, Hospitals, Bus Stations, News Papers,				
	interlinke	Banks, Post Offices, and other such prominent				
	d	places. This will reduce their identification efforts				
	computer	and will ease their transactions. Infact a special				
		drive and special teams are required to complete				
		this task within stipulated period.				





28	Implemen	There is a rule that if adulteration is huge then		
	tations of	that petrol pump will be closed. Still many such		
	very strict	cases have been sidelined. There is rule that no		
	rules and	spare parts be manufactured using improper		
	regulation	resources. Still fake spare part market is causing		
		major trouble in India. Hence, implementation of		
		very strict rules like in the European Union,		
		Japan and America can bring this up to world		
		mark. Another factor is of course lack of proper		
		awareness among the masses.		
29	R & D in	Still the 1950's Morris runs on the India roads in		
	the	the form of Ambassador cars. There is no scope		
	Automobil	for R & D in India. These are few of the		
	e Sector	complainants of the engineers and foreign		
		investors, which incidentally is a true fact. India		
		has lost the first R & D wave of up gradation		
		cycle. However, in future only that country will		
		survive in the global technological race which has		
		best adoption practices and which can generate		
		new technologies. Especially in the Automobiles		
		and Computer field where ever new technology		
		has market of more than one trillion dollars per		
		year. Infact knowledge based society is emerging		





		day by day. R & D is the heart, brain, soul and			
		prime mover of this upcoming techno-socio-			
		economic knowledge based civilisation.			
30	Expectati	This is also an important factor. Rickshaw men			
	ons from	fly past these senior citizens so rashly that many			
	the	a times senior citizens get either confused or lose			
	rickshaw	balance. Then these rickshaw men charge heftily			
	men	even senior citizens. They drive rashly and there			
		is hardly any scope left for the senior citizens			
		than panicking.			
		Rickshaw men are requested to drive safely and			
		steadily so that these citizens can get benefited.			
		Of course in longer run it can benefit the			
		rickshaw men as well as habits are like solid			
		ropes if moulded in better fashion can give better			
		results otherwise these habits which harm senior			
		citizens can also harm in some way or other to			
		these rickshaw men in their future.			
31	Town	Many senior engineers when see the gloomy			
	Planning	picture of implementation of their plan of cities,			
		they feel annoyed. Many said we had these things			
		in the plan but over the years and delay of the			
		projects many factors got overlooked. Lot of the			





		projects suffered set back due to political					
		interventions. Lot of plans though classical and					
		futuristic were overlooked mainly due to lack of					
		vision.					
		Like four lane roads were planned in early 1970's					
		could not implemented in India, interlinking of					
		rivers and over bridges to cross the canals are					
		even at the planning phase, the dream of Tata to					
		make rupees one lack car park-able in a smaller					
		space, the parking islands at prominent locations,					
		the glittering highways and the city roads, the					
		distinct industrial estates with heavy duty roads					
		and distinct town roads, the amusement parks					
		with go-carting facilities located at the outskirts of					
		the every major cities, the footpath to every road,					
		etc. All have been planned or under planning but					
		are less vigorously implemented.					
32	Alternativ	Few senior engineers are warning us about the					
	e fuel	extinction of fuel within thirty years on earth.					
	vehicles	Hence, are advising us to develop alternative					
		fuelled vehicle having least pollution with cheaper					
		price tag in India.					
33	Business	Even though senior citizens provide free					





men	consultation; no businessman is interested in
neglecting	capitalising these opportunities to develop these
senior	ever-new technologies. Everybody wants quick
citizens.	result and quick money. Year 2000 results show
	that R & D and new technologies bring more than
	USD 500 Billion in the automobile world. On the
	other hand services and maintenances cannot
	even fetch one-hundredth part of it in India. Thus
	proving that R & D is the heart, brain and soul of
	the automobile industry. If neglected our
	businessmen would become slave of the foreign
	technologies.

Conclusion of the senior citizens about this matter:

Hence, if automobile technologies are indigenously designed and developed for the safety, comfort and services of the senior citizens it will boost the R & D efforts and business opportunities in the technology and services sector in India. Benchmarking and technical spin-off can even boost the other allied sectors too. It has capability to make India heart, brain and soul of the technological world.





CHAPTER 37:

IMPROVING ROAD CONDITIONS BY USING INDIGENOUSLY BUILT MACHINERIES



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE National Highway Development Project (NHDP) is providing a better intra and inter state connectivity. However, for the better traffic management and for better utilization of time and resources following important aspects are need to be taken care off. These are the aspects, which are just prima facie where as a detail and specified study could be done into each section, which we're widely trying to cover.

Otherwise, what will happen?

If delayed, by 2030 A.D. when these roads will be ready, the world will be dearth of the petroleum being on its extinction phase. *Remember by 2050 almost all the petroleum stock will be used up on the earth. Hence, India could utilize this complete road network only for two decades only.*

37.1: Main aspects of concern:

Let maximum work be done by Indian people,

Let maximum technologies used be totally made in India,

- Let maximum projects be done through maximum indigenous workers, executives, and other high ranked offices.
- Let the plans be made from Indian experience through Indian

Human Resources (HR)/ Expertise.

Let maximum areas of the nation be covered through these roads.

- Tertiary roads are so supportive to these roads that the whole nation looks like the well-connected nerves and arteries and veins of transportations.
- Due importance to faster and smother traffic using indigenous technologies be there.



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Diagram 37.1: NHDP's East West Corridor and Golden Quadrilateral:

37.2: Scope:

1. Design Criterion:

The standard width of the road must be decided for the every class of the city. May it be A, B, or C class cities. Thus, road width must be considered with the length, width its depth and with its material used. Mostly cement roads should be there. These cement roads will have longer life than the tar roads. This will avoid unnecessary rework hence the funds can be diverted to some other constructive work.





2. Locations and Purpose:

The location of the road network is also very important factor. For the intra city and intercity, intra state and inter state road network some important factors which are left in the above project are the consideration of Signage and Graphics on the roads and even for the footpaths:

a. Visual signage and Graphics,

Audio signage and Voice Data Standard recorded and announcements.

3. Smoother Access to the roads:

There must be barrier free access from roads to footpath and to the buildings. For these purpose following provisions are very important:

Parking lots for vehicle driven by normal persons (private owned vehicles)

Parking lots for public vehicles/ private company vehicles.

The most important parking lot for vehicles driven by physically challenged and differently able people.

Different and Special Signage for the above three categories also for the physically challenged and differently able people will have their own significance.

iv. Proper gradient/ slopes of rams and access from roads to footpath and from roads to buildings and parking lots.

v. Parking lots at the required junctions for ample scope of turning vehicles.

vi. These parking could be open air, covered, temporarily covered (during rainy seasons and summer)

vii. Special Parking lots:

Multistoried Buildings specially meant for the parking only.



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Additionally the parking provided by municipal bylaws will also be there.

4. Special Residential Zones:

The special Residential zones should be created which will be free from any vehicular traffic except bicycles, cycle rickshaws, or electrically driven carts; in order to avoid the excessive noise and air pollution.

i. These residential zones could host a hoard of facilities like shopping malls, markets, theaters, multiplexes, vegetable markets, etc.

ii. A service access to these zones can be provided separately by which the electrically driven carts/ bullock carts can be run to carry the goods and the related items to the specific destination.

5. Traffic Management:

i. All the parking lots and vehicular traffic should be stopped at least 1.5 kilometers away from these zones.

ii. A special care taking ambulance shall only be allowed in case of emergency to carry the patients, children, or the elderly people and the physically challenged.

iii. Special network of footpaths, road, biking lanes to be introduced. Each building shall have two means of access. The front access could be the main entry and the rear access could be the service entry.

iv. Special Garbage collection carts to be provided and to be taken to the incinerator or the areas where electricity can be produced through garbage. This so generated electricity can be used for the street lighting and lighting the recreational zones public areas or the gardens etc.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE v. Solar energy also can be utilized at times and at specified places as a substitute to the conventional source of energy.

6. Management and Maintenances of these roads using indigenous machineries:

Management and maintenance of so constructed roads shall be given the top priority. Depending on the change in seasons and the climatic conditions the schedules and the shifts will be there.

In addition to the facilities provided on the highways the important facilities to be maintained properly are:

- Communication systems, i.e. telephone booths, RTO, flying squads and police patrol,
- First Aid Centers, emergency helps, urinals and refreshing rooms-public toilets, motels, eating joints, tea-coffee-bars and road clearing in case of traffic jams or accidents, etc.
- Highway mobile vans for accidents and breakdowns, ambulance service, cranes at the specified junctions, service stations and garages, fuel stations (All kind- Petrol, Diesel, Electric, CNG, LPG, LNG, etc.) to add pinch into it if these technologies are Indian and indigenously made then it will add lot of job opportunities and high turnover in the market.

The proper Maintenances of all the above facilities to be provided on the National Highways, Golden Quadrilateral, East West Corridor, North-South corridors and the road networks will only make this ambitious Government project successful and will help in reducing the traveling distance as well as




E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE the fuel consumptions, peaceful and secure life of all the citizens and ultimately result in the progress of the nation.

If all these are done through indigenous resources and for indigenisation of all the technologies which are very widely useful at every step and which are very often used for maintenances or construction of roads then it will be golden decision in the history of Indian Socio-Techno-Business World.

As these technologies have wider, spin-off and they can be used in other sectors like mining industry, and other industries. Even few gadgets used at various places if indigenously made then it will help other sectors as well.

After all every one including pedestrians, road side mechanic, traffic signal technologies, you and me, doctors, police, engineers are customers who have their say in the indigenisation of car industries. Hence, is this chapter!





CHAPTER 38:

R & D AND ADVANCEMENT IN TATA INDICA TECHNOLOGIES: A FIRST STEP TOWARDS 100% INDIGENOUS CAR TECHNOLOGIES





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38.3	Expectation of R & D Engineers, Organisations and Investors in India from the Indian Government	1335
38.4	Which Technologies Tata Motors are trying to indigenise in India, and which they have not yet indigenised?	1336



38.1: The Background:

Tata Indica has become the most infectious car in its category. It happened only due to its advancements in the indigenous technologies and improved customer base. One analysis shows that in coming years many global giants will be copying the formulae adopted by the Tata Motors to capture the Indian/ World car market.

Only few would forget about the news which took automobile world by storm, that Rs. 125 Crores were spent on the 50,000 Tata Indica Customers for replacing Rs. 25,000/= indigenously researched and developed kit of suspension system in 1999-2000. It proved that advancements in the technologies are for customer satisfaction only and positive response from the customers encourages the scientists and engineers for their future ventures. No need to say it improved the image of the Tata Motors. The satisfied customers also became brand loyal due to such extraordinary concerns shown by the parent company. At the present juncture Tata Indica is one of the only few vehicles which has a long-standing waiting list of buyers.

How did it happen?

38.2: The Planning of Tata Motors:

In the conceptual phase of the Tata Indica, priorities were decided with customer focus and indigenisation of technologies to be developed. The aspects, which got more focus, were:

<u>Safe Vehicle:</u> To make driving safer in the Indian conditions Tata Motors added:





Safety bars and crash zones to protect in house car people,

One of the biggest crash zone in front to save from the accidents, and Easier mode of repairing with easier technological features so that even roadside mechanic can repair the vehicles in emergency.

2. <u>Reasonable Reliability</u>: No technology is perfect in the world however there must be reasonable reliability, which should make customers confident about the vehicle. Tata Indica has that credibility. A reliable engine, gearbox, fuel atomisation system, the accessories, and the interiors, which infact have direct impact on the aesthetics and ergonomics of the safe drivability.

3. <u>Operational Economics</u>: Few Tata Authorised Service Stations like Jaika Motors, which happens to be the second best in India; is providing a typical kind of Annual Maintenance Contract (AMC) of Rs. 3000/=. The customer has to pay only Rs. 3000/=. For this customer gets almost five free services. If religiously followed it comes out to be five times more than that. Thus straight a way customer saves almost Rs. 15000/= yearly on maintenances for the first three years. This scheme is the most successful scheme of its kind in the small car segment. Also when calculated Tata Indica consumes (eight) 8 Paise per kilometre. No other car stands even nearby. Another thing is Tata is the biggest brand in India. Tata have biggest set up of service stations in India. It helps in even the breakdown maintenances. Thus, it happens to be economically most viable car.

4. <u>Reasonable Initial Cost:</u> Out of eleven car manufacturers in India only Tata Indica has big car at lower price. It is he only vehicle, which needs





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE advance booking. At the price of small car customer drives almost a middle level car. Hence, it is called as the most infectious vehicle in India.

5. <u>Selling Coal to New Castle</u>: New Castle is the place where the coal is extracted. If somebody from India says he is selling the Indian coal to new castle he would be called lunatic a decade ago. However, Tata Indica is selling its vehicle to the Great Britain the land of Rover vehicles. Tata Indica and the Rover is the car having highest demand from the Asian community in the Great Britain. It proves the export success story of Indica. It is one of the cheapest but most reliable vehicles in the Great Britain.

6. <u>Good Services</u>: The Tata Motors is coming out of ages. It has set up or encouraged its loyal dealers and authorised service stations to develop ultramodern facilities for the customers. Many provide service check up within few minutes. Many provide emergency services within few minutes. Almost all of them provide free guidance to understand the technology better. Many provide the services of the kind of 'right first time' and 'there must not be repeat of the complaints'.

7. <u>Great Look</u>: Aerodynamic design is required for the vehicle running more than hundred kmph which Tata Indica can. May be it not the best on its look but it is not even too bad. Still it can carry the things which luxury and more advanced bigger cars of the world can.

8. <u>Providing thousands of jobs to Indians</u>: No need to say that every car has more than 30,000 parts right from the small screw, the circlip, to the big assemblies. There are more than thousand such ancillary units of Tata Motors who got developed themselves up the world standards. Many service





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE stations, many garages, many dealers and SSI units has provided thousands of jobs to skilled, semiskilled, unskilled workers and to the executive and engineers as well.

This broad-minded strategy has made the Tata Indica the most contagious vehicle in its category.

38.3: Expectation of R & D Engineers, Organisations and Investors in India from the Indian Government:

Nobody yet attempted to manufacture the small car with maximum indigenous technologies in India of the latest standards. The Tata Motors are doing so. If asked every mechanical, automobile, production, instrumentation, industrial engineer; he will ask following things from various sources especially from the government, the industrial secretary, and the planning commission:

There must be less excise duty on indigenously developed vehicles,

- There must be concession for developing the prototype along with first one lakh vehicle.
- The R & D help provided by the SISI, SIDBI or other such organisation is not enough it must be more comprehensive.

More the indigenous vehicle lesser its price must be,

There must be less tax applicable to the buyer,

Less interest rate on the buyer's loan,

Lower interest rate on the maintenance loan,

On the petrol pump, charges of fuel for the person having indigenous vehicle must be at least one rupee less, etc.

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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE These concessions can provide the R & D engineers, the investors, the buyers the encouragement for the further such successful ventures.

Most important thing about Tata Motors is its 'never say die' attitude. Even though there are no concessions provided by any entity it is going on its path. Now it has modified the same Tata Indica for more advanced Tata-Sedan. It also has developed Tata Indigo the 'spoil yourself' kind of vehicle.

"Tata Motors has almost 125 passengers car dealerships at present in India. Tata Motors are planning for 150 dealerships till March 2005. Tata are investing Rs. Six thousand crores each year in Pune factories to indigenise car technologies and to take lead in the car market. It has 24% market share in India out of 9,00,000 cars sold in India and 1,00,000 Cars were exported in 2003-04. In 2003-04 Tata Motors had more than Rs. 15000 Crore turnover (Approximately USD Four Billion) with net profit of Rs. 810 Crores (Approximately USD One and Half Billion). Out of Rs. 810 Crores 48% share was of Tata Cars (i.e. Approximately Rs. 400 Cores = USD 900 million). **Tata Cars demand is increasing by 51% per annum), Rajiv Dube, Vice President (Commercial) Tata Motors, Pune. (Reference- The Hitvada- 22nd May 2004/ Saturday). It shows maximum customers are demanding indigenous cars in India.**

These are the Advancements in the Automobile Technologies coming out of continuous R & D from the Tata Motors. Hope it becomes one of the global giants in coming few years from now.

Though Tata Motors are trying day and night still the task s huge hence let us see which are the technologies, which Tata are yet to master.



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38.4: Which Technologies Tata Motors are trying to indigenise in India, and which they have not yet indigenised? :

Tata Motors have not yet indigenised and not have mastered the following technologies to level what the Mercedes, GM, Ford, Toyota, have mastered:

The flexible manufacturing and automation system,

The flexible robotic car assembling technologies of the cars,

The catalytic converter technologies,

The Petrol Injection System (which it is importing from Hitachi-Japan),

The following Autotronics devices are still imported from various countries or are not as advanced as the Mercedes kinds of cars have:

Electronic Ignition System,

Electronic Power System,

Engine Management System (EMS),

Fuzzy Logic Antilock Braking system (ABS),

Navigation System,

Air Bags Control,

Car Music System, which it imports from Blaupunkt, Germany,

Automatic Transmission and its controlling unit.







CHAPTER 39:

SUMMARIES





SUMMARIES

The impact of customer behaviour on the development of the car technologies can be experienced from the fact that more and more companies are becoming customer oriented and are trying to develop and are giving those technologies which are needs of the car customers.

The impact of technologies on the customer behaviour can be experienced from the facts that better the technologies and that too at affordable prices the better the responses from the car customers.

Mutually both these aspects are developing the human interactive car technologies at the level where comfort, safety, and loyalty of the customers are becoming reality nowadays.

Also, looking at the response the maximum indigenous car of its class Tata Indica is getting and a hefty fifty one percent rise in demand in the year 2003-04 (Reference: Mr. R. Dube- VP (Commercial)- Tata Motors-The Hitvada-22nd May 2004- pp 5- City Business- Nagpur) the totally indigenous car and its technologies will become the Indian fact in future. As it becomes responsibility of the domestic companies, technocrats, businessmen, and government systems to satisfy customers needs by developing indigenous cars and the supporting technologies that are used to develop those cars in India. As already the fresh cars sells in India has touched the Nine-Lakh (9,00,000) mark in the year 2003-2004. That is the turnover of billions of dollars. The supporting services can add the woes to India if indigenisation of technologies aspect required for the car industry is not taken care



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE immediately. As the technologies used for the supporting tools and equipments are also foreign made at present in the multinational car manufacturing cars services.

Mr. Peter Burgess, Editor, Daily Express, World Car Guide 2001, 47th Edition in his editorial has put up, (verbatim), "*There are those who argue that cars should be treated just like other commodity. If there is glut of plums, the price drop and the same should happen with cars. That is too simplistic. Too many jobs, companies, even national economies, rely upon motor industry for that scenario to be realistic. But if the motor industry deserves special status, it should not abuse that position. It seems that it has, and it has been found out. Let's hope the lesson has been learnt and buyers are treated honourably in future."*

The message is very clear. Hence, the most important factor here is that Indians have to decide on the following front for the faster implementation of this indigenisation of the car and its technologies project:

Whether Indians want to be Independent on the technological front or Dependent on the foreign companies?

Whether Indians want to be Self-Reliant on the technological front or want to be Relying on the foreign technologies?

Whether Indians want to be Leader or the Followers in the Technological aspects?

Whether Indians want to be Heart, Brain and Soul of the world of car technologies and other technologies or not?



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Whether Indians want to leave its Impact on the Techno-Socio-Economics of the countries?

Whether Indians want to be Proprietor of the many important big firms or simply the dealer, service provider or the market of the world's biggest companies?

Whether Indians want to be Leading R & D hub of the world or the leading technological Dump yard of the old technologies hub of the world?

Whether wants to be a leading knowledge based society like in the Vedic, Puranas, Ramayana, Mahabharata era and technologies provider of the world in the form of Vimana Shaastra, Vedic Aeronautics, Astraas and Shaastras, Chariot Shaastra, Vastu Shastraas or the follower of the foreign technological sources?

Whether Indians want to be knowledge-based society, the independent society or a just casual living and dependent society?

It is concluded in this project that Indians want to have all the positive qualities with them taken care into this project. The reason of this conclusion is many experts, customers, future customers, students, businesspersons, Institutions; Organisations are progressive in India they want to grow higher and better and self-reliant. The country having strongwill to succeed and the country, which has shown resilience in the global crisis situations, cannot remain ever dependent on the technological front as well. It is the matter of time these hard and intelligent working Indians will bring joy of victory in few years from now. Also, it has been observed that the ways the Indians can manage the total indigenisation of cars





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE technologies as per the demand from the customer is applicable to other fields as well. It could be done by means of pursuing the following ways:

By giving special status to Automobile Industry,

By giving special respect and honour and very much importance to R & D in the resources required for the car and its products, R & D in customers' behaviours and R & D in the required services.

By result oriented approach in the most competitive car world market.

By proper utilisation of all the indigenous Indian resources.

By adopting or developing new techniques to suit the very Indian conditions. By satisfying every individual's needs in the car industry, there by satisfying the national needs, and humanitarian needs.

By ultimately satisfying the every possible need, may it be even up to the self actualisation level of the internal customers; and trying the delight of the external customers and the people concerned with the car business,

By upgrading the education and training systems in India so that both the learner and the teacher/guide get the total satisfaction also there by satisfying the needs of the country and the humanitarian world at every possible techno-socio-economic levels.

Latest Demands of the customers can be summarised like this:

Few car customers like Dr. M. B. Nagarkar, feel that in the field of software India is leading only due to its brainpower. On the other hand in the automobile field only twenty percent of software field's brainpower in R & D is required hence in coming years if India starts this project India is going to win the car race i.e. India can become the global leader on this front. Another





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE reason is many developed countries have the money to spent now but lack the human resources with high skills and qualifications and the brain power as much the India have. Hence, this kind of project is very much viable project. (**Reference:** Dr. M.B. Nagarkar, In his Editorial- Ek Nava Itihas- i.e. One New History, Marathi Magazine: Swaroopyog- January-February 2004, 2004 Year's 10th Volume).

Next in his spiritual cum patriotic address Dr. M.B. Nagarkar categorically states that by the end of 2006 A.D. India along with the its all the South Asian neighbours will be having the free trade zone. Thus, if any one of the projects in this thesis like Rupees One Lakh Car gets into reality India won't have to look for the market around the world. These all developing countries will get the 'modern car' at its cheapest cost. Hence, also it also proves that this project will be a big success, as customers are demanding the Car that too less than Rupees One Lakh. They feel they are safer on four-wheeled car than on the two-wheeler costing nearly Rupees One Lakh. Remember India has Hero Honda the two-wheeler, which has highest sells in the world. This also proves the viability and gravity of this thesis. Thus, slowly Indian Car MNC, may be as giant as the General Motors and Ford and Toyota, will also make impact on the world car market by producing world-class products and will provide world-class services. Thus these Indian companies will achieve the global car customer satisfaction through 'Made In India' Cars. That is all is the aim, the gist and the overall summary of this project.



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CHAPTER 40:

CONCLUSIONS



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CONCLUSIONS:

This, project has following conclusions when studied from various angles:

- Internal Customers are demanding number of Indian Car Component Manufacturing Organisations to manufacture maximum number of car parts in India to prove their skills and creativity. Hence, ultimately it leads to total indigenisation of the car technologies.
- External Customers, who actually drive the Cars, are demanding maximum indigenous, cheaper but quality cars, so that they get the satisfaction of providing valuable suggestions to the Indian manufacturer.
- Technological Breakthroughs will be coming from the Indian car R & D that too every day, once this project gets into full swing.
- Though Suzuki-Maruti has maximum share (54.2%) of Suzuki and governed by Suzuki, the facts is that when Suzuki-Maruti started its manufacturing in India it provided cars at affordable Indian prices.
- May 2004, Tata Motors has shown 322.4% whopping growth in its sales at overseas front. (Reference: "Auto exports zoom by 56%"- The Hitvada: May 10, 2004, Tuesday- Business Hitvada Page). These figures show that more the indigenous cars more are the sales. This is proved from the example of Tata Indica sold in overseas market and is most sought after car by the Asian community in UK and other countries. Please note Tata Motors does not have totally indigenous technological set up and totally indigenous car products and still this is the result, hence if it gets totally indigenised then what will be the result?



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Various other Examples, Project and Extract of Annual Reports of various Practical and Validity Reports organisations, of manufacturing organisations given in this project, Statistical Analysis, R & D Analysis, Technical and Financial Feasibility Reports, Investment Facilities, Financial Availability, Opportunities in the World Car Market, and Most importantly Car Technologies developed for the human comfort and safety; shows that it is better to start with this project as soon as Indians can. Most importantly two wheeler owners have started demanding Rupees One Lakh Car to replace the Bike those are costing nearly Rupees One Lakh in India.

It may also, be concluded that the car technologies and human needs if followed well it will not only delight the Indian car customers but also can bring huge up gradation in the indigenous car technologies in India. Further more it can upgrade the supporting technologies in India as well and influence its indigenisation. Even it can influence the up gradation and indigenisation the technologies in other fields. It can generate huge job potentials in India due to increase in quality products. It can also bring result oriented education system in India to remain in the global competitive market. It will force the result-oriented society and the governments in future as no country can compete well in the global market unless these market and political forces and ultimately the civilians in that country wish so. Thus it can bring a techno-socio-economic stability at upward front for the country.



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Few more conscious points to be dealt with are the management of the investment, research, developing, maintenances and services of the cars developed totally indigenously in India according to the latest and the futuristic needs of the customers. It has become dire need of the hour and a proven viable job. It can be achieved by:

1. Using all the Indian indigenous resources consciously and judiciously,

2. Special attention be given to the customer behaviour; as in future king customer will be dictating the terms and conditions in the field of technology and the service industry as well,

Allowing benchmarking to develop other industries in India,

Generating huge employment potential and thus allowing the socio-technoeconomic growth of the country.

Making Indian economy and Indian technological front a self-reliant look to strive in better fashion in the future world.

Bringing laurels to the nation by giving the world the world-class 'Made in India Car'.

Producing remarkable results before the world by cohesive and synergistic actions of the people of the nation.

When internal customers produce what they want and actual external customers get what they want then satisfaction will be of course the result.

Giving special status to the car indigenisation business at the earliest and at war footing.

Designing and developing the venture with interesting in its aims- to be an essentially export-oriented project that is capitalising on the few advantages



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE that the Indian labour market offers for indigenous production of the export oriented parts and assemblies.

Last but not the least, developing result oriented and learner and guide/ teacher satisfaction education system to satisfy market demands as well. **E.g.** If the mechanical, production, automobile, industrial engineers comes out of college with enough skills and knowledge of the automobile industry then they can immediately be absorbed in the factories. With nominal guidance or training these engineers can give India the result of indigenised cars in India.

Hence, in all the exercise, every individual taking part in making and managing the technologies of the total car indigenisation must be able to reach the self-actualisation needs and will try only one thing- the delight of the internal and external customers and the delight of the domestic and international customers. Looking at the space age technological breakthroughs in India, it may be concluded that Indians have the culture, the civilisation and the strong community will power to succeed and hence to conclude with Indians will be able to do this successful venture very soon.





CHAPTER 41:

RECOMMENDATIONS FOR FURTHER

STUDIES AND RESEARCH





RECOMMENDATIONS FOR FURTHER STUDIES AND RESEARCH:

Mainly recommendation for further studies related to present studies, analysis and research to bring out maximum out of this research. Future studies must be related to how to bring these ideas into practice and bring them into successful ventures than finding out something else from this project.

1. *Car indigenisation requires funds.* Hence, how to mobilise funds into these indigenisation efforts should be focus of interest of scientists from business management, economics, engineering economics, estimation and costing scientists, even engineering like diverse fields.

2. Even a special award should be put for this. Thus, in future a result oriented national or international award/ awards to provide solution over the present situation should be the criteria. 'Propose the problem and get the result, implement it and then produce the award to the solution provider'. This will keep Indian Economy truly pulsating all the times. This will stop stagnancy, over inflation, in the Indian Economy. The specialised sector like Car sector can be taken as the pilot project.

3. Systematic Analysis of existing manufacturer in the car sector, which are:

Fully indigenous,

Partially indigenous, and

Fully non-indigenous, must be made.



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE This in reference to knows what is the contribution of that unit in the contribution of Indian Economy. In terms of job the unit has provided. In terms of resources it has contributed or exploited. If the result is negative that unit must be automatically ceased to exits if it continues for more than five years. Infact even the money criteria also should be very strict. Thus, limitations and rules and regulations needed to be revamped.

4. The policy recommendation is that *full time job of Research and Development must be made compulsory in the every automobile organisation* to tackle ever up-gradation in product and production technologies.

5. Criterion for compulsory symbiotic exchange of consultancy to the Education Institutes and the Automobile Sector is need of the hour. This way, these organisations become self-reliant and the education Institutes become soul, heart and brain of the future technologies. At the same time education Institute should provide those lot of the students, which are end product of the requirement of these kinds of organisation. Hence a result oriented education and organisations to provide jobs should go hand in hand. This can boost the automobile sector. If other branches of science, commerce and arts adopt this strategy, then they can become the perfect solution in their field, rather producing a problem of educated unemployment. Hence, a comprehensive study must be carried out to develop present education curriculum of many courses, to train professional manpower to have good workforce in the country. Even few experts like

Dr. B.S. Sonde in his technical lecture in the Institution of Engineers (India), Nagpur Local Centre claim that *day by day modern technologies are used in*





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE various fields and hence accordingly the syllabus and curriculum to be updated to meet the demand of industry, so that students and engineers, should be able to meet the challenges of the future.

6. All the organisation in the field of car sector must bring the results. Even the Institutes like CII, MIDC, ARAI, VRDI, and PCRA which are giving better result should also strive for indigenous technologies and provide special concessions to testing and recommending their technologies.

E.g. ARAI provides the approval certificates to the technologies either newly developed or brought previously developed technologies from the foreign land but only if that parent company wants to run that technologies on the Indian roads. Here, I recommend to ARAI that they must provide at least 10% concession charges to the indigenous technologies over the technologies having foreign origin.

7. Patent fees in India for Indians must be reduced for the students and for the SSI sector from four digits, to say, merely up to Rs. 100/= or so for the automobile technologies as the more number of cars running on the road more will be the stakes from the Indian side. This will also reduce the prices of manufacturing. Thus, more number of options meant better the quality of products will be developed to survive in the market. China did this kind of thing and whole world is now flooded with the Chinese products in the field of electronics and other goods. Its threatening side is that China has even captured the Indian Bus and Two Wheeler market in the neighbouring country Nepal.





8. Special Wings be set up by various organisations on how giant car companies remain at the top, how they adopt huge investment strategies, how *R* & *D* is maintained in every level and in every department and how Industry Institute interaction is giving results in Germany, USA and Japan.

At proper places and with relevant background some other recommendations like these are put into this thesis beside these recommendations.

9. Regular study is required on whether Indian Techno-Business world is truly progressive or not? The question arises due to the fact that our R & D scientists are more successful in Western and/or Developed countries than in India.

10. Few experts like Engineer K.D. Telang, 10th February 2004, in the Institution of Engineers (India), Nagpur Local Centre, Nagpur, in his lecture told that the cases of accidents are the vehicles faults in addition to the negligence of driver. The numbers of persons dying in accidents are more than the war. The causes of accidents in addition to the driver faults is design of the vehicle in India and the faulty and old spare parts also causes the accidents. When the defects in design are reported to the manufacturer of vehicle they do not give proper alteration to it. If such defects are taken proper cognisance then the umber of accidents can be reduced. Hence, such organisation who manufacture these kinds of parts and even sell them if found guilty either be banned or forcefully will have to modify the parts as per the recommendation of the experts. It also needs the R & D wing in every organisation.



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE **11.** First the national standard like Bureau of Indian Standard (BIS), Indian Standard (IS), and the international standards decide the category of various organisations. The BIS and IS are upgraded later when the ISO kinds of standards are about to enter into India. Where as USA, Japanese, German, UK, Swedish companies try to be far better than these standards. When these countries pass beyond this standard these countries bring that standard into other countries. By the time other countries pass on adopt ISO 9000, these developed countries with their most sophisticated companies like Volvo, Toyota, General Motors, Ford Motors, bring further standards like ISO 14000, and by the time they are in OHSAS 18000 is already here. Thus, Indians must make R & D even these kinds of standards. Infact if India wants to develop faster following things are must. Hence, I would suggest following standards to be inculcated first in India:

i. PIES Quotient Standard for Human Resources: The person to enter in the organisation is tested at PQ, IQ, EQ, and SQ i.e. <u>Physical</u> Quotient, <u>Intelligent Quotient</u>, <u>Emotional Quotient</u>, <u>Spiritual Quotient</u>. It will be called as the <u>PIES</u> Quotient Standard. This will keep only quality human resources in the organisations.

ii. Work Culture Standards: WCS: It must be decided on the Profit, Internal Customer Delight, and Love of job for each employee, the facilities he is provided, by the employer.

iii. Employer Standard: ES: He must also be tested on the PIES standards. If employer does get fitted into this and if employees have a complaint about him that company be immediately closed.





iv. Honesty and Ethics Standards of the Company: HESC: To reduce mall practices and to give next generation a true good ethical business practices then it is must. Otherwise majority of the people lose interest in the field of work.

v. Conducive infrastructure and atmosphere of the company: CIAC: Only Tata, Reliance, and Infosys receive more Resumes to work in their company than any other companies in India. Why? They have better infrastructure and atmosphere in their companies. Same facilities be given to similar kinds of organisation, similar pay packages be given to qualified and skilled work force. To stop further reduce in the value of educated employees degree it is must. Otherwise the person who earns merely Rupees two thousand in spite of all knowledge about Automobile or Computer gets at least ten million rupees worth job in Western countries. Does it mean our skilled people have more value in those countries? Does it mean our employers cannot keep the value of these high-class people? Why after five years experience in automobile and computer the person goes to either gulf or in other countries? Does it mean only employer earns profit in lakhs, millions and crores, where as employees who work hard for the companies get salaries in thousands? Where as in Microsoft Corporation the amount of salary CEO Bill Gates gets if it is in Billion then its next person also get in Billion, its employees also get in millions, unlike Indian companies where salary structure is more exploiting than making employees happy. Looking at the results of Infosys, Microsoft in future only those companies will survive the global pressure of competition who will care their biggest asset





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE the employees that is the internal customers the most. As these internal customers if are delighted only can delight the external customers.

vi. Yoga, Zen Education and Truthfulness based organization: Yoga, Zen Education, Truthfulness, Prayer and Hard Work, High Profit is given High and Equal Priority. Unless it happens within twenty-five years work culture become nasty, environment will become unhealthy, and purity of mind will be found in books only, hard working people will get discouraged. Also, high profit could get vanished if Yoga based work culture is not there. Because, Yoga builds persona behind the personality of every person, and every person along with his family is an asset to the organisation as well as the nation even an asset to the world. E.g. Zen Education in the Japan has build the nation.

Hence, to build such people such organisations which will keep better living culture and human civilisation is need of the hour.

12. Education System must be made result oriented and required skills oriented, so that by the time student comes out of the school and/ or college must be able to tackle his job very well, which is the present need of the market. Most important factor is that there are few schools in the world where students as well as the teachers/ faculty get satisfied at the end of the day and at the end of the year for their contribution in their field. Also satisfied are the industrial people who bring problem to these students and faculties to get solution. **E.g.** Massachusetts Institute of Technology M.S. in Mechanical Engineering. If such courses are developed in India, if such faculties are





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE developed in India and if such students are developed in India, then these kinds of project will bring miracles for India and the whole world.

13. At present there are only three most promising regular Institutes in the world, which have full time, and full course in Automobile Designing those are having tough competition in which Indians hardly get any chance. The Institutes are:

- i. Art Centre in Pasadena, California, USA,
- ii. The Royal College of Art, UK, and
- iii. Pforzheim, Germany.

Hence, it is recommended to the Indian Institute of Technology, the top class Indian Technological and Engineering Institute to start these kinds of full time Designing Courses to get in future totally Indian indigenous designed car in future.

14. Few full time and direct job providing courses be started in various institutes where manufacturing technologies be indigenised in India at faster rates. Especially mentioning here would be the Autotronics and Mechatronics parts in the Automobile like Computerised Fuel Injection System, Computerised Global Positioning System, Computerised Fault Detection System and Computerised Auto-control of car system and An Automatic Computerised Self Adjusting Fuel Injection System to run vehicle on any Hydro-Carbon fuel by adjusting its Air : Fuel Ratio. Infact, these Institutes will be giant, vibrant, creative and innovative R & D centres in India where every minute new technology will be developed and will be put into industry after rigorous testing.



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15. Try to avoid organised crimes like fuel adulterations, dubious/ fake parts manufacturing business those causing severe damage to environment and takes lives of people. Making technology roadmap very much aggressive can do these. It will also stop hampering the progress in the technology.

16. Try to develop indigenous Indian Automobile Survey organisation at par with J.D. power. Thus, instead of depending and giving much importance to the J.D. Power survey, Indians must have their own such recommendations, verdicts, and the survey results which will be trusted and respected all over the world.

17. *Indigenising Automobile Accessories and Maintenances products* like Car Locks, Timing Lights, Pollution Analyser of various standards, automobile pints and painting shops, Three Dimension Automobile *Designing Software cheaper enough to be ought by the SSI too.*

18. To avoid making India a junkyard of the world's biggest second hand premier car market by putting a shield of strong tariff barrier. Also laws for the technologies must be made very strict and action oriented. It must be the case with Indian as well as the foreign made cars. This will also encourage Indian indigenous R & D in future.

19. *Please start and develop more Institutes and organisations like ARAI-*Pune on which the workload is increasing rapidly since last five years.

20. Indians must avoid Suzuki over taking Maruti's bigger halve 54.2% in other such Automobile firms and other supporting ventures and thus handing over the complete hold of the Indian market to the foreign companies in the Joint Ventures.





21. If any foreign car company wants to sell its car in India then that company must be allowed to enter into Indian only if it transfers it technology by developing Original Equipment Manufactures (OEM) in India within say five years time or so, otherwise it must not be allowed to so.

22. Giving special category status to the Automobile Business for coming ten years, more debt with less interest be given to interested young achievers in the academic field to set up their own Automobile Business, factories, manufacturing units. This will develop a band of new entrepreneurships in India.

23. One more reality about Indian customers is that they rejected few foreign companies who tried to bring old technologies into Indian market. E.g. the Indian customers rejected Peugeot who tried to take control of PAL due to its above-mentioned strategy. Finally Peugeot withdrew from Indian market. Anyhow, this also proves that Indian customers demand new models of cars and the necessity of R & D and new indigenous cars in India.

24. Daewoo Matiz was the most successful car in its category and it was the most sold car in 122 countries (Pamphlet Daewoo Matiz). However, due to problem in the parent company at Korea Indian customers found it very difficult to get original parts in India. Hence, it is recommended that most frequently parts of the foreign origin parts be compulsory made in India to avoid these kinds of crisis. Infact few luxury car owners of the Ford-Mondeo, Skoda-Octavia, also demanded the same. Thus, luxury cars must also be very immediately made in India, to satisfy the upper crest of the customers,



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE otherwise they will become addicted foreign made cars and the supporting services and goods.

25. While Automobile is USD One trillion dollars business in the world, the automobile instruments, tools, equipments, spare parts, servicing business is USD 500 Billion Dollars business. Hence, a proper planning and implementation is required at this front as well. Specialised industry getting specialised job and specialist getting specialist's job can be the recommended solution over this.

26. The survey of Automobile associated products; accessories and spare parts, manufacturing units were asked following questions:

i. Are you committed to total customer focus in all their operations, process and systems with plan for continuous improvement on all performances measurement including new products?

ii. Are you actively committed to continuous development and upgradation of competence throughout the firm, including management?

iii. Do you accept that continuous change will be the future pattern of life in manufacturing and act accordingly?

iv. Do you have the courage and determination to be able to look the bear (the global competition) in the eye?

v. Do you think manufacturing is the process internal to the firm that is internally defined, internally driven and not world-class customers driven?





vi. Do you feel that size of the manufacturing industry increase and the capabilities of the people manning them also increases by the time factor?

vi. Do you think R & D for product and process is must in the manufacturing industry?

vii. Do you thing manufacturing industry is customer driven and customers have high expectations about their quality and services? In the whole of India majority of the industrialists had started asking themselves these questions in the year 2000. [Reference: CII Conference on: Manufacturing Strategies for Competitive Advantage in the New Economy: 8th -9th November 2000: Review: Events-Section- The Machinist (Magazine), pp. 105- November-December 2000]. In one independent survey of researcher, even many did not know what is R & D prior to this happening. The reason being since years they were manufacturing few parts a bit mechanically and in routine. Half of the machineries in the manufacturing units were foreign made. Slowly the employer and employees are getting awakened on this front. They are realising that they can help each other in their each other's business if they buy and sell their mutual indigenously made products and consult each other and know each other's process indigenously in India. Many have developed Quality and R & D units.

Hence, the recommendation here is a special result oriented, door to door/ or industry-to-industry awakening cell of the government of India or the Industrial wing on this front in the Industrial world is need of the hour.





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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Engineering) in The Institution of Engineers (Nagpur Chapter), on 4th July 2003, as appeared in the IEI Review October 20003.

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157. *Amendments required in Motor Vehicle Act-1988*, along with Advocate S.R. Deshpande, of Nagpur Bench of Mumbai High Court as



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE a co-author, in India's premier Law Journal, published by 'All India Reporter', Nagpur.

158. Adding biodegradable anti-detonation and fuel efficiency agent in the present fuels: Unleaded petrol and in the diesel'. Research Paper Appearing in the Bio-diesel section of the-AU-Fuel All India Seminar on the Alternative Fuels, conducted by the Institution of Engineers (India), Nagpur Local Centre, held between 22nd and 23rd August 2002.

159. *Telehaptic Telematic Remote Controlled Robotic* Technology Trauma Surgery in a Car or in a Helicopter'. Research Paper Appearing in the Annual Technical Paper Meeting 2003, on 19th October 2003, in Institution of Engineers (India), Nagpur Local Centre.

160. Happy Motoring", in the Sub-Theme- Maintenance. Research Paper Appearing in the National Seminar on "Advancement in Automobile Technologies", on February 2004, Sunday, 1st in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-author of the paper was Er. Prafulla Revatkar, MD, Khamala Automobiles, Nagpur, Authorised Service Station of Tata Motors.

161. *Expectations of Senior Citizens from the Indian Automobile* Industry', in the Sub-Theme- Services and Safety Features. Research Paper Appearing in the National Seminar on "Advancement in Technologies", Automobile February 2004, Sunday, on 1st in Institution of Engineers (India), Nagpur Local Centre. Author Er.





E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Ashish Urkude, Co-author of the paper was Er. Y.V. Joshi, and Er. R.U. Khade.

162. *"Automobile Engineering and Architectural consideration for the Resources including investments.* Research Paper Appearing in the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-Authors of the paper were Er. Ms. Chanda Sinhababu (MBA Student- CP and Berar), and Mr. Gaurao Deoras (III BE Student).

163. "Auto Exports zoom by 56 pc", The Hitvada, 10th May 2004, Nagpur, pp 9.

164. Mr. Alok Tiwari, "Cheers for Motown", Personal View Section, 25th April, Sunday, 2004, The Hitvada, pp 6.

165. Ms. Sujata Bijwe, "Textile Industry WTO Challenges- A New Trading Reality", in the Industry Monitor Section, in The Monthly Economic Digest, vol. XXXIII No.: 6, 29th April 2004, pp 20 to 24.

166. "India Fast becoming research and development hub: Bhojwani", The Hitvada, City Line, Page 8.

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168. "Targeting India's own indigenously built Luxury car by 2007", Er. Ashish Urkude, in IEI news, October 2003.



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169. "Automobile Finance from Engineering point of view", Er. Ashish Urkude, in the Bulletin, pp 4, A Monthly Magazine, of Institution of Engineers (India) Maharashtra State Centre, Mumbai.

170. Indigenisation of Indian Air Force Needs'– 2000-Souvenir-Swadeshi Udan, Seminar-cum-Exhibition 2002.

171. Quarterly Indian Journal of Pharmaceutical Education, Apr-Jun, 2002, Vol-36, No.2.

172. Monthly Review- Aseemaa Journal for National Resurgence, June 2002.

173. 2002 Planner, Monthly Magazine - Autocar India, December 2001, Vol.3, No.4.

174. Website of Autocar India: www.autocarindia.com

175. Hyundai Motor India News letter, Jan-Feb 2002, Vol. 4, and Issue 1.

176. Monthly Magazine, Overdrive, Vol. 4, No.6, Feb.2002,

177. Monthly Magazine, Overdrive, Vol.4, No.1, Sept. 2001,

178. Monthly Magazine, Overdrive, Vol.3, No.4, Dec. 2000,

179. Seminar on "Advancement in Automobile Technology", 1st February 2004, IE (I) News Bulletin, April 2004, pp 2.

Special Note: As and wherever required the references are put immediately at the spot may it be table, simple sentences, the diagram, or the quote or the examples.



A2: Appendix 2:

Research Papers Published/ Presented by the Researcher till 2004

PUBLISHED RESEARCH PAPERS:

These technical research papers are been published or read at National Level/ All India Level in the Engineering and Management field.

1. A research paper with an Advocate: On Topic 'Amendments required in *Motor Vehicle Act-1988*', along with Advocate S.R. Deshpande, of Nagpur Bench of Mumbai High Court as a co-author, in India's premier Law Journal, published by 'All India Reporter', Nagpur.

2. A research paper on Chemical Engineering: On Topic 'Adding biodegradable anti-detonation and fuel efficiency agent in the present fuels: Unleaded petrol and in the diesel'. In the Bio-diesel section of the-AU-Fuel All India Seminar on the Alternative Fuels, conducted by the Institution of Engineers (India), Nagpur Local Centre, held between 22nd and 23rd August 2002.

3. A research paper with Medical Practitioner- A Child Surgeon: On Topic, *'Telehaptic Telematic Remote Controlled Robotic Technology Trauma Surgery in a Car or in a Helicopter'*. In the Annual Technical Paper Meeting 2003, on 19th October 2003, in Institution of Engineers (India), Nagpur Local Centre.



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4. A research paper with Managing Director of Authorised Tata Dealer and Service Station: On Topic, *'Happy Motoring"*, *in the Sub-Theme-Maintenance*. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004,Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-author of the paper was Er. Prafulla Revatkar, MD, Khamala Automobiles, Nagpur, Authorised Service Station of Tata Motors.

5. A paper of Retired Civil Engineer and Automobile Engineer: On Topic, 'Expectations of Senior Citizens from the Indian Automobile Industry', in the Sub-Theme- Services and Safety Features. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-author of the paper was Er. Y.V. Joshi, and Er. R.U. Khade.

6. **A paper of An Architect and Automobile Engineer:** On Topic, "Automobile Engineering and Architectural consideration for the road construction and improvement in the existing road conditions", in the Sub-Theme Services and Safety Features. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-author of the paper was Architect Sudhir Bagade, and Er. R.U. Khade.

7. The most appreciated research paper by the Nagpur News Papers:

Rs. 100,000/= Car: On Topic, "A Practical Approach to manufacturing an indigenous car worth Rs. 100,000/= (Rs. One Lakh Car)" in the Sub-Theme-



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Indigenisation of Technologies. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude.

8. A research paper with General Manager of the biggest and the best Tata Motors dealer cum authorised service station in Central India- The Jaika Motors, Nagpur: On Topic, "*R* & *D* and Advancement in the Tata-Indica Technologies" in the Sub-Theme- Indigenisation of Technologies. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004,Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, co-Author of the paper was Er. V.A. Sahasrabudhdhe, GM, Jaika Motors, Nagpur, Authorised Dealer and Service Station of Tata Motors.

9. RTO Rules and Laws for Technologies a paper with Advocate: Research Paper On Topic, "An immediate wake up calls for the laws for technologies in India and for the Indian Judiciary System," in the Sub-Theme-Managing R & D, Quality, Productivity, Fuel Technologies, and Resources including investments. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, co-Author of the paper was Advocate Satish R. Deshpande, Nagpur Bench of Mumbai High Court.

10. A Research Paper with Engineering and MBA students to developing
Indian Automobile R & D: On Topic, "Status, Problem, and Promises of R &
D in Indian Automotive Industry," in the Sub-Theme- Managing R & D,



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Quality, Productivity, Fuel Technologies, and Resources including investments. In the National Seminar on "Advancement in Automobile Technologies", on 1st February 2004, Sunday, in Institution of Engineers (India), Nagpur Local Centre. Author Er. Ashish Urkude, Co-Authors of the paper were Er. Ms. Chanda Sinhababu (MBA Student- CP and Berar), and Mr. Gaurao Deoras (III BE Student).

11. New Invention: Future Technologies: Developed Totally New **Concept:** On the Topic, "Concept Automobile: Quark Based and Panch Tatva inter-convertible Automobile Technologies", a totally new thought in the Science and Technology and Engineering field has been put forth and accepted by the Institution of Engineers (India), Nagpur Local Centre, Nagpur. The Quarks are farther range of sub atomic particles of the size less than 10⁻¹⁵ mm. The work is send to the NASA (USA) for the further review on 4th February 2004, Wednesday and on 5th February 2004, Thursday.

Research Papers Under Publication:

1. On Topic: "Management of Indigenously built small car market in India with special reference to customer behaviour". Indian Institute of Industrial Engineering (IIIE), Journal, Mumbai. It is in process of publication.

2. On Topic: " Laws for Technologies in India", All India Reporter Journal, Nagpur. It is in process of publication.

3.On Topic: "Indigenisation of car technologies in India", Think-Line, Nasik, It is in process of publication.

4.On Topic: "Inspiration of Human Body in developing Car Technologies".



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E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Indian Medical Journal, it is under modifications.

5.On Topic, "Two 911/ Help line helicopter one with paramedics team other with robotic technologies and all instruments supported by portable equipments can save lives of trauma patients by operating on the spot of accident" in Indian Medical Journal. It is under modifications.

6. "Chemical used in the every day life", not received a reply yet.

7. "Remote controlled toy car with stepper motor and multiple motions", it is a practical project and a research paper and both under modifications.





A3: Appendix 3:

Successful Communications for this

project

Few Successful Highlight of the D. Litt. Research Project:

Most prominent among the all communications is that two Indian Business houses of India are bringing their own indigenously manufactured Car Engines in Indian market due to the communications by the researcher through Honourable Mr. Rajeev Dixit of Azadi Bachao Andolan, Wardha, who stays near Gandhi Ashram, 60 Kilometres away from Nagpur.

A. With Indigenisation Cell of IAF:

Indian Air Force (IAF), Indigenisation Substitution Cell, during the Air Show in Nagpur in 2003, for the technologies, R & D, kinds of efforts, and direction of working:

I. Interviewed:

- 1. Mr. Revind Kumar, Engineer, ISC, 8, BRD, AF, Chennai, Pincode-600055.
- T.W.O. G.P. Shukla, Indigenisation Substitution Cell, 9, Base Repair Depot, Nagar Road, Pune, Pincode-411014.

Mr. Narasimhan, Engineering Head, Pune.

Mr. Pande, (The PCB which experience more frequency of failure are indigenised.)





II. Letter Communication with IAF:

Mrs. Ulka Modak, Senior Head (Designing), HAL, Ozar, Nasik, Maharashtra, (MIG 21, MIG 27, Sukhoi 30. (Asked for a visit)

National Metallurgical Laboratory (NML), Jamshetpur.

NAL, Banglore,

DMRL, Kanpur and Hyderabad.

B. Stalwart in the Indian Car World: To know their opinion on indigenisation:

1. Interviewed: Mr. Rahul Bajaj, MD, Bajaj Auto Ltd. Pune.

2. Got Permission Letter: Mr. Ratan Tata, Tata Motors of Pune.

3. Was Called on the Telephone: Mr. A.G. Gandhi, President, Hyundai Motors India Ltd.

C. Communication with Highly influential luminaries involved in the Patriotic organisations/ running the indigenous businesses or activities

of/in India:

Mr. Rajeevji Dixit, Head, Azadi Bachao Andolan, Wardha.

Mr. M. G. Vaidya, Rashtriya Swayamsevak Sangha, Nagpur.

Mr. Gurumurthy, Swadeshi Jagaran Manch, Nagpur.

Mr. Desai, Gandhi Ashram, Sevagram, Wardha.

Mr. Gurumurthy, of Swadeshi Jagaran Manch, during his Nagpur visit.

Mr. C. K. Prahlad, Highly influential Economists,

Mr. Bibek Debroy, Highly influential Economists in India of Jawaharlal Nehru University.

Dr. J.P. Modak, Dean (R & D), PCEA, Nagpur.





Mr. Gorey, former MD, Maharashtra Centre for Entrepreneurship Development (MCED), Nagpur.

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Mr. Vishram Jamdar, M.D. of Garud Industries and Board of Directors of V.N.I.T. (VRCE) Nagpur and president of Indian SSI (Laghu Udyog Bharati) Dr. R. K. Paretkar, Professor and HOD, Metallurgical and Materials Department, VNIT, Nagpur.

Dr. N. V. Deshpande, Professor and HOD, Mechanical Engineering Department, VNIT, Nagpur.

Dr. A.G. Bhole, Chairman, The Institution of Engineers (India), Nagpur Local Centre, Nagpur.

Mr. S. Doifode, Honourable Secretary, The Institution of Engineers (India), Nagpur Local Centre, Nagpur.

Mr. Sunil Raisoni, Chairman, Raisoni Group, Nagpur.

Dr. G. K. Ghoshal, HOD, Petroleum Refining and Petrochemical Technologies, LIT, Nagpur.

Ganesh Dalavi, Senior Lecturer, Government Polytechnic, Nagpur.

Prof. Shantanu Kulkarni, PCEA, Nagpur.

Mr. D.C. Upadhyay, Regional Manager, Ashok Leyland, Poonam Chambers, Nagpur.

Mr. V. A. Sahasrabuddhe, G.M. (Customer Support), Jaika Motors, Authorised Tata Motors Dealer and Servicing Station, Nagpur.

Mr. S. Kunte, Marketing Manager, Jaika Motors, Authorised Tata Motors Dealer and Servicing Station, Nagpur.



E-BOOK- ISBN: 978-93-5235-445-0. COPYRIGHT TO AUTHOR- DR. ASHISH MANOHAR URKUDE Prof. K. Dixit, Sr. Lecturer, Automobile Engineering Department, G.P. Nagpur.

Dr. B. G. Zamad, ENT Surgeon, Dhantoli, Nagpur.

Dr. D. Banerjee, MBBS, MS, MCh. Child Surgeon, Nagpur.

Mr. Revatkar, CEO, Khamala Automobiles, Nagpur.

Mr. A.S. Madbhavikar, Director, Small Industries Services Institute, (SISI), CGO Complex, Nagpur.

Dr. H.V. Gokhale, Director, G.S. College of Commerce and Economics, Nagpur.

Mrs. Chhaya Satpute, Senior Document Officer and Project Co-ordinator, Patent Information System, Nagpur.

Mr. G. N. Pande, Director, Himalaya Publication, Nagpur.

Mr. Ketan Pande, Director, Himalaya Publication, Nagpur.

Mr. Bhagirath Kaushik, Regional Manager, S. Chand and Company, Nagpur.

Dr. Raju Deshmukh, Director of Suretech and Apollo Hospitals, Nagpur.

Mr. Kiran Dinkar Atre, Project Manager, IBM Global Services India Pvt Ltd.

Adv. Satish R. Deshpande, Nagpur Bench of Mumbai High Court.

Adv. Akshay Naik, Advocate Manohar, High Court, Nagpur.

Adv. Sachin S. Deshpande, Nagpur.

Adv. Phadanavis, Congress Nagar, Nagpur.

Adv. S.C. Sen, Senior Advocate, Nagpur Bench of Mumbai High Court.

Adv. Samudra, Nagpur, Nagpur Bench of Mumbai High Court.

Mr. Amit Mujumdar, Central Techno Publication, Nagpur.

Mr. Manoj Kumbhare and Leeladhar Kirpani, Khamala, Nagpur.



Dr. Amita S. Bhusari and Sachin Bhusari, Mumbai.

Mr. Naresh Khapekar, Regional Manager-Marketing, Himalaya Publication.

Prof. Gadgil, C.P. and Berrar College of Management, Ravinagar, Nagpur.

Mr. S. Joshi, Automotive, Authorised Dealers and Service and Spareparts Division for Maruti and Ashok Leyland Vehicles.

D. Communication with the Foreign MNC on Email:

- i. Ford Motors-USA,
- ii. Aston Martin-USA,
- iii. Volvo-Sweden,
- iv. Volkswagen-Germany,
- v. General Motors- USA.



A4: Appendix 4:

Experts who devoted their valuable

time:

SN	Name of the	Field of	Designation	Experience in
	Expert/ Day	Expertise	and	Years
	interviewed		Organisation	
	or contacted			
1	Mr. Rahul	Automobile	Chairman,	40 years in
	Bajaj/ October	Engineering	Bajaj Auto,	Automobile
	2002.		Pune	Engineering
2	Mr. Ratan	Automobile	Chairman,	50 years in
	Tata/ October	Engineering	Tata Motors,	Automobile
	2001		Pune	Engineering
3	Mr. V. A.	Automobile	General	35 years in
	Sahasrabuddh	Engineering	Manager,	Automobile
	e/ October		Jaika Motors,	Engineering
	2003		Nagpur	
4	Mr. S. V. Deo/	Automobile	Proprietor	51 years in
	May 2000.	Engineering	Provincial	Automobile
			Automobiles,	Engineering
			Nagpur	





5	Mr. S. Gadgil	Automobile	Retired GM,	37 years in
	/ August 2003	Engineering	JOY Motors,	Automobile
			USA.	Engineering
6	Mr. S. Shetty	Automobile	Worked with	37 years in
	/ February	Engineering	PAL Thane.	Automobile
	2004			Engineering
7	Mr. S.	Automobile	Retired GM,	36 years in
	Agrawal/	Engineering	Hindustan	Automobile
	October 2002		Motors	Engineering
8	Dr. A. R.	Automobile	Principal, Saint	32 year in
	Bapat/	Engineering	Vincent College	Automobile
	October 2000.		of Engineering	Engineering
9	Mr. D. C.	Automobile	Regional	29 years in
	Upadhyay /	Engineering	Manger, Ashok	Automobile
	December		Leyland,	Engineering
	2003		Nagpur Office.	
10	Mr. R. L.	Automobile	Professor	15 years in
	Shrivastava/	Engineering	(Mech)	Automobile
	December		Y. C. C. E	Engineering
	2003			
11	Mr. S. L.	Automobile	Professor	15 years in
	Bankar/	Engineering	(Mech)	Automobile
	February 2004		Y. C. C. E	





12	Dr. S.	S.	Automobile	Professor	25	years	in
	Khandare/		Engineering	(Mech)	Autor	nobile	
		0.4					
	January 20	04		Y. C. C. E	Engin	leering	
13	Dr. N.	V.	Automobile	Professor-	15	years	in
	Deshpande	/	Engineering	HOD- Mech-	Autor	nobiles	
	December			VNIT.			
	2003						
14	Dr. G.	K.	Petroleum	Retired HOD -	40	years	in
	Ghoshal	/	Expert	LIT Nagpur.	Petro	chemical	
	December				Techr	nologies	
	2003						
15	Dr. D.	В.	Medical	Paediatric	10	years	in
	Banerjee	/	Practitioner	Surgeon	Paedi	atric	
	December				Surge	ery	
	2003						
16	Mr. V. Jam	dar	Automobile	Head of SSI of	30	years	in
	/ Janu	ary	Engineering	India	Autor	nobiles	
	2004				Engin	leering	
17	Prof. S.	R.	Mechanical	Professor	13	years	in
	Kulkarni	/	Engineering	Mech. PCEA,	Mech	anical	
	December			Nagpur.	Engin	leering	
	2003						
18	Dr. R	aju	Medical	President,	35	years	in



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	Deshmukh /	Practitioner	Apollo	Medical Field
	December		Suretech	
	2003		Hospital,	
			Nagpur	
19	Mr. G. Dalvi /	Automobile	Government	25 years in
	December	Engineering	polytechnic,	Automobile
	2003		Nagpur	Engineering
20	Adv. S. R.	Lawyer	High Court,	25 years in Law
	Deshpande /		Nagpur	field
	December			
	2003			
21	Mr. K. Dixit /	Automobile	Government	15 years in
	December	Engineering	polytechnic,	Automobile
	2003		Nagpur	Engineering
22	Mrs. C.	Project Co-	Patent	16 years in
	Satpute /	ordinator	Information	Patents.
	December		System,	
	2003		Nagpur.	
23	Dr. J. P.	Automobile	Dean R & D,	40 years in
	Modak /	Engineering	PCEA, Nagpur	Automobile
	January 2004			Engineering
24	Prof. M. A.	Co-	Prof. In	10 years in
	Burghate/	Coordinator	PDIMTR,	Management



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	December		Nagpur	Education
	2003			
25	Mr. B.	Books	Regional	20 years in all
	Kaushik/	nublication	Manager	kinds of book
		publication		
	December		S.Chand & Co.	publications
	2003			
26	S. S. Kumar /	Banking	Branch	15 years in
	December		Manger, SBT,	Banking and
	2003		Congress	Loans.
			Nagar.	
27	Dr. A. G.	Civil	Chairman, The	37 years in
	Bhole/	Engineering	Institution of	Chemical and
	December		Engineers	Civil
	2003		(India), Nagpur	Engineering.
			Local Centre.	
28	Mr. M. G.	Civil	Retired Dy. G.	37 years in
	Urkude/	Engineering	M. IRCON	Railways and
	December		International	Road Bridges
	2003			
29	Adv. Akshay	Lawyer	Nagpur Bench	8 years Lawyer
	Naik /		of Mumbai	
	December		High Court	
	2003			





30	Mr. A. S.	SSI	Director SISI,	25 years SSI
	Madabhavikar		Nagpur	Projects
	/ December			implementations
	2003			
31	Dr. H. V.	Commerce	Director, G.S.	25 years
	Gokhale /	and	College of	Commerce and
	December	Management	Commerce and	Economics
	2003	Education	Economics.	
32	Mr. Kiran Atre	Computer	Project	15 years in
	/ December	Software and	Manager, IBM,	Computer field
	2003	Hardware	Banglore	
33	Dr. B. G.	Medical	ENT Surgeon	30 years in
	Zamad/	Practitioner		Medical Field
	December			
	2003			
34	Dr. A. S.	Medical and	Consultant	15 years in
	Bhusari /	Yoga	and Yoga	Medical and Yoga
	December	Practitioner	Therapist	field
	2003			
35	Mr. G. N.	Book	Himalaya	40 years in Book
	Pande /	Publication	Publication	Publication
	December			
	2003			





36	Dr. R. K.	Metallurgical	Professor and	25 years in
	Paretkar /	Engineering	Head, Met	Metallurgical
	December		Engg Dept	Engineering
	2003		VNIT, Nagpur	
37	Dr. K. Singh /	Physics and	Professor &	29 years in
	December	Dynamics	HOD, Dept of	Physics and
	2003		Physic Nagpur	Dynamics
			University	
38	Mr. S. Raisoni	Industrialist	Chairman	25 years as a
	/ December	and	Raisoni Group	Industrialist and
	2003	Educationist		15 years as a
				Educationist
39	Mr. H. Munot	Automobile	General	25 years as a
	/ December	Engineering	Manager	Authorised
	2003		Ajantha	Dealer of Kinetic
			Motors,	Engineering
			Nagpur	
40	Mr. A. Morey /	Automobile	Retired M. D.	30 years in the
	December	Engineering	Mahindra and	field of
	1996		Mahindra	Automobile
				Engineering
41	Prof. S. M.	Financial	Professor	28 years in F.M.
	Singru /	Management	NIFM, Minstry	





	December		of Finance	
	2003		Govt of India.	
42	Mr. A. Sharma	Finance	Manager, IDBI,	8 years in
	/ January		Nagpur	Finance
	2004			
43	Mr. V.	Mechanical	Manager Plant	20 years in
	Karandikar /	Engineering	Machinery,	Machinery
	January 2004		KEC	Maintenances
			International,	
			Nagpur.	
44	Mr. S.	Automobile	Sales Manager,	8 years in
	Tiwarkhede /	Engineering	Ketan	Automobile
	January 2004		Hyundai,	Engineering
			Nagpur	
45	Mr. A. M.	Finance and	Union Bank of	25 years in
	Kalbandhe /	HRD	India, Nagpur	Finance and
	January 2004			HRD
46	Mr. V. Akolkar	Automobile	Works	12 years in
	/	Engineering	Manager, Seva	Automobile
	January 2004		Automotive,	Engineering
			Nagpur	
47	Mr. M.	Mechanical	Manager –	20 years in
	Sardeshpande	Engineering	Quality	Mechanical




	/	and Quality	Control, KEC	Engineering and
	January 2004	Control	International,	Quality Control
			Nagpur	
48	Mr. I. Ahemad	Automobile	Guinness Book	30 years in
	/	Engineering	Record holder	Automobile
	January 2004		for smallest	Engineering
			engine	
			manufacturing	
49	Dr. Z. J. Khan	Engineering	Dean Faculty	25 years in
	/		of Engg. &	Electronics and
	January 2004		Tech. Nagpur	Power
			University	Engineering
50	Mr. R. Joshi /	Automobile	Branch	18 years in
	January 2004	Engineering	Manager,	Automobile
			Automotive	Engineering
			MPL, Nagpur.	
51	Mr. B. R.	Management	Retired	40 years in
	Singru /	and	Director,	insurance and
	January 2004	Insurance	NYSS-IMR,	Management
			Nagpur.	
52	Dr.	Economics	Professor,	25 years in
	Deshpande /	and	Dept.	Economics and
	January 2004	Management	Economics,	Management



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			Nagpur	
			University	
53	Dr. S. S.	Chemistry	Retired	Chemistry
	Dara/		Director,	
	January 2004		PCEA, Nagpur	
54	Mr. R. Udhoji	Automobile	Proprietor,	Hindustan
	/	Engineering	Pramod Auto	Petroleum- Petrol
	January 2004		Station	Pump
55	Mr. Arneja /	Spare Parts	Proprietor,	30 years.
	January 2004	Dealer of	Bombay Auto,	
		Automobiles	Nagpur	
56	Mr. A. R.	Automobile	Project	12 years in
	Askhedkar /	Engineering	Engineer,	Automobile
	January 2002		ARAI, Pune	Engineering
57	Mr. R. R.	Automobile	Project	12 years in
	Askhedkar /	Engineering	Engineer,	Automobile
	January 2002		ARAI, Pune	Engineering
58	Dr. S. L.	Mechanical	Professor,	30 years in Auto,
	Bapat /	Engineering	Refrigeration	Mech,
	January 2004	and Space	Engg. IIT –	Refrigeration,
		Technology	Powai, Mumbai	and Space
				Technologies
59	Mr. A. Maske	Automobile	Manager,	15 years in



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	/	Engineering	Daewoo Motors	Automobile
	December		India Limited	Fngineering
	Determber		india Linned.	Engineering
	2002			
60	Mr. S. Bagade	Architecture	Architect	18 years in
	/	and Civil		infrastructure
	December	Engineering		development
	2003			
61	Prof. V. Kale /	Automobile	HOD –	18 years in
	December	Engineering	Automobile	Automobile
	2001		Engineering	Engineering
			Raisoni Engg.	
62	Mr. S.	Automobile	Regional	21 years in
	Madheswaran	Engineering	Manager (Sales	Automobile
	/ October		and Services)	Engineering
	2002		Sundaram-	
			Clayton,	
			Chennai.	
63	Mr. A. Sant /	Computer	CEO, Amar	10 years in
	March 2004	Engineering	Computers,	software
			Pune	development for
				the automobile
				field
64	Mr. M. M.	Automobile	Engineer-	10 years in





	Moghe /	Engineering	Vendor	Automobile
	March 2004		Development	Engineering
			Mahindra	
			Ugine	
65	Mr. Kedar	Automobile	K. Engg.	12 years in
	Sant/ March	Engineering	College, Pune	Automobile/
	2004			Mechanical
				Engineering
66	Mr.	Automobile	Retired	32 years in
	Khandekar /	Engineering	Manager Telco,	Automobile
	March 2004		Pune	Engineering
67	Mr. R. Zore /	Automobile	Manager	8 years
	December	Engineering	Stores,	Automobile
	2000		Ketan Hyundai	Engineering
68	Mr. Y. G.	Banking and	A. G. M. SBI,	30 years in
	Karandikar /	Finance	Regional Office,	Banking and
	December		Nagpur	Finance
	2003			
69	Mr. R. U.	Automobile/	Engineer,	25 years in
	Khade/	Mechanical	Ordinance	Automobile/
	December	Engineering	Factory,	Mechanical
	2003		Nagpur	Engineering
70	Mr. Singh /	Automobile/	Works	25 years in





December	Mechanical	Manager,	Automobile/
2000	Engineering	Sharda Rolling	Mechanical
		Mills, Nagpur	Engineering
Mr. A. Joshi /	Automobile/	Works	12 years
December	Mechanical	Manager, V.	Automobile/
2000	Engineering	Engineering,	Mechanical
		MIDC, Nagpur	Engineering
Mr. A.	Automobile/	Expert	20 years in
Shastri/	Mechanical	Technician	Automobile/
December	Engineering	Mahindra and	Mechanical
2000		Mahindra,	Engineering
		Nagpur	
Mr. Gautam /	Automobile/	Engineer R &	12 years in
March 2004	Mechanical	D Hero Honda	Automobile/
	Engineering		Mechanical
			Engineering
Mr. N. V.	Computer	Hardware	18 years in
Dhole/	Engineering	Expert	Computer
December			Hardware
2002			
Mr. Sorkar /	Metallurgical	Casting and	25 years in
December	Engineering	Forging Expert	Casting and
2003			Forging
	December 2000 Mr. A. Joshi / December 2000 Mr. A. Shastri/ December 2000 Mr. Gautam / March 2004 Mr. N. V. Dhole/ December 2002 Mr. Sorkar / December /	DecemberMechanical2000EngineeringMr. A. Joshi /Automobile/DecemberMechanical2000EngineeringMr.AShastri/MechanicalDecemberEngineering2000EngineeringMr. Gautam /Automobile/March 2004MechanicalMr.N.VComputerDhole/EngineeringDecemberEngineeringMr. N.ComputerDhole/EngineeringMr. Sorkar /MetallurgicalMr. Sorkar /EngineeringDoconEngineeringMr. Sorkar /MetallurgicalDocoEngineering	DecemberMechanicalManager,2000EngineeringSharda Rolling Mills, NagpurMr. A. Joshi /Automobile/WorksDecemberMechanicalManager, V.2000EngineeringEngineering, MIDC, NagpurMr.AAutomobile/ExpertShastri/MechanicalTechnicianDecemberEngineeringMahindra and Mahindra, Nagpur2000EngineeringMahindra, NagpurMr.Automobile/Engineer R & NagpurMr. Gautam /Automobile/Engineer R & NagpurMr. N. V.ComputerHardwareDhole/EngineeringExpertDocemberEngineeringMarch 2004Mr. Sorkar /MetallurgicalCasting and Forging ExpertMr. Sorkar /MetallurgicalForging Expert





76	Mr. K. Joshi /	Costing and	ICWA and CA	15 years as a
	December	Estimation		ICWA and 5
	2003	and		years as CA.
		Accountancy		
77	Mr. K.	Mechanical	President KEC	25 years in
	Ramkumar/	Engineering	International	Mechanical
	December			engineering
	2003			
78	Mr. B. Debroy	Economist	Prof. In Rajiv	25 years as a
	/ December		Gandhi	Economists
	2003		Institute	
79	Mr. C. K.	Economics	Economist and	30 years as a
	Pralhad /	and	Management	Economist and
	December	Management	Guru	Management
	2003			guru
80	Mr. Ajamera /	Tyres	Proprietor	15 years in Tyre
	December		Ajmera Tyres,	industry
	2003		Nagpur	
81	Mr. Shaw /	Industrialist	Chairman,	32 years in Auto
	December		NECO, Nagpur	and Mech
	2003			industry
82	Mr. Patil /	Autombile	MD, Swastik	Ancilliary to
	October 2000	Engineering	Engineering,	Mahindra and



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			Goregaon,	Mahindra
			Mumbai	
83	Mr. H. Joshi/	Computer	HOD and	12 years in the
	December	Engineering	System	field of System
	2003		Administrator,	Administration of
			Jaika Motors,	Automobile
			Nagpur	Dealership and
				Servicing firm.
84	Dr. H. R.	Engineering	Retired Advisor	40 years in Auto,
	Takhalate /		to Government	Mech, Electrical
	December		of India, and	and Chemical
	2000.		Director of	Engineering
			YCCE, Nagpur	
85	Mr. S. Chati /	Automobile	Mahagas	10 years in
	December	Engineering		Automobile and
	1998			Mechanical
				Engineering
86	Mr. A.	Automobile	Head,	8 years in
	Yerpude/ May	Engineering	Dhomane	inflammable
	2004		Petroleum	material store
			Stores	keeping
87	Mr. H. O.	Engineering	Vice Principal,	15 years in Civil
	Thakare/		YCCE and	Engineering





	December		council	
	2003		Member	
			Institution of	
			Engineers	
			(India)	
88	Mr. P. Rathi /	Agricultural	CEO, Krishi	20 years in
	May 2004	Equipments	Centre, Nagpur	Agricultural
		and		Equipments and
		machines,		Instruments and
		and		machines
		Instruments		
89	Mr. V. Pandit	Mechanical	Proprietor VM	15 years as a SSI
	/	Engineering	Engineering	in Mechanical
	December		and Fabricator	Engineering
	2002			
90	Mr. V.	Automobile	CEO of	20 years in
	Samudra/	Engineering	Samudra	Automobile
	May 2004		Garage and	Engineering field
			Service Station	
91	Mr. Ninad/	Automobile	CEO, Car	25 years in
	December	Engineering	Shoppe,	Automobile
	2000		Nagpur	Accessories
				Dealership.





92	Dr. V. S.	Chemical	Professor and	25 years in
	Sapkal /	Engineering	HOD Dept of	Chemical
	December		Chemical	Technology
	2003		Technology,	
			Amaravati	
			University	
93	Mr. M. Paliwal	Environment	CEO,	25 years in
	/ December	al	Environmental	Chemical
	2000	Engineering	Engineering,	Engineering and
			Nagpur	Environmental
				Engineering
94	Mr. S. K.	Mineral	Manager	25 years in
	Gupta,	Exploration	(Geology)	Mineral
	December	and Geology		Explorations
	2002			
95	Mr. R.	Consultancy	CEO, Small	25 years in SSI
	Bhimjiani/	in SSI	Organisations	development
	December		Support	
	2002			
96	Adv. S.	Motor	Advocate	18 years in
	Ghatole	Accident		motor accident
		Claims		claim settlement
		Consultant		





97	Mr. A. Katole	Pollution	Officer,	15 years in
	/ December	control	Maharashtra	pollution control
	2002		Pollution	
			Control Board,	
			Nagpur.	
98	Mr. C.	Surveyor and	Independent	8 years in
	Naniwadekar	Loss Assessor	Surveyor	surveyor and
	/ April 2004			loss assessor
99	Mr. M. P.	Maintenance	Service	
	Dhopavkar /	of	Engineer,	
	December	Machineries	Merck India	
	2001		Ltd. Mumbai.	
100	Mr. R. W.	Insurance	Divisional	29 years in
	Kaskhedikar /		Manager	insurance field
	December			
	2002			
101	Mr. P. B.	Mechanical	CEO, Shivalkar	30 years in
	Shivalkar	and	Engineers and	Mechanical and
		Metallurgical	Consultants,	Metallurgical
		Engineering	MIDC, Nagpur	Engineering
102	Mr. P. Gautam	Automobile	CEO, Sairam	13 years in
	/ December	Engineering	Enterprises,	Automobile
	2003		Govt. Supplier	Engineering





			for Auto	
			Spares	
103	Mr. J.	Mechanical	Proprietor of	13 years in
	Maheshwari /	Engineering	Up-Tech	Workshop
	May 2004		Engineering	Equipment and
			Agencies	Machineries
				Mechanical
				Engineering
104	Dr. Y. C.	Petrochemical	HOD,	Petrochemical
	Bhatta-	Technology	Petrochemical	Technology
	charyulu,		Technology,	
	December		LIT, Nagpur	
	2003			
105	Dr. S. Gole,	Industrial	HOD,	25 years in
	December	Engineering	Industrial	Industrial and
	2003		Engineering,	Mechanical
			RKNCE.	Engineering
106	Mr. J.	Car Coating	CEO, Gunesh	8 years in
	Bhalerao,		Enterprises	Automobile
	October 2003			Engineering
107	Mr. S. P.	Special	Consultant	18 years in
	Dilip/	Purpose		Automobile
	December	Heavy		Engineering





	2003	Vehicles		
108	Mr. D.	Quality	Manager	13 years in
	Kulshrestha ,	Assurance	Quality	Automobile
	October 2002		Assurance,	Engineering
			Benara	
			Bearing and	
			Bushes	
109	Mr. M. K. Naik	Travel	Govind Travels	8 years in Travel
	/ December	Services		Agency
	2003			
110	Mr. L. P.	Automobile	CEO, Car –Sun	Automobile
	Kirpane /	Engineering	Motors	Engineering
	December			Workshop and
	2003			Service Station
111	Mr. Revatkar,	Automobile	MD, Khamala	15 years in
	December	Engineering	Automobiles,	Automobile
	2003		Nagpur	Service Station
112	Mr. P. Kotwal	Travels and	CEO, Orient	20 years in
	/ October	Tourism	Travels and	Travels and
	2003		Tours, Nagpur	tours.
113	Mr. S. Hajare	Chartered	CEO, ProEdge	25 years in
	/ October	Accountant	Career	Chartered
	2003		Academy	Accountancy



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Mr. R. Joshi /	Mechanical	CEO, Raj	18 years in
October 2003	Tools and	Enterprices,	Mechanical Tools
	Equipments	Authorised	and Equipments
		Dealers in	
		Taparia Tools.	
Mr. S.	Entrepreneur	Program	15 years in
Giripunje,	ship	Coordinator,	entrepreneurship
May 2003	development	MCED, Nagpur	development
Mr. M.	Engineering	President,	28 years in
Agrawal,		Vidarbha	varied industries
February 2003		Industries	
		Association	
Mr. N. S.	Automobile	Board of	18 years in
Chakraborty,	Engineering	Directors,	Automobile
July 1998		Aditya Motors	Engineering
Mr. M. Naik,	Automobile	Retired	25 years
May 1998	Engineering	Manager,	experience in
		Mercedes-	Automobile
		Benz, Munich,	Engineering
		Germany	
		20	
Mr. V.	Automobile	Manager,	15 years in
Mr. V. Balkrishnan	Automobile Engineering	Manager, Caterpillar,	15 years in Heavy Motors
	Mr. R. Joshi / October 2003 Mr. S. Giripunje, S. May 2003 Mr. M. Agrawal, February 2003 Mr. N. S. Chakraborty, July 1998 Mr. M. Naik, May 1998	Mr. R. Joshi / Mechanical October 2003 Tools and Equipments Equipments Mr. S. Entrepreneur Giripunje, S Ship May 2003 G development Mr. M. M. Engineering Agrawal, Engineering Mr. N. S. Automobile Chakraborty, Engineering July 1998 Engineering	Mr. R. Joshi /MechanicalCEO,RajOctober 2003Tools andEnterprices,EquipmentsAuthorisedEquipmentsDealers inTaparia Tools.Taparia Tools.Mr.S.EntrepreneurGiripunje,shipCoordinator,May 2003developmentMCED, NagpurMr.M.EngineeringAgrawal,IndustriesFebruary 2003IndustriesMr.N.S.AutomobileBoard ofChakraborty,EngineeringJuly 1998EngineeringMay 1998EngineeringMay 1998EngineeringMay 1998EngineeringManager,Mercedes-May 1998EngineeringMarcedes-Benz, Munich,GermanyIndustries





115	Mr. T.	Mining	GM,	40 years in
	Karrahe, May	Engineering	Malanjakhand	Mining
	2004		Copper Project	Engineering and
				vehicles related
				to it.
116	Mr.	Automobile	Service cum	25 years in the
	Gopalkrishna	Engineering	Spareparts	field of car
	n, March 2004		Manager,	servicing and
			Wassan Ford,	dealership and
			Mumbai	spare parts.
117	Mr. B.	Automobile	Spareparts	18 years in the
	Richards,	Engineering	Manager,	Spareparts of
	March 2004		Authorised	Mercedes, Ford
			Dealer,	and General
			Mercedes,	Motors Service
			Mumbai	Station.
118	Mr. S. K.	SSI	CEO, Guru	20 years as SSI
	Khanna,	Automobile	Auto	in Automobile
	October 2003	Engineering	Manufacturing	parts
			Ltd. Faridabad.	manufacturing
119	Mr. S. Murthy,	Servicing of	CEO of Murthy	Servicing of lifts
	May 2004	Lifts in the	Enterprises,	in various plants.
		plants	Chennai.	





120	Professor Anil	Computer	VNIT, Nagpur	15 years in
	Mokhade,	Technology		Computer
	October 2002			Technology
121	Mr. V. T. Sam,	Information	Manager,	15 years in
	October 2003	Technology	Information	Information and
		and MIS	Technology,	Telecommunicati
			Indo Rama,	ons Technology
			Nagpur	
122	Mr. Mandar	Law Books	Asst. Manager	15 years in AIR
	Chitaley,	Publication	All India	publications
	August 2002		Reporter Pvt.	
			Ltd. Nagpur	
123	Mr. V. Valunj,	Conventional	CEO, Vikas	30 years in
	July 2002	Machine	Engineers,	machine tools
		Tools	Bhosari, Pune	manufacturing
		Manufacturin		
		g		
124	Mr. S. V.	Forged, CNC	CEO, Laxmi	18 years in
	Valunj, July	turned,	Udyog, MIDC,	Automobile and
	2002	milled	Bhosari	Machinery
		components		Components
		& Assemblies		manufacturing
125	Mr. S. Mutha,	Electronics	IES and	20 years in



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	July 2002	Expert	Director	Electrical and
			Engineering	electronics
			Study Cirolo	Fnginooring
			Study Circle	Eligineering
126	Dr. Anil	Management	Director,	Management
	Keskar,	Education	Allana I. M. S.,	Education
	October 2000		Pune.	
127	Prof. A. B.	Engineering	Principal, G. H.	25 years
	Deshmukh,	Consultant	Raisoni	Engineering
	July 2002	and	Polytechnic,	Consultant and
		Educationist	Nagpur	Educationist
128	Mr. R. Kumar,	Automobile	Manager,	8 years in
	May 2000	Finance	Platinum	automobile
			Finance,	finance
			Bandra,	
			Mumbai	
129	Mr. P. Kumar,	Auto Finance	CEO, Max	5 years in Auto
	May 2003		Motors,	Finance
			Nagpur	
130	Mr. A.	Engineering	Freelance	8 years in
	Khanzode,	Consultant	Engineering	Mechanical
	May 2003		Consultant	Engineering
131	Mr. P. B.	SSI Finance	Officer, Bank	18 years in
	Hinganikar,		of India,	Banking and



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	October 2003		Somalwada,	Finance.
			Nagpur	
132	Mr. S.S.	Service,	CEO of	15 years in
	Wahn,	Sales,	Saradar	Service, Sales,
	October 2003	Repairing,	Scooters.	Repairing,
		Spareparts,		Spareparts, Two
		Two		Wheelers.
		Wheelers.		
133	Mr. G. Goyal,	Iron and Steel	CEO, Laxmi	Iron and Metal
	October 2003	Industry	Iron and Steel,	Products.
			Nagpur	
134	Mr. A.	Information	Consultant	23 years in
	Wathore,	Technology	with Vasantrao	Agricultural
	October 2003	and	Naik	Machinery and
		Computer	S.A.E.M.T.I.,	Management. 8
		Aided	Nagpur	years in
		Manufacturin		Computer Aided
		g in		Manufacturing
		Agriculture		
135	Mr. A. Gorey /	Special CNC	CEO AG	8 years in
	October 2002	Machineries	Technologies,	supplying and
		for	Mumbai.	maintaining
		Manufacturin		special CNC





		g		Machineries
136	Mr. S. Gore,	Entrepreneuri	Director, Gore	25 years in
	December	al	Entrepreneuria	Entrepreneurial
	2002	Development	1 &	and Management
			Management	Services for SSI,
			Services	MSI and LSI.
137	Mr. M. D. Tare	Entrepreneuri	Project Officer,	8 years in
	/ March 2004	al	Maharashtra	Entrepreneurshi
		Development	Centre for	p Development
			Entrepreneurs	
			hip	
			Development	
			(MCED)	
138	Mr. B. N.	Servicing and	Service	20 years
	Rathish / 18 th	Maintenances	Manager,	Servicing and
	and 19 th	of Ford	Cauvery Ford,	Maintenances of
	February 2004	Vehicle	Manglore	Cars.
139	Mr. B. Mehta/	Ford Vehicles	Area Manager,	18 years in the
	February 2004		Ford India	Car industry
			Limited,	
			Chennai	
140	Mr. S. Valunj/	Ford Vehicles	Manager Ford	12 years in Car
	February 2004		India Ltd.	industry





			Chennai	
141	Mr. R.	Ford Vehicles	Bhagat Ford,	18 years in Car
	Khurana /		Chandigrah	industry
	February 2004			
142	Mr. B.	Opel –	Chief	12 years in the
	Lanjewar /	General	Technician	car industry
	February 2004	Motors cars	Coventry	
			Motors Nagpur	
143	Mr. D. K	Ford Cars	Service	12 years in car
	Tiwari/		Manager, Prem	servicing and
	February 2004		Ford, Agra	maintenances
144	Dr. A. K	Mining	Retired	38 years in
	Gupta / May	Vehicles	Scientist and	Mining Industry
	2003		Professor VNIT	
			Nagpur.	
145	Dr. Madhukar	Finance and	Ex-Principal	25 years in
	Rode, during	Management	A.G. College.	Finance/
	PhD guidance			Accounts/
				Management
				field
146	Mr. A.	Hyundai	President	25 years in
	Gandhi/ 29 th	Vehicles	Hyundai	Automobile Field
	October 2000		Motors India	





			Limited	
147	Mr. Jeevaji/	Business	Director, Dept	Management
	February 2003	Management	of	Teaching
			Management,	
			Nagpur	
			University.	
148	Mr. A.	Motor Driving	Proprietor	10 years in
	Mandalekar	School	Mandalekar	Motor Driving
			Driving School	and RTO
				transactions
149	Mr. Murthy	Industrial	Regional	22 years in IDBI
		Development	Manager, IDBI,	
		Bank (IDBI)	Nagpur	
150	Mr. B. Bhaje	Financial	Manager	30 years in
		Management	(Finance),	Internal Finance
		in Automotive	Automotive	of Automobile
		Industry	P.L. Nagpur	Industry
151	Sou. P. M.	Effiecient	Retired	37 years
	Urkude	Home	Teacher,	Teaching
		Management	Somalwar,	
			Nagpur	
152	Mr. A.	AutoCAD and	Senior Design	12 years
	Deshmukh/	Pro E expert	Engineering	designing





	October 2000	in Designing	Kinetic	experience of
		Engineering	Engineering,	automobile parts
			Pune	
153	Mr. A Savant	Automobile	Senior	12 years actual
	/ October	Manufacturin	Engineer,	Production of
	2000	g	Mahindra and	Mahindra
			Mahindra,	Automobiles
			Kandiwali,	
			Mumbai	
154	Mr. M.	Automobile	Senior	8 years actual
	Deoghare /	Manufacturin	Engineer,	Production of
	December	g	Mahindra and	Mahindra
	1999		Mahindra,	Automobiles
			Hingana,	
			Nagpur	
155	Mr.P. Prapte/	Computer	Production	4 years actual
	October 1999	Aided Design	Engineer, Bajaj	working on CAD
		(CAD) and	Auto, Akurdi,	and CAM
		Manufacturin	Pune	
		g (CAM)		
156	Mr. M. Pandit	Computer	Head CNC	8 years in actual
	/ October	Numerical	Manufacturing	Computerised
	2000	Control (CNC)	System	Manufacturing



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		Manufacturin	Department,	
		g	Laxmi Udyog,	
			Akurdi, Pune	
157	Dr. P. R.	Chemist and	CEO Trio Bio-	Manufactured
	Kulkarni/	Biologist	Chemicals,	long lasting
	October 2002		Pune	biodegradable
				plastics
158	Dr. M. B.	Chemist and	Retired	Appreciated my
	Nagarkar/	Biologist	Scientist	idea of Car
	October 2003			indigenisation
				and hence
				Motivator for
				Indigenisation of
				technologies
159	Mr. P.	Manufacturin	CEO	18 years in
	Karawande /	g		Pharmaceutical
	October 2003	Pharmaceutic		and Chemical
		al Chemicals		Industry and
		with foreign		Managing SSI.
		made		He received the
		machines		best SSI award
				1998.
160	Mr. Milind	Manufacturin	CEO	18 years in





	Limaye /	g		Pharmaceutical
	October 2003	Pharmaceutic		and Chemical
		al Chemicals		Industry and
		with foreign		Managing SSI.
		made		He received the
		machines		best SSI award
				1998.
161	Dr. R. T.	Chemical	HOD,	25 years
	Jadhav	Technology	Chemistry	chemical
			Department,	industry. He has
			RKNCE,	few patented
			Nagpur	technologies to
				his name.
162	Mr. A.	Automobile	Professor,	He has done lot
	Mahalle/	Engineering	Raisoni College	of good projects
	December		of Engineering	on automobiles
	2001			with students.
163	Mr. Khanzode	Mechanical	Past Chairman	35 years in
	/ December	Engineering	Institution of	Automobile
	2004		Engineers	Industry.
			(India), Nagpur	
164	Mr. K. D.	Architect and	Director,	He was one
	Jamsandikar	Civil Engineer	DECT, Jakarta	partner to built



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	/ May 1992			fast track railway
				and roads in
				Jakarta and
				Mumbai Pune
				Expressway.
165	Mr.	Automobile	Retired	37 years in
	Khandekar /	and	Engineer, Ford	Automobile and
	December	Mechanical	Motors,	Mechanical
	1996	Engineering	Detroit.	Engineering.
166	Mr. Nangia	Automobile	CEO, Nangia	18 years in
	/December	Engineering	Automobiles,	Automobile
	2000		Nagpur	Engineering
167	Mr. A. K.	Automobile	CEO, A. K.	25 years in
	Gandhi/	Engineering	Gandhi	Automobiles
	December			
	2000			
168	Dr. P. Pandit/	Medical	CEO Pandit	18 years Medical
	October 2003	Practitioner	Nursing Home	Practitioner
169	Mr. Y. V.	Retired Civil	Former	36 years in Civil
	Joshi/	Engineer	Lecturer	Works
	October 2003		Government	
			Polytechnic,	
			Nagpur	
1	1	1	1	1





170	Mr.	Automobile	Works	18 years	in	
	Shrivastava/	Engineering	Manager,	Automobile		
	October 2000		Automotive P.	Engineering		
			Ltd.			
171	Mr. S. Telang	Automobile	Service	8 years	in	
	/ December	Engineering	Engineer,	Automobile		
	2000		Ketan Hyundai	Engineering		
172	Mr. R.	Automobile	Marketing	8 years	in	
	Nandagawali/	Engineering	Engineer, Eros	Automobile		
	December		Fiat Motors	Engineering		
	2000					
173	Mr. Parulekar	Automobile	Retired	37 years	in	
	/ October	Engineering	Engineer,	Automobile		
	2000		Telco, Pune	Engineering		
174	Mr. P.	Mechanical	CDAC, Pune	8 years	in	
	Kalbandhe	and		Developing		
		Computer		Software	for	
		Engineering		varied		
				organisation		
175	Mr. Degvekar	Automobile	Marketing	27 years	in	
		Engineering	Manager, PAL,	Automobile		
			Thane	Engineering		
176	Mr. R. Dixit	Indigenous	President Azadi	20 years	in	



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		Products	Bachao	indigenous
			Andolan	products
177	Mr.	Electrical and	Scientist,	28 years in
	Subramaniam	Mechanical	DRDO, India	ASLV, PSLV, and
		Engineering		GSLV project.
178	Mr. G. Hirave	Technician	Retired Soldier,	18 years on the
	/ October		Indian Navy.	ships like INS-
	1993			Virat the only
				aircraft carrier,
				INS Garud, INS
				Khukri and
				Submarines
179	Mr. Garud /	Engineer	Retired Soldier,	18 years on the
	October 1993		Indian Navy.	ships like INS-
				Virat the only
				aircraft carrier,
				INS Garud, INS
				Khukri and
				Submarines
180	Mr. M. Alur/	Production	Major, Indian	12 years in
	October 2002	Engineer	Army – Tank	manufacturing
			Division	Tanks
181	Mr. S. Patil /	Shaktiman	Technician,	28 years



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	December	Trucks of	Jabalpur	Manufacturing
	2000	Indian Army	Ordinance	Shaktiman
			Factory	Trucks, Jonga-
				Jeeps, and
				Special Military
				Vehicles.
182	Mr. S.	Mechanical	Lecturer,	23 years
	Dharmadhikar	Engineering	SDMP, Nagpur	Mechanical
	i / Decmber			Engineering
	2003			
183	Mr. B. Gopal /	Automobile	Engineer,	8 years
	December	Engineering	Mukund Iron	Manufacturing
	1999		and Steel	special steels
184	Mr. K.	Production	Engineer, Bajaj	Manufacturing
	Patawardhan	Engineer	Auto	CAD, CAM, CAE,
	/ July 1993			CNC assisted
				fully automatic
				Engine block
				Manufacturing
				unit.
185	Mr. S.C.	Mechanical	General	29 years in
	Bhargava/	Engineering	Manager, KEC	Mechanical
	October 1996		International	Engineering
Ì	1	1	1	



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186	MR. Kunte/	Marketing	Marketing	25 years in	
	December	indigenous	Manager Jaika	Automobile	
	2001	Tata	Motors	Engineering.	
		Automobiles			
187	Mr. M.	AutoCAD,	Design	5 years in	
	Marathe/	ProE Auto	Engineer	Automobile Arts	
	March 2004	Parts		designing	
		Designing			
188	Dr. S. L.	Medical	Doctor for	32 years as a	
	Ashtankar/	Practitioner	WHO project in	Doctor/ Medical	
	May 2000		Gadachiroli practitioner		
189	Dr. P. Pathak/	Chemical	Advisor to	25 years in	
	May 1992	Engineering	Chief Minister	Chemical	
			and	Engineering	
			Government of		
			Goa		
190	Dr. Y. Pathak/	Pharmaceutic	Freelance	20 years in	
	October 1996	al and	Scientist	Pharmaceutical	
		Chemical		and Chemical	
		Engineering		Industry	
191	Dr. M.	Marketing	Principal	20 years in	
	Phadanavis /	Management	Vasantadada	Marketing	
	December	Guru	Patil College.	Management	





	2002				
192	Dr. R. Singh/	Scientist in	Then Chief of	40 years in	
	May 1992	Physics	RSS.	Physics	
193	Mr. Desai/	Pro-Village	Chief of	70 years for	
	October 2001	Technologist	Sevagram	developing Pro-	
			Ashram	Village	
				technologies	
				Worked with	
				Gandhiji	
194	Mr. G. Dixit /	Civil	Retired	32 years in Civil	
	December	Engineering	Government	Constructions	
	2000		Servant		
195	Mr. R.	Aeronautical	Indian Air	18 years in	
	Kumar/	Engineer	Force, Ozar,	Mechanical and	
	October 2003		Nasik	Aeronautical	
				Engineering	
196	Mr.	Aeronautical	Indian Air	18 years in	
	Narasinhan /	Engineer	Force, Ozar,	Mechanical and	
	October 2003		Nasik	Aeronautical	
				Engineering	
197	Mr. Mickey /	Automobile	CEO, Mickey	21 years in	
	October 2003	Engineering	Motors,	Automobile	
			Nagpur	Engineering	





198	Mr. Palekar /	Automobile	Manager	28 years in
	February 2004	Engineering	Customer	Automobile
			Care, Wassan	Engineering
			Ford, Gowandi,	
			Mumbai	
199	Mr. Gordon /	Automobile	G. M. Shakti	27 years in
	February 2004	Engineering	Ford and	Automobile
			Shakti Daewoo	Engineering
			Motors,	
			Mumbai	
200	Mr. S.	Automobile	CEO, Kinetic	12 years in
	Jamdar/	and	Gears, Nagpur	Export Oriented
	October 2003	Mechanical		Mechanical
		Engineering		Engineering
		Industrialist		business.
201	Mr. V. D.	Mining and	Retired	45 years in the
	Sant/ October	Geology	Government	Geology and
	2000	Expert	Servant	Mining.
202	Mr. M.	Mechanical	HOD (Mech.	27 years in
	Shirbhate /	Engineering	Engg)	Mechanical and
	October 2003		Government	Automobile
			Polytechnic	Engineering field.
			Nagpur	
1	1	1	1	1





203	Mr. Bamnote	Industrialist	CEO, Springs	25 years in
	/ 1994	and Professor	India &	Automobile field.
			Professor	
			YCCE, Nagpur	
204	Mr. A Jog/	Industrialist	CEO, Jog	17 years in
	October 2002		Rubber	automobile
			Factory,	rubber
			Nagpur	accessories
				manufacturing
205	Mr. R. S.	Dealer	CEO,	25 years in
	Sharma/	Automobile	Sharmajis,	Automobile
	October 2003	Ornamental	Nagpur	Accessories
		Accessories		marketing
206	Mr. K. Gupta/	Engineering	Engineer,	23 years in Iron
	May 1996		Sharda Ispat,	and Steel
			Nagpur	Industry.
207	Mr. D. Singh	Engineering	Incharge, Sun	25 years in
	/May 1996		Vijay Rolling	Rolling Mill and
			Mill, Nagpur	Steel Industry.
208	Dr. Padhey /	Scientist	Retired	40 years in the
	May 1994	Chemical and	Scientist from	USA's
		Mechanical	General Motors	Automobile and
		Engineering	USA.	Chemical





				Engineering
209	Dr. V. M.	Mechanical	Director, VNIT,	32 years in the
	Pandharipand	Engineering	Nagpur	field of
	e/ October			Automobile and
	2003			Mechanical
				engineering
210	Dr. Y. V. N.	Remote	Director,	28 years in
	Krishnamurty	Sensing	R.R.S.S.C.	Indian Remote
	/ October		Nagpur	Sensing Services
	2003			
211	Dr. R.	Engineering	VNIT, Nagpur	30 years
	Tupakari/			experience in
	October 2003			Engineering field





A5: Appendix 5:

Customers' Samples and Providers:

Highlighting aspect for the sample providing and allowing their models of cars, as the example of indigenisation efforts is the **"Letter from Honourable Mr. Ratan Tata, Chairman of Tata Motors, Pune through the Vice President Mr. V. Krisnan".**

Besides this most important letter in which it appears that Honourable Mr. Tata is eager to improve his car at all the times. He has allowed visiting and taking sample from any of his dealer and service station in India. These are the signs of Tata Motors being storming in as the Indian MNCC giant in future. Researcher is very much thankful to Honourable Mr. Ratan Tata.

Thanks also to all these following organisations for providing kind help during entire project. Few provided talk with experts coming to them; few helped in free interview for taking reply from the sample customers internal as well as the external customers while few felt pride for helping such kind of project:

SN	Organisation/ Dealer/	City	Cars from the	No of
	Service Station/		Organisation	Samples
	Garage/ Work shop			
1	Jaika Motors, Near	Nagpur	Tata Motors and all	100
	Vidarbha Cricket		kinds of Tata	

Table: A8: Customers' Samples Providing Organisations:



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	Association.		vehicles.	
2	Ketan Hyundai, Near	Nagpur	Hyundai Motors	100
	Nagpur University		India Ltd.	
3	Wassan Ford,	Mumbai	Ford Motors India	100
	Gowandi.		Ltd.	
4	Khamala Automobiles	Nagpur	Tata Motors Cars	100
			only	
5	Automotive Pvt. Ltd.	Nagpur	Suzuki-Maruti	100
	Kamathi Road.			
6	Automotive Pvt. Ltd.	Nagpur	Ashok Leyland	100
	Kamathi Road			
7	Samudra Garage,	Nagpur	All Kinds of Cars.	100
	Dhantoli.			
8	Pandit Automobiles,	Pune	Tata Motors Cars	100
	Tilak Road.		only.	
9	Shakti Ford.	Mumbai	Ford Cars only	100
10	Shakti Dawoo.	Mumbai	Daewoo Cars only	50
11	Jogeshwari Motors	Nagpur	Mitsubishi Lancer,	25
			Hindustan Motors	
12	Wassan Tata Motors,	Mumbai	Tata Cars.	100
	Gowandi.			
13	Arun Automobiles	Nagpur	Bajaj Two Wheelers	100
14	Ajantha Motors	Nagpur	Kinetic Two	100





			Wheelers	
15	Nangia Motors,	Nagpur	Kinetic Two Wheelers	100
16	A. K. Gandhi	Nagpur	LML and TVS Two Wheelers.	100
17	Sundaram Ford	Chennai	Ford Cars	100
18	Bombay Scooters,	Nagpur	Spareparts of Two Wheelers	100
19	Bharat Scooters	Nagpur	Spareparts of Two Wheelers	100
20	Kapur Automobiles	Nagpur	Authorised Spare Parts Kinetic and Service Station	50
21	Mahalaxmi Motors	Nagpur	Second Hand Car dealing of any make.	50





Appendix 6

Request Letter to Honourable President of India Dr. A. P. J. Abdul Kalam to indigenise all the technologies in India related to Automotive Industry and the high end technologies: -

From:

Ashish Manohar Urkude, (Research Student of PhD in Management - Nagpur University), 5/24, Radha Damodar Apartments, Congress Nagar, Nagpur. Pin code: 440012. Residential Phone: 0712-540775. Email: <u>ashish.urkude@gmail.com</u>

To, Honourable Devotee of the Indian Motherland, Honourable President of India, Bharat Ratna Dr. A. P. J. Abdul Kalamji, Government of India, Rashtrapati Bhavan, New Delhi, Pin: 110001.

Subject: Research findings for making India a developed Nation by 2020.

- 1. In the current Socio-Financial crisis and for long term benefits of India, Indigenisation of Automobile Field and hence Heavy Machineries and Industries, and Military Systems, Agricultural systems & Machineries, and giving upsurge to the local products, are the best possible solution to develop our great nation.
- 2. It is also the best solution for generating the huge employment potentials and overcoming other socio-economic problems, presently what India is facing. These are but the research findings.
- 3. Further, researcher hereupon is trying to request you to highlight importance of R & D and needs of indigenisation in your every possible meeting with the Indian technocrats, bureaucrats and other important persons from important institutions and organisations.

Reference:

Wide range of Data collected from various sources including IAF, DRDO, and the thorough analysis for the PhD-Research in Management of indigenously built small car market in India with special reference to customer behaviour,



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under the most able guidance of the Honourable Provisional Vice Chancellor of the Nagpur University, Dr. Mr. Madhukar Rode and under co guidance of Dr. Arun Bapat.

Honourable Sir,

Warm Greetings.

Accept Ram Ram and Salaam from a simple ordinary citizen of India.

Sir, this is Ashish Manohar Urkude perusing his all-important Research studies for the Ph.D. thesis in Management.

Researcher is writing this letter to inform you but the world known fact of the research findings.

Just to inform you researcher is a Bachelor of Engineering Graduate in Automobiles, AMIE (Mechanical), MBA in Marketing and Finance, having almost twelve years experience in the field of Automobiles, Mechanical and Computer Industries. Please don't get confused I'm only 30 years of age.

Following are the Details of the Research for PhD: -

The Topic of research for the PhD:

Management of *indigenously built small car* market in India with special reference to customer behaviour.

The Researcher for the PhD:

Shri. Ashish Manohar Urkude, Nagpur.

The Guide for the research for the PhD:

Dr. Madhukar Rode, Honourable ProVice Chancellor of Nagpur University.

Co guide for the research for the PhD:

Dr. Arun Ramchandra Bapat, Former HOD of Mechanical Engineering Department, Priyadarshini College of Engineering and Architecture, Nagpur.

Place of research and submission for the PhD:

Nagpur University



The Hypothesis put forth by the Researcher for the PhD:

The Param Super Computer, which Indians have developed, forms the most complicated technology in the field of Electronics and Computers. Comparatively, also it is the latest branch of Science than the Automobile, which is an older Technology that Indian people have digested and assimilated since last fifty years. So, if India can make breakthrough in the latest branch of Science, which utilized limited resources, why cannot it do same thing happening in the basic and important old form of science? Here researcher firmly believes they can, they should, and they will. Indian can make a Research, they can Design, Develop and Manufacture the car and other Automobiles right from the Engine, Gear Box to the Tyres and also manufacture them at the equal standard the Americans and Japanese can. *Please remember, this form of Automotive Technology also forms the basics of* many other technologies right from manufacturing Heavy Machineries and Space Shuttles kind of Vehicles to the most advanced Medical Technologies. Henceforth, India can enter successfully into every other possible field of Higher End Technologies.

Again, Researcher firmly believes that the small car can become a smaller part of this giant Indian project of technological advances and self-reliance of India and Indian.

Why the researcher has selected this topic?

Researcher has passed his Automobile Engineering in Second Merit Rank from Nagpur University in the year 1994; he is also AMIE in Mechanical Engineering and has passed MBA from Nagpur University in 1998. While pursuing CDAC-ACTS diploma in IT this 'indigenisation' idea got a tremendous boost and already informed for guidance Professor Dr. Madhukar Rode, the then Principal of A. Gundawar College of Commerce, Nagpur, was contacted for the final decision. Please remember in the year 1995, Dr. Madhukar Rode was contacted for the first time for this kind of PhD the time when researcher was pursuing his P.G. At that time, Professor Dr. Madhukar Rodeji, advised researcher to get professional experience of five years in the field of Automobiles and other allied industries to understand the whole marketing and industrial basics.

Since his student age, researcher is interested in developing and manufacturing indigenous Indian cars with using all Indian Resources. Researcher firmly believes that Indian Scientists, Engineers and Managers, Businessmen and Consumers can develop their own technologies using their own resources any time if they wish and if they come together.

Now, researcher feels from heart and soul that this is the write time to start this venture.





The <u>Problem targeted</u> by the researcher:

Let us review in nutshell, the technical, and marketing side of the Indian Car Industries:

- a. Until Nineteen Eighties, there were only few cars in the Indian Market the Ambassador by Hindustan Motors and Fiat or Premier Padmini from PAL.
- b. Since Maruti-Suzuki cars entered with well-planned set up of service stations and supporting network, the car market has totally changed for the first time in India.
- c. Next time not only Indian Car Industry but also the whole Industrial world changed a lot, at the time when GATT got its final 'yea' for implementation from Indian in India and 'yea' from many more countries around the world, as well.
- d. The results of 'these kinds of implementations of open economy have shown the whole world the Mexican crisis'. Mexican Economy totally collapsed due to the heavier losses in the industrial sector may be mounting to whopping \$56 Billion.
- e. This was the same time when many more MNC added woes to this factor and destabilized the grandfathers of Indian Auto Industry. Infact, Premier Auto Ltd. (PAL) had to close few of its plants in Mumbai, as they could not compete the professional and result oriented approach of the Maruti-Suzuki and later on from many more MNC.

Few of the major Reasons detected during the research:

- a. Through R & D at all the fronts and at all the possible levels: may it be product, process, resources, technologies, and consumer in the car market; these companies always try to improve all their resources at every possible moment.
- b. Later on, these MNC try to dominate the market by highlighting their products and services through all the possible sources of heavier advertisement doses to the public. Researcher must mention here but the known fact that many of the MNC have yearly turnover more than the GDP of many countries, even more than one third of the GDP of what India (India) has.
- c. Where as the companies, in India, for example PAL, tried to rely on the age-old product and substandard services for more than few decades with absolutely no R & D and nothing new in their cars and services.

<u>Solutions suggested in the PhD thesis by the Researcher for PhD along</u> with his Honourable Guides over the problems India facing at the present moment:

1. As early as possible a strict Indigenisation of the Car Industry, Supporting Services and the Car Market as whole; through using all the indigenous resources, which are abundant in India,



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2. It means, local production of the product (here car) for the whole world with local perfectly developed methods and means. – Mr. M.K. Gandhiji.

As, it is highly perceived thing now a days that, whoever controls the volume of money in any country is master of all its legislation and commerce, so all the controls must be also indigenously developed should be in the hands of the indigenous citizen of India. – Mr. James Garfield – TOI-11th July 2002.

3. Simultaneously, higher end technologies can also be made self reliant in India through indigenisation after starting with this project – Ashish himself and Rajeev Dixit, of Azadi Bachao Andolan, Wardha.

Warning: If these measures are not taken as early as possible then India will lose its self-reliance stats in the technological and socio-economic front.

How Researcher is pursuing this exercise?

Researcher carried out survey of the Indian Car Market and the conclusions are drawn after the detailed survey and heavy discussions with the people who are bosses in their field. Researcher took five thousand odd samples commenting on this topic. The research sample range is quite huge and varied having interest in this field. The samples taken are from Masters in the Research Associated Field of this topic, may them be the Scientists to the roadside Mechanics, and of course, Housewives who go in the grocery shops through the small cars. Samples are Engineers in the plant, from the service stations, or from the big garages. Samples are Managers of MNC Cars Manufacturer. Samples are Future Customers, other Consumers, and Dealers in the Car Market. Lastly but not the least, the names not to be mentioned as they wished while interviewing the managers from the PAL and then the consumers of the PAL and the manufacturer themselves are also specially targeted samples of the PhD Research studies. The conclusion drawn every time was but the indigenisation. Researcher firmly believes that it is high time that all Indian people must come together and start the exercise of building their own cars higher end technologies and military vehicles and systems relying on it, as if they are on the war front. Please remember, if this Remedy suggested is not implemented, very soon the consequences will be very harsh. The consequences can be like; at present, few Indian giants have closed their businesses and may be more will also follow the same path. Similarly, there may be a case on the Military front especially with Indian Air force. IAF will have the Fighter planes but devoid of spare part to fly them due to lack of indigenisation efforts.

Why Researcher is pursuing this exercise?

It is becoming clearer everyday of research that Car Industry forms the very basics in the Technology Sector to build Higher-end Technologies. To make idea crystal clear, researcher must mention here that, may it be anything like Space Technology, may it be Military Warfare or technology to develop





FMCG or Medical Technologies, the Car Technology forms the very basics of all these.

Only One Example will be sufficient to clear this idea. Let us take an example of the Automobile Engine to manufacture that it requires knowledge of more than many branches of Science, Arts, and Commerce. To develop Automobile Engine knowledge of Basic Kinematics, Dynamics, Rotational motions, Translation motions, Reciprocal motions, Fluid Mechanics, Fluid Dynamics, Theory of Machines, Engineering Cost Management, Foundry Engineering, Castings, Forging, Metallurgical Engineering, Machine Design, Engineering Drawing, Materials Management, Artistic Skills, Artistic Drafting, Financial Management, Various Languages in which previous designs are made and procedures are written, etc. and the list is unending. Please remember India has all the kind of skilled people in abundance.

Let us also see why the researcher feels that **if Indian develops the** advanced Automobile Engine and the Gear Box or Automatic Transmission then India can take a giant step towards indigenisation and self-reliance.

Let us see an example of Car Engine and see why it forms the major component of all the basic technology and **helps in manufacturing the following cases**:

a. The Engine of the car also forms the basis of the power generation from the **Generators**, which manufacture the alternating current of Electricity that is used in every household devices and devices of the industrial houses,

b. The Dynamos for the direct current,

c. The **Compressor** for the air conditionings and cold storage devices,

d. Hydraulic devices used in power lifting or braking,

e. **Pneumatic devices** used for the lifting, elevating, and braking,

f. The **Elevator Technology** also based on few techniques used in the Automobile Engines,

g. X Ray machines use this technology,

h. All the Electricity manufacturing **Power plants, Atomic Reactors**, and all Vehicles,

i. **Medical Devices** like artificial hearts and Anaesthesia Doctors use the kind of devices, which use this technique,

j. The technique in the **Gas Cylinder, Mixer Grinder**, and such allhousehold devices also use some or the other similar kind of technique or kinematics as used in the Automobile Engines,

k. Part time Generators and Dynamos used in the **houses, machineries** and the big industries,

1. The **pollution control measure** taken for the exhaust fumes from the Automobile Engine also forms the basic of **Environmental Technologies** used in varied fields of the Industries such as Powerhouses, etc. So there is no end to this list.





Places of the research samples:

For this, the researcher carried out a thorough survey and consulted Doctorates, Military Scientists, Indian Air force Pilots, Indian Navy Engineers, and Captains. He consulted DRDO Scientists, BARC Scientists, ARAI Engineers and Scientists, PCRI Engineers and Scientists. He wrote letters to Rahul Bajaj the CEO of the Indian Auto Giant Bajaj Auto Ltd. and got a reply too in different context. He wrote letters to Mr. Ratan Tata, MD of Tata Industry, Mr. Keshub Mahindra, MD of Mahindra and Mahindra. He has established a contact with all Auto giants of the Indian Industry. He interviewed Mr. Ashok Morey the MD of Mahindra & Mahindra, Few IAS officers, Few Scientists from Physics; The Senior Engineers form Telco, Senior Mechanics from Telco and Mahindra & Mahindra. On marketing side, he interviewed Territory Managers of MNC cars Dealers, Consumers of all Indian cars, Service Station Engineers and Owners of Garages of all the cars present in India.

The places and cities of studies vary from Nagpur, Pune, Mumbai, Chennai, Bhandara, Jaipur, Delhi, Kolkata, Nasik, Khopoli, and Thane. There are small service stations and garages from remote Indian places like roadside garage at the National Highways and State Highways even to the villages where our expert Indian Mechanics are working and consumers like farmers are enjoying the ride of an automobile, these also form the important samples.

Thus, you can say researcher has tried to find the root cause of this phenomenon by discussing and contacting the masters at the strategic level in the Automobile industry then the middle level management and the always in contact with technology scientists to the road side mechanics.

Analysis of 'What to do and how to do?'

India has more than one million strong force of Engineers and one million skilled workers in the field of Mechanical and Automobile field. India also has ungrounded **unemployed youth who can become a strong force to reckon with**, if they are trained for the particular job of indigenisation.

Revolutionary planning and implementations is needed for this job. Please remember, India and Indians already have:

- 1. Skilled workforce as mentioned earlier,
- 2. Materials required is as abundant as US, Russia, or what China has.
- 3. Industrial Mentality of the people.
- 4. Set up of the machinery.
- 5.Infrastructure set up.
- 6. Will to succeed in any kind of work using all possible efforts and resources.

Only thing needed is triggering by the Government for this kind of projects.

First making it an issue in the parliament, and at a broader spectrum, then,

Awarding to the person for making the best kind of suggestion will be an





added advantage. Researcher feels here it can start from your department first and in the Industrial sector, ARAI, Engineering Institutes, and other higher Institutes.

What will be the result?

For this we shall consider only three main units in the car, which India is not manufacturing, and the amount of loss India is suffering at financial front and losses to other resources.

S		No. of	Presen	If India	Result of the Implementation			
N	e unit	Parts in	t	starts	of this Indigenisation Project			
	of the	it	Situati	Manufactu				
	Car		on	ring it				
1	Engine	1000+ (India	There will	1.There will be mobilization			
	Unit	Thousa	not	be as	of resources.			
	and	nd plus)	manuf	many as	2.Direct Employment			
	whole		acturin	parts as	generation per part is			
	Assemb		g more	number of	around two hundred, i.e.			
	ly		than	SSI,	overall, generation of around			
			five	Vendors,	two million at least.			
			thousa	Ancillary	3.Supporting services will			
			nd	Units,	generate around eight			
			parts	Dealers,	million jobs.			
			require	Service	4. Revenue loss of Rs. Fifty			
			d in	Stations,	Billion i.e. \$1Billion, as			
			Indian	Garages,	Foreign exchange will be			
			and	and	saved every year.			
			MNC	Supporting	5. India will be self-reliant in			
			cars.	Services.	every field of technological			
					base. As manufacturing, an			
					engine means manufacturing			
					a whole power			
					on			
2	Gear	500+	India	There will	1 There will be mobilization of			
-	Box	(Five	not	be as	resources			
	Unit	Hundre	manuf	many as	2.Direct Employment			
	and	d	acturin	parts as	generation per part is around			
	Whole	Plus)	g even	number of	one hundred, i.e. overall,			
	Assemb	,	half of	SSI,	generation of at least one			
	ly		the	Vendors,	million jobs.			
	-		parts	Ancillary	3.Supporting Services will			
			require	Units,	generate around eight million			
			d for	Dealers,	jobs.			
			the	Service	4. Revenue loss of Rs. Twenty			
			gear	Stations,	Five Billion i.e. \$500 million as			
			box in	Garages,	Foreign exchange will be saved			





			many	and	every year.			
			of the	Supporting	5. India will be self reliant in			
			MNC	Services	the automobile technology.			
			cars	will be				
				developed				
3	Driving	100+	India	There will	1.There will be mobilization of			
	Axle	(One	not	be as	resources.			
	Unit	Hundre	manuf	many as	2.Direct Employment			
	and	d	acturin	parts as	generation per part is around			
	Whole	Plus)	g even	number of	one hundred, i.e. overall,			
	Assemb		half of	SSI,	generation of at least one			
	ly		the	Vendors,	million jobs.			
			parts	Ancillary	3.Supporting Services will			
			require	Units,	generate around eight million			
			d for	Dealers,	jobs.			
			the	Service	4. Revenue loss of \$200 million			
			MNC	Stations,	as Foreign exchange will be			
			cars	Garages,	saved every year.			
				and	5. India will be self reliant in			
				Supporting	the automobile technology.			
				Services				
				will be				
				developed				

Please Note:

1.Please remember that the Engine, the Gear Box, and the Driving Axles are the major components of the Car or any other Automobile. They together need a set up of the industries that ultimately can manufacture ninety percent of the basic parts of the machineries existing on the earth. May it be a small screw, a nut or may it be complicated parts like carburettor and fuel injectors and their sub parts.

2.Every distinct parts needs distinct and unique kind of industrial set up. 3.A car has almost thirty thousand components right from the small screw to the body and axles.

4. Any nation manufacturing its own small car has to have this major kind of set up of industries. This set-up of industries is sufficient to develop many of the heavy industrial machineries. Many types of machinery need only few major or minor intricate unique sets up for few parts other than the small car. Otherwise, the equipments and the infrastructure are always remaining to be as same as that of the small car. Ex. Korea can manufacture small car totally indigenously and hence other advanced machineries too, other than Few European, Japanese, and US companies. Thus, only car technology is enough to develop many of the major mechanical, medical, and electrical industrial and military machineries, as their manufacturing, designing, and development are almost similar.



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What are the other efforts needed?

- 1. In India for taking any giant step like this, it has to become a major issue. May it be political issue, socio-economic issue, and the ethical issue! Therefore, it is expected from honourable members of the society who know the seriousness of this problem that they must take this issue to the every citizen of this country.
- 2. All businesspersons must be convinced that R & D at all levels is need of the day. At every stage and every step R & D with respect to product, procedure, design, marketing, after sell services, is must. Then feedback and Kaizen in this field will bring improvements in this field. In coming future this knowledge bank will be useful in other industrial sectors as well.
- 3. The efforts from the Education Institutes, The Business Organizations, The Political will, The Banking Sector, The Industrial Development Corporations and Institutes like MIDC, CII. One more step taken can be the new and old Entrepreneurs are to be made more aware about the advantages of the indigenisation.
- 4. Few more steps can be as follows:
 - a. Provisions must be made that Management, Commerce, Arts, Home Science, Architecture, Engineering students and all the other students is given compulsory contributing internship towards nation as a practical project as part of curriculum. If Doctors have one-year compulsory internship of one year, then why can't these students also?
 - b. The Government can give concession to SSI for manufacturing the above-mentioned parts of Automobile and the higher end machineries.
 - c. MIDC, GIDC, CII, IE, FICCI, IDBI, ICICI, SBI etc. should make special provision for this and must conduct lot of seminars & meets and awareness drives.
 - d. The politicians must realize the need of indigenisation as in India this forms the very important factor to mobilize the resources to such very good and giant projects.
 - e. Students to the Consumers all must realize that indigenisation means using our own resources for our own development for our own cause and thus helping your own nation and helping yourself as well. If all these people survive then only nation will survive.
 - f. Remember USA, Japan has biggest carmakers and more than half of the resources in USA and Japan are directly or indirectly related to the Automobile and Car Market.
 - g. Though India our country is not manufacturing the complete car now, still half of the businesses and industry in India listed in CII directory are some way or the other, are based on the Automobiles and Car market. So, if we'll make our indigenous



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cars we'll be able to make more advanced machines very soon and thus will encourage the other businesses as well.

Expectations from your side:

Sir, the main aim of the PhD thesis is making India and Indians the selfreliant individuals and the self-reliant nation through the indigenisation and that too as faster as we can.

The very first thing needed in indigenisation efforts in every sector is just a triggering by the Government for this kind of projects. First making it an issue in a broader spectrum. Awarding to every possible person for making the best kind of suggestion will be an added advantage.

<u>Researcher feels Dr. A.P.J. Abdul Kalam can be the name enough to trigger</u> this process as he himself has ignited mind to work for the national cause.

Sir, so it is requested from your sides that please highlight few of the major points from this project. It is the only expectation from this younger Indian brother.

Sir, make sure that R & D for Indigenisation be given the highest priority too more than any other issue.

Long live our nation, our culture, our civilization, and our spirituality and of course, the devoted people like you.

Sir, please do send at least "one sentence reply" with your most able signature and seal on it to promote such kinds of activities in the young generation. Especially to me as I'm a case of ignited mind.

With high regards to everyone and lot of support for a huge task and selfless service, you have taken, from a simple devotee of the Mother land. Jai Hind.

Thanking you.

Yours sincerely,

Ashish Manohar Urkude.

25th July 2002.

N.B.: <u>Sir, you are requested to send few invaluable suggestions for this</u> project, which will be welcomed as if it is a need of the hour.

<u>Please note: Dr. A. P. J. Abdul Kalam had wished "All the best for</u> <u>Ph.D." in reply to this email and hard copy letter instantly. Author is</u> <u>grateful to him</u>



Bharat Mata Ki Jai!										
+++++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++++	++++	+++++	+++++	+++++	++++++	-++++++++	++		
Soooham	Hansah	П	Hari	AUM	Tat	Sat	Aum	Tat	Sat	

Brahmarpanmastu | |

