Chapter No. 4
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CASE STUDIES

(Based on Primary Data)
Case Study 1

The Successful Launching of the World’s Cheapest Car viz. ‘Tata Nano’ at the Targeted price of less than $3000

To quote Ratan Tata’s observation, “In India, a middle class family often travels by scooter in the death-defying fashion, the father drives with his son on the floorboard/petrol tank in front of him, the mother seated pillion, cradling her infant daughter in her arms since cars for young middle class families are far out of reach.” When in late 1970s, Maruti car was launched, its price was rather affordable to upper middle class people and it became quite successful because of its petrol-efficiency, speed, stability, low maintenance and the most attractive feature of its price. In last 25 years, the price of Maruti went on rising upto about Rs. 3 lakhs; therefore a large segment of the social class of people marginally between middle class and upper middle class could not afford to buy Maruti which in the past three decades virtually had become People’s car in India.

Ratan Tata made a judicious assessment of the people’s needs and declared that $50 billion Tata Conglomerate accepts the challenge of designing and manufacturing technically, as good as, world’s
cheapest car at a price of $2500 approximately. Its price should be around Rs. 1 lakh; which may be marginally higher than the best racer motorcycles and less than all the models of Maruti, Hyundai, Nissan and Honda etc. which are available at going price range of Rs. 2.5 to 4.5 lakhs. Original idea of Ratan Tata was that a family which moves together on a scooter will find it safe and convenient to reach distant places in a metro city; the size being compact, it will also assure convenience for parking and moving on a crowded roads.

When this task was assigned to the Dept. of Designing, the engineers had thought of following options; so as to be within the comfortable margin of the cost target of Rs. 1 lakh.

The options were following:

a) A scooter with two extra wheels at the back for better stability
b) An anti-rickshaw with four wheels, instead of 3 wheels
c) A three wheeled car like a closed auto-rickshaw
d) A four wheeled car made of engineering plastics
e) Rolled up Plastic curtains in place of windows
f) Openings like auto-rickshaws from the side
g) A four wheeled open car with safety side bars

All the options had to be set aside because the prominent designer of ‘Nano’, Shri Wagh interviewed a number of prospective...
buyers, vendors, dealers from different sections of the society, and got a feed back of their needs, liking and requirements. The consensus was in favor of the ‘form of a car’, providing ‘Status’; along with safety, sturdiness and sleek look! Drivers and owners of two wheelers and three-wheelers are normally looked down upon in India.

Ratan Tata identified the three essential requirements for the new vehicle. It should be low-cost, adhere to regulatory requirements and achieve performance targets such as fuel-efficiency and acceleration capacity. It should provide safety and status.

The design team initially came up with a vehicle which had bars instead of doors and plastic flaps to keep out the monsoon rains! It was closer to a quadricycle than a car and the first prototype had bigger engine. The body had to be changed because Ratan Tata, over six feet tall himself, tested it to be easy for tall people to get in and out of the car. On the 10th of January, 2008 at the ‘Auto Expo, Delhi’, Ratan Tata stepped out of the driver’s seat with ease, which made a great visual impact!
What shook the automobile world most was the fact that the designers seem to have done the impossible: the sleek, sophisticated Nano did not look flimsy or cheap(!), it appeared to be the World-class stylish and cute car. It was adjudged as the International Car of the year in 2008 by the World’s automobile industry and obtained admiration and esteem from the automobile engineering experts. Nano’s birth was prolonged due to the protests and agitations of Nandigram farmers, who were not willing to give their lands to left front government in West Bengal. Majority of
farmers did not oppose the land acquisition in the initial stage, later on political rivalry crept in and the entire issue got a disappointing turn. Tatas had to wind up their installation and took them far away to Uttaranchal state; which incurred huge losses and indirectly pushed up the budgeted cost.

The ideas of cost cutting were once again vigorously tried because no one believed that Tatas would ever be successful in maintaining the cost level upto Rs. 1 lakh as per their commitment.

The first thing which was given priority was to make use of ‘Robotics’ i.e. automation in order to maintain the high and precise quality of product and its consistency. This choice of appropriate technology, reduced more than 40 percent costs which conventional methods require.

The design has to question the need of each and every component and also the minimum requirements of its functionality. Therefore Tatas opted for the ‘concept of disruptive technology’ which was clearer than absolute technology. The guiding factor was that the cost has to be minimized for each component, get maintaining its basic functionality.

The alternatives were A) Reduce consumption of heavy and costlier material B) Alternate suppliers to get same material at lower prices C) Use alternate materials. With this objective, the designing job was outsourced to Italy’s Institute of Development in Automotive Engineering. But Ratan Tata made minute changes from time to time in their standard designs. For example, Italian Designers had
designed two blade windshield wipers. Ratan Tata insisted on one single wiper in consideration with relatively narrower width of Nano. He wanted ‘Manual steering’ instead of ‘Power steering’ which was just redundant considering the size of Nano. In the frontal side, he kept the petrol tank, the spare wheel etc. and he preferred to install the engine at the rear dicky. Instead of cast-iron engine, he chose aluminum for engine, which reduced the weight and became rust proof. Instead of 800cc or 1000cc, he wanted 624cc two cylinder engine which per se becomes petrol efficient. (When Maruti 800 gives an average consumption of one litre petrol for 20 kilometers, Nano positively gives around 24 kilometers per litre average in city drive and about 27 to 28 km per litre on highways. Engine has automatic cooling system by cool air instead of water pump, radiater and its paraphernalia. The engine body work is made of sheet metal coated with plastic. The body parts are joined by adhesives rather than welding.

The suspension and the chasis is as sturdy as any other Tata car like Indica V2 etc. Use of tubeless tyres are introduced. The width is around 5 ft. The length of Nano is 10 ft. and the height is 5 ft plus. This height factor has given more than adequate leg space for drivers, front seat and backseat occupiers. One does not become tired or gets swollen legs; the common experience of travelling in small cars like Maruti 800 etc. The ideal speed which Tatas recommend is 70km per hour but a large number of Nano drivers/owners vouch that it can maintain stability on road at a speed even between 80 km to 100 km per hour. It is not only ideal for city drive and parking but it is also the most economical and safe car on pretty long distance. The Aluminiun engine provides
higher thermal conductivity than cast iron. Superb control over emission and smooth acceleration along with ‘air cooling system’ improves the petrol consumption average. It has an advantage of Front and Rear suspension (McPherson strut in front and coil spring and prasiling crm in rear.) It has an amazing pick up to ascend in ghat roads comfortably in third gear and on graduall climbs even using the ‘Top Gear’. The seats can be adjusted as per the height, seat belts, strong seats and anchorages.

**Technical Details of Nano**

1) Nano Engine is 4 stroke, water cooled, and multipoint fuel injection system.
2) Number of cylinders 2 in line
3) Stroke-73.5 mm x 73.5 mm
4) Capacity 624 cc
5) Maximum Engine output- 35PS at 5250 +/-250 rpm as per IS.i4599
6) Firing order 1-2
7) Coolant: 50: 50 (Ethylene glycol)
8) Clutch – outside diameter lining 160 mm-Single plate, dry friction
9) Suspension- Front/Independent. McPherson struts
10) Rear Independent semi portable arm with coil spring and hydraulic shock absorbers
11) Brakes- Hydraulic
12) Total Weight- 600kg
13) Tyres - Radial Tubeless.
Marketing Economics

It will be commercialized in whole of India, mostly targeted to the middle class and lower middle class people. Tatas will sell its ultra cheap new car through its own retail and electronics megastore outlets, as well as, recognized auto dealers. It will also be sold through outlets like Westside and Croma. These outlets will display the Nano and also take bookings. Nano will not be big on advertising. There will be no TV campaign, only innovative use of print, radio and other media, particularly the web. It believes in ‘word of mouth’ of the actual owner and the user of Nano. Nano uses facebook, orkut and other websites. In short, it will be the most ‘cost effective’ and ‘innovative’, so that Nano becomes synonymous with anything ‘small, cute and brief’. Tatas always believe in ‘excellent after sales service’ in order to push up the marketing and the sales. They take the most earnest and prompt steps for removing the doubts and difficulties of their customers by providing anti-fire kits when 2 or 3 Nanos had caught fire and the newspapers gave a lengthy coverage of those exceptional mishaps. As a result, Nano’s domestic and international sales are steadily rising.
Case studies on cost cutting / saving through use of Smart Cards – A brief note on what are Smart Cards.

Before we get into the actual case studies done by the author of this thesis, let us understand what smart Cards; are –

Right now, inside your wallet, you probably have a couple of credit cards, an ID card, an ATM card and maybe a few other plastic cards. These plastic cards have become a very important part of our life. Consider a few scenarios where we use plastic cards these days:

- To identify ourselves.
- To obtain cash from the banks.
- As credit cards.
- Conventional Telephony.
- Access Control.
- Loyalty Programs.

Most of these plastic cards are usually magnetic stripe cards. In spite of their tremendous popularity, magnetic stripe cards suffer from one crucial weakness. Data stored on them can be easily read and modified by someone with access to the right kind of equipment. As a result, confidential information like PIN Number or a password can not be stored on them and a transaction host (POS device/ATM) will have to go online to verify the PIN and this in most European and Asian countries is time consuming and costly.

Enter Smart Cards. The development of smart cards along with rapid advances in cryptography has resulted in a solution to the
above-mentioned problem. This article will introduce the reader to the various aspects of the Smart Card.

**Smart Card Classification**

Smart cards are the youngest members of the plastic card family. A Smart Card is defined as:

“A plastic card, usually similar in size and shape to a credit card, containing a microprocessor and memory (which allows it to store and process data) and complying with ISO 7816 standard”

**History of Smart Cards**

Many people consider smart cards a recent invention. Nothing could be further from the truth. In 1968, German inventor Jurgen Dethloff along with Helmet Grotrupp filed a patent for using plastic as a carrier for microchips. In 1970, Japanese inventor, Kunitake Arimura, applied for a similar patent. Smart Cards were introduced in Japan in the same year. In 1974, Frenchman Roland Moreno registered his smart card patent in France.

Given that the majority of smart card research initially went on in Europe, it is not surprising that Europeans are among the largest users of smart cards. Europe currently accounts for nearly 80% of the smart card market. France and Germany have been leading the world in terms of introducing various applications on smart cards.
Smart cards are already being used the world over for a variety of purposes and in future they will become even more pervasive.

However the real usage of smart cards started in India only from the year 2000 onwards.

**Uses of Smart Cards**

Smart cards currently exist for a vast array of applications. However, the expected growth in the industry will not be merely due to growth in these segments, but also due to the addition of the Internet and electronic commerce with their myriad of uses.

**Current Applications**

A smart card, as mentioned above, is a portable computational device with data storage ability. As such, they can be a very reliable form of personal identification and a tamper-proof, secure information repository. The main possible applications of smart cards are the following:

*Payphones*

Outside the United States there is a widespread use of payphones equipped with card readers rather than p; or in addition to p; coin recognition and storage. The main advantages are that the phone company does not have to collect coins, and the users do not have to have coins or remember long access numbers and PIN codes.
Smart cards have the further advantage over magnetic stripe cards of being reloadable, and allowing advanced features like phone banking, automatic memory dialing and on-line services.

**Mobile Communications**

Smart cards are used as identification device for GSM digital mobile phones. The card stores all the necessary information in order to properly identify and bill the user, so that any user can use any phone terminal.

**Banking & Retail**

Smart banking cards can be used as credit, direct debit or stored value cards, offering a counterfeit- and tamper-proof device. The intelligent microchip on the card and the card readers use mutual authentication procedures that protect users, merchants and banks from fraudulent use. Other services enabled by smart cards are advanced loyalty programs and electronic coupons.

**Electronic Purse**

A smart card can be used to store a monetary value for small purchases. Card readers retrieve the amount currently stored, and subtract the amount for the goods or services being purchased. Groceries, transportation tickets, parking, laundromats, cafeterias, taxis and all types of vending machines are only some of the purchases that often do not reach amounts to justify the hassle of
using a credit card (a cash card reader does not require a permanent phone connection with a host computer). Radio-read smart cards will allow the free flow of people through transportation systems, avoiding the need of ticketing machines or validation gates.

*Health Care*

Smart cards allow the information for a patient's history to be reliably and safely stored. Health care professionals can instantaneously access such information when needed, and update the content. Instant patient verification allows immediate insurance processing and refund. Doctors and nurses themselves can carry smart card-based IDs that allow secure, multi-level access to private information.

*ID Verification and Access Control*

The computational power of smart cards allows running mutual authentication and public-key encryption software in order to reliably identify the bearer of the card. For higher security needs, a smart card is a tamper-proof device to store such information as a user's picture or fingerprints. Smart cards can be used also for network access: in addition or in alternative to user IDs and passwords, a networked computer equipped with a smart card reader can reliably identify the user.
Case Study 2

Enormous Cost Cutting in Security System of a ‘Diamond Industry’

‘Venus Jewellers’ happen to be the topmost company not only in Surat but the whole country, which does ‘diamond cutting’ for its clients abroad like De Beers and other Belgium companies. The company is owned and managed by ‘Patel Group’. Its annual turnover is more than Rs. 1000 Cr.

The company employs 2000 highly skilled but uneducated (company has a marked preference to uneducated labor than educated one) Labour who happen to be stable throughout their lifetime career. The majority of workers are from such families, whose fathers and grandfathers have also served the same company for years together. Genetic factor of hereditary skill has been also perceived by the owners of the company.

While cutting diamonds, ‘uncut rough diamonds’, if the job is done by machines, it brings colossal waste in terms of rupee costs, because the dust and the particles also bear tremendous waste in terms of costs worth more than Milllion. Therefore in the industry of diamond cutting, it is mandatory to cut diamonds manually by human labor by operating small machines.

Venus Jewellers factory is run throughout three shifts, because the factory has a total number of 700 machines being a limited investment in overheads of installed machinery. As a result, the
factory management calls only 670 workers per shift as 30 machines, on an average per day, require maintenance and repairs. 670 workers report for work per shift and the total number of workers required during 3 shifts is about 2000. Diamond cutting and grinding machines are manufactured in India, as per the specifications given by manufacturers because machines require a grinding stone along with smaller grinding stones which are required for shaping a rough diamond into a ‘prism’. In the last stage, polishing is very essential which is done totally with manual operation.

The factory used to employ very very trustworthy, sharp, experienced and dependable security guards; 20 per shift, average salary of them was in the bracket of Rs. 40,000 to Rs. 80,000 per month! These security guards personally know each and every worker intimately because workers come from their own local community and belong to the families, which are engaged in the employment of the factory for past four generations. The workers also get special incentives depending upon the number of stone cut and incremental ‘carrot value’ of them.

Since the workers being uneducated and having very fabulous monthly incomes and vulnerable to vices like indulgence in gambling, alcoholic addictions, womanizing and luxurious spending. Some of them also succumb to the pressures of temptation, greed and stealing of cut/uncut diamonds at the end of their shifts; due to the prospective ‘windfall gain’ of more than lakhs of rupees; per a small piece, stolen.
Every worker has a schedule of nine hours per shift; one hour is required for entry and reaching his spot of work, one full hour is required for exit and one hour is required for lunch and tea breaks; thus 25% of the working hours are lost. After entry each worker has to go to the store; where he gets rough uncut diamonds along with polishing powder for cutting or the incompletely cut diamonds deposited at the store while making the exit, on preceding day.

At the end of the shift, the worker is required to go to the store for depositing the complete or incomplete assignments and then can make the exit. The factory with huge expenditure of CCTV system costing Rs. 12 lakhs each had noticed CCTV systems are not suitable and dependable to the diamond industry because the size of cut/uncut diamonds is microscopically small and while grinding and polishing work is on, the CCTV screens get blurred due to the dust particles, which are very light and sticky, settles on the screen affecting the visibility of CCTV screens.

In spite of the installation of CCTV systems and the razor sharp vigilance done by the security guards in all the strategic places of the work site; there used to be stealing and pilferage of cut and uncut diamonds, which used to be around 10% of the total manufactured volume and was worth Rs. 50 crores per annum.

This author of the Ph.D thesis was working in Honeywell Auto India Pvt. Ltd. prior to 2005 and came to know about the marketing prospects of providing very dependable and efficient security system. He therefore personally visited the work site and became fully knowledgeable about the then existing security system and the
pitfalls in it. He then made proper notings of the proposed alternative security system which was mostly automatic, reducing the number of human guards and using ‘the smart card system’ which is ‘all-proof’ and brings 100% perfection in the security work.

Every worker was issued a ‘smart card’ being the authentic identity card. On the card, there were names, addresses, phone numbers along with photos and finger prints of all five fingers. The card was embedded with a chip, which used to read and confirm the details of the identity proof. The sticky polishing powder used to blur the fingerprints, therefore it was mandatory to read and approve minimum three fingers every time at the entry/exit.

For entry into the factory site and exit, there were separate ‘Turn style Rotating Iron Doors’. After the entry given by the smart card, if the worker does not reach the store within ten minutes, there used to be automatic alarm and all the outlets of the factory used to be closed. Similarly, if the worker does not reach within 11 minutes from the store to the work site, there used to be automatic alarm and the security used to catch hold of him.

The entire store was closed and inaccessible to the worker because it used to have a frontal wall of heavy but transparent glass leaving a ‘basin-shaped’ outlet having embedded by a sensor cum-reader. As soon as, the worker used to insert his smart card, he used to get the delivery of his assignment of cut/uncut diamonds plus polishing powder and the guidance regarding the allotted number of machine /workplace belonging to a particular floor. If the worker makes a mistake in reporting to his assignment, there used
to be automatic alarm and used to be spotted by the security. While retiring from a day’s work, every worker was compelled to go to the store, deposit all his belongings of cut/uncut diamond and the remaining polishing powder and used to obtain the final exit by inserting his smart card.

The use of sensors, readers and automatic machines was found to be far more helpful in curbing the malpractices of a prospective nexus between security guards and workers—quite natural as human behavioral weaknesses and preventing the pilferages. When smartcards and automated security were not introduced, the security guards had become too much arrogant and greedy by constant threats of leaving jobs on the condition of raising salaries, because of their indispensability. The new security system automatically checked and reduced their blackmailing and over pampered roles and their behavior was toned down to reasonable limits and their efficiency also increased because their job stress was reduced due to only ‘selective vigilance’ that they were supposed to do by attending the ‘alarms’ only. The number of security guards which used to be more than eighty; (20 per shift plus a reserve force of extra 20 guards) at present, is reduced to only 30+ (10 per shift plus 5 as reserved). Thus company saves more than Rs. 2.7 crores per annum. It has not expanded its CCTV security system and is happy to save a huge additional expenditure; which factually happens to be only of ‘cosmetic use’ like any scarecrow!

Tata Honeywell company required actual expenses amounting to Rs. 8 lakhs but sold the security package at Rs. 10 lakh to Venus
Jewellers; which for a company having turnover of Rs. 1000/- cr, was just a paltry and negligible amount! The theft and pilferage worth Rs. 50 Cr. Was almost reduced to not more than Rs. 10 Cr, therefore company could save its losses worth over Rs. 40 Crores within a cost of just Rs. 10 lakhs!!

Tata Honeywell which had launched this ‘security product’ by only creative and innovative skills; sold it at higher price packages not only to other diamond jewellery units but by making approximate and tailor-made and suitable modifications for other industries, Honeywell expanded its turnover to Rs. 300 crores from just Rs. 10 crores within a couple of years only. The percentage of profitability in ‘this type of knowledge-powered service products’, obviously is incomparably higher than that of the Brick and Mortar manufacturing industries.

The company undoubtedly raised its status, reputation and prestige by becoming the premier and pioneering company in this new field of Business.

Venus Jewellers will positively be for ever grateful to Honeywell because they could save very very huge amounts of costs of their traditional security system by the radical transformation brought by automated security system relying on smart cards, sensors, readers, automatic opening and shutting of doors and timely alarms, if anything abnormal happens.
Prior to introduction of ‘smart card’, the company was compelled to increase the security guards more than sixty and had to employ a separate team of about 20 very very trustworthy guards for keeping watch on the sixty working guards.

Guardless ushering and exit was the most appropriate solution. Each and every door of entry and exit had a magnetic lock and even the lift used to operate automatically for taking the visitor to a specific floor by using the smart card. ‘A smart card reader’ purely electronic instrument started taking the data and verifying the authenticity of the user. Thus the new system saved not only huge expenses on employing security guards, but it also prevented all untoward and fraudulent practices of the employees of the Diamond factory.
Case Study 3

Cost Cutting by Using ‘Smart cards’ of the H.R. Dept of TCS, Hyderabad

Tata Consultancy Services (TCS) is the topmost IT company of India which employs the largest number of employees in every establishment in the country.

TCS Hyderabad, probably is the giant among them which has employees over and above 70,000!

Human Resource Management Wing specially takes a lot of special effort to keep the employees very happy and in contended spirit by offering special facilities like free accommodation, free electricity, facility of swimming pool, gym and badminton courts, subsidized medical aid, free schooling, free air conditioning of the residential quarters, free internal telephone, 5 percent discount on ‘Tanishque Jewellery’ and ‘Titan Watches’, 2 percent discount on purchases from retailing malls by showing the smart card, perks of Rs. 1200 p.m. for the lunches in the canteen and extra Rs. 200/- for vending machine to buy tea, coffee, snacks and soft drinks etc.

Previously, TCS had issued coupons to its employees for lunches and refreshments. These coupons were required to obtain the facilities of canteen and library. For refreshment, the company had given odd size tokens of one rupees, two rupees and five rupees, which due to their number and sizes could not be easily put in the valets of the employees. While entry and exit, there used to be long
serpentine queues because the attendance and time were recorded by ‘punching system’, which was manually operated at the entrance/exit gate of the factory. HR Dept used to require a huge number of clerical assistance to update and record the Leave Account of the 70,000 employees.

Every alternate day the canteenwala used to receive more than 1 lakh coupons. He was compelled to employ five clerical assistants for receiving and counting the coupons and had to spend around Rs. 30,000 per month which was a serious waste of his money for getting purely unproductive work. For keeping refreshment accounts, he had to employ 2 extra men and another 2 men in library. The canteenwala was instructed to submit all the coupons on the 15th of calendar month and was given the payment on 30th of every month; after verifying the due amounts, H.R. Department was required to employ extra assistance for counting the vouchers received on 15th of every month.

Their counting was supposed to be over by 30th of the month; so as to release the payment to the canteenwala. This system invariably failed because the counting of coupons and settlement of bill used to take too much time (imagine 50 to 20 lakh coupons over a period of fortnight) and often was delayed. In the course of time, the backlog of 2 months of delay in releasing the dues, seriously caused a cash flow crunch to the canteenwala and he used to suffer the burden of interest on his borrowed funds. Under such circumstances, his demand for raising rates per lunch could not be denied by the management.
When rates were raised, either management or employee was required to suffer since the amount of perks allotted for lunches was fixed to Rs. 1200 per employee. In the initial stage, the employees were asked to bear the additional payment above Rs. 1200 of perks allotted to each employee. That created displeasure among the employees; which also was not palatable to the Tata’s special ‘employee centric welfare’ policies.

When H. R. Department was on the look out for finding an appropriate solution for this problem, Tata Honeywell marketing group approached them. They studied all the loop holes and weaknesses of the existing system which fully had relied on manual operations.

Tata Honeywell introduced the ‘Smart card’, for entry and exit, leave account and for using it at the time of taking lunch, refreshments and library service.

The smart cards were having a memory of 1 MB in which e-cash of Rs. 1200 per month per employee was inserted at the beginning of each month. Whenever the employee went to the canteen or at refreshment centers, they showed their cards to the reader placed at the canteen counter and appropriate amount was deducted from the smart card and added to the database of the canteenwala. With this, the exact amount to be reimbursed to the canteenwala was known to the accounts department on a daily basis. The same used to happen at the vending machines.
Some part of 1 MB memory in the smart card was earmarked for library function. Whenever, the employee went to the library and borrowed books, the librarian would enter the number of the books in a computer which is connected to a smart card reader/writer. The employee was to show his card to the reader/writer once the librarian entered the number. The information of the books being borrowed would then be stored in the computer, as well as, on the smart card. Whenever the employee returned the books, the number of the returned books would be removed from the smart card.

The electronic reader used to verify the authenticity of the user of the card and recorded the specific use of the card along with the date and time. So was the case of attendance at the entrance gate; automatically the exact attendance and leave account was also easily available.

The accounts of canteen, vending machines and library could be settled on day to day basis. Human labor of counting voucher became unnecessary. Canteenwala and the H.R. Department could save huge amount of salaries over Rs. 2 lakhs per month. There was no backlog of payment, therefore the canteenwala voluntarily reduced the rates, but as the perks remained the same, employees could enjoy more refreshment items by his indirect savings. Overall result was, due to full gratification, employees’ productivity increased.
The employees were specifically happy because they were not required to carry varied coupons of different denominations and odd size tokens used for vending machines. Earlier the employees would loose the unused amount of Rs. 1200 which they could not use in the month. This prompted the employees not to bring lunch from home and have lunch in the canteen itself. In spite of the quality control was done in the canteen, it could nowhere match the quality of home food.

This was because TCS management used to change the color and logo on the coupons every month to avoid malpractice by the canteenwala. With the smart card, this also got eliminated as the remaining balance would stay in the smart card itself which could be used by the employee anytime during his employment years. By the introduction of smart card, an employee received a full amount of Rs. 1200 in terms of credited money in the card and was not afraid of loosing a part of his perks in case of non use of his coupons within the given time limit.

Going forward, TCS instructed their neighborhood malls for accepting their employees smart cards and grant them a special discount of 2 percent of the total bill amount; because company bargained that it assured the mall by providing a steady number of about 1 lakh customers per month. The malls would provide the data regarding two per cent discount to the TCS management on a weekly basis and get the amount reimbursed by TCS management on a weekly basis. The neighborhood malls accepted these terms with great pleasure and as a result, the wives and the family
members of TCS employees were very much delighted by TCS’s special concern for them.

It produced a ‘win-win’ situation to all, canteenwala, neighborhood malls, employees of TCS and their families and TCS itself.

It also helped to reduce the ‘attrition rate’ at TCS Hyderabad which is currently the lowest in IT sector, (less than 4%) while attrition rate of Infosys is 10%, Wipro 15%, Cognizant 17%, Tech Mahindra 14%. The immediate and effective opposition spontaneously comes from the spouses of TCS employees, if they plan to leave TCS and join other company for getting a higher salary. TCS salaries are 5 to 7% less than the salaries of other IT companies; but still the attrition rate happens to be the lowest; only because of the Tata Groups Employee Welfare Policy, the assurance of the job security and the emotional and human bond of affectionate family relationship.
Case Study 4

Reduction in Cost, Time and Stress of the Visitors by
‘Electronic Security’
(A New Alternative to Security System at BOMBAY
HOUSE-HQ of TATAS)

Bombay House which is located at the plush locality of Ballard
Estate in the neighborhood of ‘Government Mint’ and ‘Royal Asiatic
Society’ accommodates the head offices of

1. Tata Sons
2. Tata Power
3. Tata Consultancy Services (TCS)
4. Tata Consultancy Engineers (TCE)
5. Tata Tea
6. Taj Group of Hotels
7. Tata Indicom
8. Tata Telecommunications
9. Tata Oil Mills Limited (TOMCO)
10. Tata Steel
11. Tata Motors
12. Titan
13. Tata Rallies
14. Tata Power etc. and
15. Tata Trust viz. Dorabjee Tata Trust, Naval Tata Trust,
Simone Tata Trust, Ratan Tata Trust etc.
Bombay House is a very old majestic building with 5 stories. The construction is done by European design made up of selected masonry cut stones. Every floor has around 20 special cabins meant for CEOs, Chairmen of Board of Directors, Top Management etc., and adjacent 20 office cabins for their secretaries; in all 40 cabins. In the entire building, the total number of Top Management cabins is 100 along with 100 cabins for their secretariat offices.

Dorabjee Tata Trust, Ratan Tata Trust, Naval Tata Trust are regularly visited by hundreds of people and families on every working day. Similarly, very very important visitors such as Chief Executives of Tata Allied Companies, Business and Industrial Tycoons, Top Level Bureaucrats, Managing Directors of Financial Institutions and Banks, Top Stock Brokers, Chief Executives of Public Sector and Private Sector Giant Companies which get various contracts like construction and installation and many others have to call on the top bosses of various Tata Group Apex Offices, their numbers also exceed many hundreds. As such, the average number of visitors is around one thousand. All these visitors reach Bombay House by seeking official appointments. But when they reach the office, even at early morning hours, there is a long queue of visitors already waiting their turns near reception office.

The reception office has a small area of twenty feet long and ten feet wide and it can accommodate only about twenty visitors in that room. The other visitors have to stand in queue which goes out of the reception room; on the entrance stairs and the footpath adjacent to the building on the road outside.
Founder director of Tatas have made a strict rule that “every visitor/guest is equally important”; therefore every visitor has to wait in queue; as per the principle of ‘first comes first served’. There is a small room adjacent to the reception where around twenty guards sit.

Prior to introduction of ‘Smart cards’ and ‘Automatic magnetic locks’; the security guard used to usher the first visitor of the queue up to the concerned cabin of the visitor and he used to wait outside the cabin, till the return of a visitor in an average of 21 minutes of call. The guard used to once again escort and bring the visitor back to reception counter and used to carefully ‘See off’ the visitor’s departure. In the meanwhile, other security guards used to take the second visitor to the concerned cabin and same exercise used to follow. Baring one hour lunch break and half an hour of tea break, the actual time allocated for visitors had to be around six and half hours. On an average, twelve to fourteen visitors per cabin used to be entertained during a day.

The total number of them used to be around two hundred only; the rest of the visitors standing in a queue, were called back again on next day. More than $2/3^{rd}$ of the visitors were denied the calls and they were compelled to try, time and again, by depending upon chance and luck. At the entrance, there used to be strict and thorough security checkup and then they were allowed to enter into the reception office. There was a separate team of security guards to execute the security checkup. The other team of guards was detailed to usher (an escort) the visitors upto the cabin; in order to insulate the security to the top bosses of Tatas. This system was
ridiculously disgusting. All the VIP visitors used to get annoyed and
insulted by the stress caused by that system. The funny thing was
that they had to stand alongside with all strata of people who used
to join in the same queue for sorting out their problems of regular
flows of their assigned charitable remittances.

The whole system for entertaining the visitors had turned to be
dismal both to Tata Bosses and the visitors, as well, because the
bosses could not meet the VIP visitors and take prompt decisions
and actions, in the interest of their companies; which virtually
amounted to colossal losses to their establishments.

‘Guardless ushering’ was the most appropriate solution for
sorting out the problem. Tata Honeywell studied the existing
system of ushering and escorting of the visitors by the manual labor
of security guards. There were ten usherers at the monthly salary
of Rs. 40,000. Their combined yearly salary expenditure was
around Rs. 57 lakhs. There were senior supervisors who used to
keep watch on the usherers at the monthly salary of Rs. 1 lakh per
person. Therefore Bombay House used to spend another Rs. 60
lakhs on the existing system, as the security guards had to be
continuously monitored and checked because of the high profile
nature of occupants at the Bombay House. In all, its security
system used to require a sum greater than Rs. 1 crore per annum.
The system had proved to be a serious flop one.

Tata Honeywell proposed an alternate plan of ushering and
escorting of the visitors by using the ‘Smart card’; a smart card
reader (electronic instrument) and by fixing magnetic locks to each
and every door of staircases, lifts, common passages and cabins on all the floors of the building.

After finishing the routine security at the visitor’s desk, the receptionist used to enter the name of the visitor, the floor number, the cabin number, the person to whom the visitor desires to meet and used to allow to proceed of his own without the ushering of the security guards. The sensor/reader at the door of the lift used to read the details from the smart card and automatically allowed the visitor to enter. After his entry, the lift would take the visitor to the floor on where the cabin of the person to whom he wanted to meet was present. After reaching the allocated floor, the lift used to open. The visitor then used to walk on the common passage upto the door of the cabin number assigned to him. A smart card reader/purely electronic instrument/as per new arrangement used to read the data from the card; check the validity of the card and the door would be open if the data was valid. After the visitor’s entry, the door was automatically closed and locked. If any unauthorized person tried to enter or by mistake authorized person on that floor tried to enter the wrong cabin, an alarm used to make the security cabin alert downstairs, near the reception counter. All the adjacent doors used to get locked and unauthorized person used to get stuck in the passage, itself.

While making exit from the cabin, visitor was supposed to show his smart card to the reader, (which was also on the backside of the same door). The reader used to check the authenticity and the door would open and after the visitor’s exit, it would close automatically. By showing the smart card to the lift door, the visitor would use the
lift for reaching the ground floor and make final exit from the premises of Bombay House.

Staircases were closed by magnetic lock, so as to prevent their use for going to unauthorized floor. In case of wrong entry of unauthorized person, the alarm sounded at the security cabin. After fire alarm, all the doors of lifts would get locked and lifts were suspended and not allowed to be used. All the doors of cabin, passages and staircases would get automatically locked and the security guards could then investigate any unauthorized entry.

Thus the new automatic security system, without involving manual security became not only the full proof security, but also it brought overall efficiency and optimum utilization of time. It saved nearly 60% of the office time which was required for manual ushering and escorting. The bosses of various Tata group companies now could entertain more than 20 to 30 visitors, per day, which means 300 % rise in the ‘quality time utilization’. The greater the number of such negotiation deals; more is the turnover of Tata and greater profits. The satisfaction quotient of the visitors also radically improved. Prior to the new reception system; visitors were completely unsure whether they will ever meet the Tata bosses within a day after calling continuously for three to four days! It was almost speculative and uncertain. Both the Tata bosses and the visitors having business relations with various Tata group companies; ‘Visiting Bombay House’ was an experience of threatening nightmare! But with the new system, it became a smooth and delightful experience.
Tata Honeywell required about Rs. 7 lakhs for the cost of ‘software development’ and about Rs. 7 lakhs for the purchase and fixing of magnetic locks and electronic card readers. Being an allied company viz. Tata Honeywell, the company offered the installations of the new system on concessional rates for Rs. 15 lakhs; by keeping a profit margin of only Rs. 1 lakh. When Bombay House was extremely delighted by this automatic visitor management system, the other company offices of Tata group of companies gave many orders to Tata Honeywell. By mouth to mouth publicity, Tata Honeywell could multiply its business by 10 times more, within only one year by raising the price of packages and the number produced.

Tatas as clients also became happy, by trimming down the number of security guards by more than 60% and save the salary expenses of Rs. 60 lakh per annum. That expenditure was never a big problem to Tatas; but loss of goodwill and courtesy to visitors was a more serious problem which was sorted out by the new visitor management system.
Case Study 5

Cost Cutting at ONGC by the Use of ‘Smart cards’

The number of existing and retired employees of ONGC are more than three lakh persons; a very large figure next to Indian Railways; among the public sector industries. All of them, working and retired are covered by the ‘Health scheme’ which provides all the necessary medical facilities to the employees and their families.

The H.R. Department of ONGC had enormous work of making plans of transportation by ships, helicopters etc. so as to transport its employees to the places of ‘Rigs’. It used to detail particular employee on a particular Rig so as to enable him to know by which ship he was supposed to board or by which helicopter he was supposed to lift him from the shore to the Rig. Planning of duties of such a big number was a tremendously difficult job. The service book of the worker not only used to keep the accounts of his salary, special allowances, the number of days of actual work on a Rig, the number of days ‘off duty’; the leave account, the exact names and numbers of workers on duty at Rig, the information regarding any mishap/accident and the exact report about the casualities etc. etc.

All these things were done at ‘ONGC Bhavan’, Bandra and at ‘ONGC Gandhar’ office in Gujrat. Due to manual and clerical operations, there used to be long delays and total chaos; in the routine working of the H.R. department.
The nature of routine duties of every employee also happens to be very complicated. Because every worker can stay on the Rig in deep sea only for 21 days, after 21 days of heavy duty; he has to be given 21 days off and he was allowed to go to his native place of family residence. Another variance used to cause confusion because every worker who used to work on ‘Land duty’ for 3 months would get complete rest for one month.

Every Rig approximately can accommodate only 400 to 500 workers as the Rig is in deep sea, hence normally cannot be made larger than 100 meters diameter. ONGC has to provide all the facilities of food, bed, medical aid etc. of seven star hotel amenities. The temperature on the Rig is abnormally humid and hot so the working conditions are very tough and hazardous.

After enjoying 15 days ‘off duty rest’, a worker has to return to Mumbai at least six days in advance to know his details of his transportation due to the chaos caused as mentioned above. Thus a worker used to return to Mumbai six days in advance; therefore he used to forfeit the enjoyment of six days of duty rest. After his return, he was supposed to report to ONGC Bhavan and used to get instructions about the name of the particular ship or the helicopter, their time and date which were supposed to lift him from the Mumbai shore to the Rig. This whole planning used to require three days within which he was supposed to stay somewhere near ONGC Bhavan, and ONGC used to bear all his hotel expenses of lodging, boarding and transport etc. After getting exact plan of reporting, the worker was asked to go to the shipyard or the helipad as per his schedule. After reaching the shipyard, the worker used to get
‘his passage certificate’; after elaborate verification of his service book, his assignment done by H.R. Department of ONGC Bhavan. The clerical staff of the ship used to send the information to ONGC Bhavan about the persons reported and the persons moved by the ship in the sea. Similarly, the helipad would send the information to ONGC Bhavan about the persons reported and the persons moved by helicopters to the Rig. Three days were required to reach this information to ONGC Bhavan; from the port and the helipad. The worker used to require about seven hours to reach the Rig in the ship which is to carry him or about an hour by helicopter. He was supposed to wait for another hour or so for actual lifting to the Rig by the crane from the ship. From the next day; his 21 days duty at the Rig used to begin. Then the staff at the Rig used to convey the message to ONGC Bhavan; that a particular worker had completed his 21 days duty. Again the instructions of his return journey by ships/helicopters used to be passed to the Rig staff. The transit used to require three days, therefore Rig staff used to communicate the report in advance i.e. on seventeenth/eighteenth day of his duty. If the instructions from ONGC Bhavan were delayed, the worker used to get three times of his salary, if his stay exceeded more than three and less than seven days. After the time lag of communication, he used to proceed for his ‘Off duty rest’.

For getting doctor’s treatment and purchase of prescribed medicines, he was required to show his service book, while reporting at the ship, as well as, getting boarded on helicopter he was required to do a lot of paperwork and obtain passes. All these obstacles used to induce malpractices and abnormal favors, by paying the bribery price of them.
ONGC used to spend lakhs of rupees on its clerical staff for planning to send employees to the Rigs for 21 days duty and to ask them to return for 21 days Off duty rest. Due to the large number of more than 2 lakh workers; this work used to require huge costs but even then, there used to be serious snags, delays and confusion due to the manual operations involved.

The need for obvious solution was felt by ‘CMC’ – the biggest software service working under the public sector. CMC has a reputation of being one of the few professionally competent companies. CMC being a public sector company receives special concession of 10 percent rebate and gets payment of the ‘Lowest Bid Amount’ offered by any private sector company.

CMC approached Tata Honeywell for helping them to prepare a ‘Software package’ and the preparation of Smart cards along with the equipment of ‘Card Readers’ etc. CMC finished the work of entering the record by producing a software for the same. Tata Honeywell gave them the ‘solutions’ by producing the package essential for operations and use of the Smart cards.

The Smart card became such a fantastic solution that ONGC was extremely satisfied. The card became successful in removing all the delays, costs, and confusions etc.

ONGC could save crores of rupees in the transit delays, in which it had to bear three times the salary of the employee, the workers could easily get planned information in advance about the ship and helicopter etc. and smoothly could report to the Rig after enjoying
fully the ‘Off duty days’. The workers also could purchase medicines and get the treatment from the doctor promptly by showing his card. ONGC HQ got the detailed data about the names of employees at the Rig, the names of the casualities in cases of mishap etc. The malpractices of seeking special favors were automatically stopped. ONGC especially was benefitted by avoiding wasteful costs caused by inefficient manual planning and accounts. The computerized operations enhanced its efficiency in multiple times.

ONGC employees work for explorations and drilling, as well as, extraction of crude oil and its refining. Every Rig has a shape of Christmas Tree and is deepest at the bottom of the sea.

While refining of the crude, we get ‘natural gas’ plus ‘nafta’. When ‘nafta’ is cracked, we get Polypropelyne, high density polyethylene, plastic, nylon, CNG and LPG gases. By heating crude to 200 degrees celcius, we get kerosene and white petrol. At the temperature of 480 degrees celcius, we get petrol, whereas at the temperature of 800 degree celcius and more, we get Diesel, High Density Diesel and Engine oils. A very High Density Diesel is used in furnaces and lastly we get tar.

Since Diesel requires too much heating, its price is more expensive than petrol all over the world. But Indian crude has a large content of wax, wax is to be separated therefore that cost is certainly greater. However, Diesel output in India is four times more than that of Petrol, therefore use and sale of diesel is encouraged by Indian Oil Companies by granting subsidized pricing
of diesel. Reliance therefore could not compete with Indian Public Sector Oil companies viz. Indian Oil companies, Bharat Petroleum, Hindustan Petroleum because they receive subsidies from the Government. Since in recent years, petrol prices are linked to World market prices and move up during winter and fall down in summer because of supply conditions; at present, petrol prices are changed from time to time. Reliance had made a countrywide network of its petrol-pumps; after the linkage of Indian Petrol prices to world market prices; (No regime of administered prices). Reliance once again has started selling petrol in their pumps. Reliance, recently also has explored a new stock of natural gas and intends to start a refining unit of its own. At present, out of four existing crude mines, Bombay High and ‘Gandhar’ near Dahej are supplying the bulk of petro products.

The Smart card system has, no doubt, brought a welcome ‘Order’ in planning, detailing, transporting, communicating and calling back the workers from Rigs to their ‘Off duty’ destinations, providing prompt medical facilities to them and their families, settling their leave and salary accounts by computerized operations carried out by the ‘Software packages and the Smart cards’. It has saved huge costs of ONGC and removed the problem caused by chaotic manual operations of work-planning of its H.R. Department.


**Case Study 6**

**Huge Cost-saving by Optimum Deployment of Human Resources in IT Business**

Indian IT companies like Wipro, Infosys, ABB, Siemens, Emerson, Mahindra, Accenture, Cognizant and TCE etc. have been getting fabulous business for producing the appropriate tailor-made software packages according to the needs and instructions of World’s giant hardware companies like Microsoft, IBM, Oracle, SAP, Google etc.

There are mainly three sources of IT Business.

A) **Projects** – The project is assigned by the client if he finds the bid and terms of contract quoted by the Indian IT company (are) acceptable to him. After the completion of the project, the fixed amount of contract is paid and the deal is finally settled. Sometimes, the client also gives a sumptuous advance before the final settlement of the bill.

B) **Job Assignment** – The client gives a contract to Indian IT companies for carrying out a specific job within the time limit. Payment is done on the basis of per hour. Payments are done by the client fortnightly on the basis of Time and Material quality per hour. Deductions for wasted time and errors are done by the client at the time of fortnightly payments.
C) **Service Requests** – The clients such as DHL courier service—the world’s biggest supply chain manufacturing company makes specific requests for availing services of the Indian IT companies. The payment is done on the basis of Time and Material quality per hour. The serious problem emerges when client companies are closed for 2 weeks in Xmas in U.S., U.K. and Europe; 2 Golden weeks of Thanksgiving in Japan in January, New year celebrations from end of January to first week of February in China and hence, there is complete stoppage of the communication between client and Indian software companies.

Patron companies like Microsoft, Oracle, SAP etc. give assignments of parts of the whole programme to Indian IT companies. That part is supposed to be developed by our personnel. Billing is done by Indian companies after the job is finished or fortnightly billing is also entertained as the work proceeds. The patron companies deduct the respective amounts on account of wasting of working hours and the quality of the work. (If there would be errors, they deduct the amount per error). Normally billing is done on the basis of one working hour of the IT Engineer/BCS etc. and the rate is fixed in terms of dollars per working hour.

The central and common problem of all Indian companies is that, Indian companies do not get the full amount of billing; because there is a serious lapse in exact deployment of the worker, planning and coordination require for optimum utilization of labour resources and communication gap between ‘Delivery Head’ and ‘Project
Manager’ in detecting the idle human resources whom work is not allotted promptly.

The main leakages in full utilization of human resources occur due to the following reasons and the areas.

There is a potential revenue leak at each stage

The case study of Wipro alone, reveals shocking information and fact that as against, its total billing to its clients which is equal to $7.25 billion; Wipro receives only $3 billion; because the clients deduct the billed amount on the basis of wasted hours and the quality of the work. Thus by and large, Wipro has to bear the loss of about 60% in its routine billing. This loss is very unfortunate and unacceptable to the principles of management. The loss occurs only because of the failure of perfect human resource management.
Let us know the reasons of these losses due to lack of vigilant personnel management. Since 1995 onwards, IT companies are continuously getting ‘Outsourcing’ orders and the buoyancy has sustained for a period of more than decade except Mid August 2008 up to “December 2009, a very small period of almost 1 ½ years when conditions had become quite frustrating. From January 2010, a new and stronger wave in favor of IT industries in the country has re-emerged. Demand for IT personnel is continuously greater than the supply at a point of time; therefore IT companies have been recruiting hundreds of IT men/women by offering very high salaries and cannot afford to be very serious and demanding about the ‘quality’ and ‘capacity’ of the young entrants. They are required to make compromise with the existing available quality. The ‘attrition rate’ in the IT industry also is very high; therefore companies have been pampering the IT men, by giving additional perks and allowances, so as to prevent their ‘job-hopping’.

The entrance examination and selection interview have become virtually a farce; because the H.R. Department relies only on one book which has objective questions on logical thinking, simple and basic mathematics and aptitude in computer use applications. Those who score six to eight marks out of ten; are selected, others are rejected because they are either more or less intelligent than the normal avarage B Grade candidates!

H.R. Department uses flexible compromise of appointing computer engineers, MCS etc. by priority but accommodates even persons having BCS or other diplomas in computer training. The number of
employees in prestigious IT companies like Wipro/TCS/Infosys etc. normally exceeds 20000 per unit.

Since the number of projects also exceeds hundreds; there are equal number of teams whom the project work is assigned. It is nearly impossible to manage planning and coordinating the work assigned to such a large number of workers; who are not working at a machine but at the computer; therefore there is basic difference between brawn and brain and computer operators happen to be ‘knowledge workers’.

Within a period of 2 to 3 years, a new entrant is promoted to the position of a ‘project leader’; within another couple of years, he is promoted to the position of project manager. Experience of 8 to 10 years enables a person to become ‘delivery head’, who is supposed to be a coordinator and liaison between top bosses and the project managers, below. A large number of IT personnel, consists of teenaged, quick tempered and immature young men. A project manager naturally is inclined to ask surplus labor force; extra and above, the normal requirement; because as the work proceeds and he finds paucity of men; he cannot readily gets them and his work suffers. Therefore he is interested in ‘Retaining large sample workforce than required’ as a safety measure. This practice is followed by all project managers; therefore 20% to 30% extra workforce is employed and included in billing.

This extra force does not get any work. They just sit at the bench and nobody bothers to allot them some work or the other and keep them productively engaged. Between two projects; there
is often a time-lag, when actual work is not there, the persons continue to be engaged with that bench; without getting any work assignment. They are not transferred to other projects or benches because nobody is authorized to make such deployments. These Teenaged project managers, who lack in experience of making correct estimates of normal costs and the contingency costs arising due to unprecedented circumstances, are asked to make quotations of their ‘lump sum billing’ to the client party. They are so much concerned to get the contract and are nervous with a thought of losing it; they often underestimate the quoted amount of the remuneration for their project. They also do not take into account of average number of days when the worker does not report for work; either for its casual or sick leave. They also do not make estimation of the total percentage of absenteeism of their team. The result is that their bills are refused by the client company and they are paid less by deductions for wasted hours and the unsatisfactory quality of the work.

Furthermore, there is a very serious communication gap between project leader and project manager and again between delivery head and project manager. The only competent person The delivery Head - who is supposed to get information about the actual persons working on different benches and projects and is supposed to detail a person on other bench and project; cannot perform these coordinating tasks; because of the ‘communication gap’. It has been found very frustrating fact that there is a total communication gap between project manager and a client from abroad and vice versa therefore compliances of changes told by client are either not carried out; or the status of work carried out by the project
manager often does not reach the client. This gap affects the actual billing because the client has every genuine reason to reject the claim as the work is not satisfactory, as per his instructions.

In software IT industry, Manpower is the most crucial and important factor and the biggest component within the total cost. “Leakages in optimum manpower utilization add to huge losses to the IT companies which are worth hundreds of crores rupees.

During 2008/2009, the author of this research study was working as a vice president of a IT company viz. Compulink Systems Limited which used to provide services for cost reduction in problematic industries. When Wipro approached my firm; we accepted the offer and started developing a program of “Service execution management” – which we named as “WHIZIBLE”.

In Whizible package, there are eleven modules by which entire program is available at centrally located server. It can be referred and used time and again by connecting through internet. When project plan is ready, allotment of various tasks are assigned to the concerned executives, developers, programmers, team leaders etc. of various departments. If any minor or major change is brought in the existing program, it is exhibited on the server; which becomes convenient to follow it smoothly. By this program, data regarding how many persons are on leave or absent, how many of them are working on different benches, how many persons are sitting idle without clear assignments of work, how many persons are actually working on a project bench and how many of them are in surplus reserves, without any work assigned. This complete information is
visible to all from time to time, by updating done in it time and again. Due to this solution; the communication gap between Delivery Head and the Project leader, has been removed. Delivery Head can immediately take decisions of deploying the idle and surplus labor, whenever it is needed very urgently.

The Marketing and Sales Department became fully aware and confident of actually available manpower; therefore could bring a larger number of ‘Work Contracts’. By making full utilization of manpower, greater number of contracts could be completed within the scheduled time and the amounts of ‘Billing’ being the principle source of company’s income, started increasing. It was made mandatory on the part of every employee to fill the Daily Timesheet; therefore it became easier to find out instantly the difference between the income and the cost. If Loss was detected for a day or two; immediately corrective actions could be taken to prevent loss and earn profit. Prior to the introduction of ‘Time Sheet’; the worker used to take nine hours for finishing the job which was allotted for six hours. When the work was rejected by the client due to errors; the concerned worker was asked to rework on it. There was no check and regulation of Time Variable, therefore a worker used to take too much long time for finishing it. The client company deducts the part of the amount of billing required for rework. Under the new program, the worker was compelled to enter the Time sheet for Rework; thus it was easily recorded and deductions of his remuneration, could be done promptly.
Due to ‘Whizible package’; the losses of Wipro amounting to about $400 billion; reduced by net 10%; i.e. $40 billion the company could earn additional profit along with the routine profit. Due to this package, invoice of every project used to be forwarded to the client company by 16th of every calendar month; and Wipro used to receive the payment from client on every 30th day of a calendar month. Every project manager now can forward his billing invoice through the common software; addressed to the respective clients. Due to this solution; the delays in receiving payments were avoided and the company started enjoying comfortable cash flow to meet its current costs.

The rough estimates of the losses due to wrong managment of human resources were as follows:

A) Wipro could have done revenue worth Rs. 773 Crores in 2003-04. Actually due to inefficient utilization of available human resources, the actual revenue was Rs. 533 Crores only.

Looking at the above WIPRO management initiated a process to find a solution to take corrective action and reduce the losses. Wipro case study is as given in Annexure 1 A.

The high level benefits Wipro received from Whizible is as follows.

B) Losses on idle labor at benches were about Rs. 132 Crores.
   By the use of ‘Whizible’ they were reduced by Rs. 20 Crores.
C) Losses of Project bench were around Rs. 48 crore. By the use of ‘Whizible’ they were reduced by Rs. 23 Crores.

D) Changes in work-Losses used to be around Rs. 29 Crores; By the use of ‘Whizible’ they were reduced by Rs. 10 Crores.

E) Rework- Losses due to rework were about Rs. 31 crore. By the use of ‘Whizible’ they were reduced by Rs. 16 Crores.

F) The total gain of Wipro by using the package of ‘Whizible’ was about Rs. 69 crores. (20+23+10+16 = 69 crores).

The Compulink Company could earn Rs. 15 crores plus within seven years of its working.

Because of the success of Compulink’s Whizible solution, Compulink got many more similar clients and could raise its status of Rs. 2 lakh p.a. turnover company to Rs. 20 crores turnover company!

The funny thing to note is that Wipro is reputed as a company of international repute; to provide solutions to the client but was clueless as to find appropriate solution for its inefficient and inadequate utilization of available human resources. Thus a ‘Solution-giver’ company had to become a ‘Solution taker’ one; and a small company like compulink could become a savior of a Giant company like Wipro!
CASE STUDY OF
USAGE of Whizible at WIPRO
Client Info

Wipro technology is one of the leading provider of integrated business, technology and process solutions on a global delivery platform.

Wipro Technologies is a global services provider delivering technology-driven business solutions that meet the strategic objectives of our clients. Wipro has 75+‘Centers of Excellence’ that create solutions around specific needs of industries. Wipro delivers unmatched business value to customers through a combination of process excellence, quality frameworks and services delivery innovation. Wipro is the World’s first CMMi Level 5 certified software Services Company and the first outside USA to receive the IEEE Software process Award.

Wipro’s Service portfolio includes:

- Business Intelligence & Information Management
- Enterprise Application Services
- Infrastructure Management Services
- Business Process Outsourcing
- Consulting Services
- Testing Services
- Product Engineering Services
- Enterprise Technology Integration
- Total Outsourcing
Business Challenge

With more than 1,00,000 IT professionals spread all over the globe and 75 odd centers of Excellences deploying a diverse range of practices and process, Wipro faced a unique challenge in Service Execution Management. While the need for process and service execution automation was a foregone conclusion, choice of a single integrated solution wasn’t. Wipro’s Information Systems division implemented SAP for contract administration and continues to build in-house solutions for process and service execution.

In 2004, bid management was executed in home grown tool called Predict. Post contract projects initiation phases were mapped to SAP product Module, while a host of other tools, provided the functionality required for Service Execution and Project performance reporting. IPAT, an in-house tool provided for only the capture of project performance date but didn’t have the support for processes themselves, such that this data could be generated in the course of execution. This dichotomy fuelled the need for single integrated solution and let to discussions between Wipro and Glodyne – a leading provider of Service Execution Management product and services globally.
Solution and Approach

Whizible, now Christened E-cube in Wipro– Enabling Excellence in Execution within Wipro, Offered almost 80% of the base functionality and execution infrastructure services, required by Wipro. Although remaining 20% of the gap looked daunting at an estimated 30 person years to complete, Glodyne could demonstrate that they could be bridged in less than half the time estimated by using Whiz TM framework .Backed by Glodyne flexibility to work in a on-site/off-shore model and extensive implementation experience, Wipro was convinced of a complete solution, which would be available in time to support global rollout.

Both parties, entered into an agreement in August 2004.

E-Cube System was conceived as part of an integrated solution, consisting of Predict, SAP projects and Whizible. This solution is represented in the next sheet:
Joint teams of Wipro and Glodyne faced unique challenge of developing E-cube and rolling it out in parallel. There are many process models followed by Wipro - Development, Maintenance, Testing, Conversion, EAI, ASIC, Board, Agile, EAPM Metrics, Managed Service to name a few. Each process group needed functional support from E-cube to support its own specific needs.
and metrics, before the tool could be rolled out. At the same time, there were other non-functional requirements, which needed support in E-Cube for it to be operational. These requirements includes:

- Interface to SAP and Effort Billing Systems
- Off-line Timesheet to Support users, who did not have access to Wipro LAN or internet to access E-Cube application.
- Authentication against Wipro Active Directory server
- Audit Trail requirements, as per Wipro Security policies

Non functional requirements were critical to rollout, whereas functional requirements (support for process models) could be added as rollout progressed to those areas.

Based upon the situation at that time, an aggressive implementation plan was prepared by the implementation teams and the whole implementation was completed as per the schedule given below.

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<tr>
<th>Phase</th>
<th>Complete Initial Solution</th>
<th>Nov 04 - Sep 05</th>
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<tr>
<td>1</td>
<td>Complete Initial Solution</td>
<td>Nov 04 - Sep 05</td>
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<tr>
<td></td>
<td>Implement Non functional requirements</td>
<td>Nov 04 - Sep 05</td>
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<td></td>
<td>Implements Common functional requirements</td>
<td>Nov 04 - Sep 05</td>
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<td></td>
<td>Provide supports for development and Maintenance models</td>
<td>Nov 04 - Sep 05</td>
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<td></td>
<td>Glodyne Team Moves on-site (Bangalore)</td>
<td>Nov 04 - Sep 05</td>
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<td>Phase</td>
<td>Rollout to First set of 3,000 users</td>
<td>Rollout to 10,000 Users</td>
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<td></td>
<td>Rollout to initial 3000 users</td>
<td>Make Architectural Development changes (Web servers and Database server, PDMR server and QRB server)</td>
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<td>Glodyne Teams offshore ,expect Application support team</td>
<td>Carry out Scalability improvements</td>
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<td>Provide Support of testing ,ASIC, Board, BI&amp;DW and EAPM process models</td>
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<td>Enhance Project performance reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rollout to next set of 7000 users</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Rollout to First set of 3,000 users</th>
<th>Rollout to 10,000 Users</th>
<th>Rollout to 25,000 users</th>
<th>Functional Enhancements</th>
<th>Functional Enhancements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Oct 05 - Mar-06</td>
<td>Apr 06 - Dec 06</td>
<td>Jan 07 - Mar 08</td>
<td>Apr 08 - Mar 09</td>
<td>Apr 09 - Mar 10</td>
</tr>
<tr>
<td>3</td>
<td></td>
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<td>5</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
| Phase 6 | Functional Enhancements And 9x Upgrade  
|        | - Account Risk Register  
|        | - 9x Upgrade (E-cube on top of Whizible New feature and UI change)  
|        | - MSP project integration New Approach for Wipro  
|        | Apr 10 - Mar 11 |
| Phase 7 | Functional Enhancements  
|        | - Open sources changes  
|        | Apr 11 - Mar 12 |
Case Study 7

Cost Reduction Devices viz. Programmable Logic Controller (PLC) & Distributed Central System (DCS) for improving & maintaining the production quality of HPCL

Before 1991, Public Sector Refineries used to depend on manual operations to maintain the quality, consistency and the purity of every petroleum product. There used to be ‘hand operated controlling knobs’ which used to be operated by several men appointed for that work; the cost of which used to be not only very high but, there was overall lack in precision in adjustment of the knobs from time to time. The result was that petrol used to be mixed up with diesel and other impure substances.

While using such mixed petrol, the carburetors of the cars used to get choked by the carbon dust and the cars used to face ‘break downs’ due to the blocks in smooth supply of petrol. Everyone who has used cars during pre-reform years i.e. since 50’s to 90’s must have experienced this problem and mechanics always used to suspect about the choking of the carburetor. Mixed petrol was the major cause of breakdowns of Fiats and Ambassadors.
After reforms, high tech world class cars and foreign cars have driven old Fiats and Aambassadors out of the market. All the new cars like Maruti, Suzuki, Honda city, Hyundai, BMW, Chevrolet, Ford, Toyoto etc. badly require pure petrol or pure and best quality diesel. Since petrol market in India also got linked to global market and global companies, as well as, private companies like Reliance were allowed to open their petrol/diesel supply pumps; the public sector companies like Indian Oil, Bharat Petroleum and Hindustan Petroleum were seriously threatened by the competition; in giving best quality petrol; because their monopoly status was threatened.

The public sector companies suffered a crisis of their very survival; hence they had only 2 options left viz

a> either improve their quality of petrol/diesel or

b> to close their production; by losing their customers and their market.

The main problem was Indian Public Sector Refineries used to receive supply of crude from various sources like Bombay High, Gujarat, Andhra Pradesh and Assam, etc. After an interval of every 4 days, crude used to reach refineries and they used to require different temperatures as per the quality and the source of their supply of crude therefore standard temperature control; common for all, was not feasible.
Following variations in temperature control for getting various petroleum products are mandatory.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Description</th>
<th>Temperature in Farenhiet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White petrol</td>
<td>50 to 90</td>
</tr>
<tr>
<td>2</td>
<td>Gasoline or ordinary petrol</td>
<td>90 to 220</td>
</tr>
<tr>
<td>3</td>
<td>Nafta</td>
<td>220 to 315</td>
</tr>
<tr>
<td>4</td>
<td>Ordinary Kerosine</td>
<td>315 to 450</td>
</tr>
<tr>
<td>5</td>
<td>Light gas Oil or Diesel</td>
<td>450 to 650</td>
</tr>
<tr>
<td>6</td>
<td>Heavy Diesel</td>
<td>650 to 800</td>
</tr>
<tr>
<td>7</td>
<td>Tar</td>
<td>Residue after 800 and above</td>
</tr>
</tbody>
</table>

Since the range is very wide; precisely appropriate temperature cannot be maintained and altered by manual operations. In order to overcome this main difficulty, two things were absolutely essential viz

1. That tuning up the required temperature by main “distributed control system” and

2. The precise measure of the purity of the refined output

Since 1983 onwards “computerized programmable logic controller (PLC)” and “analog controllers” were used in the functioning of “distributed control system. “PLC’s were distributed in different units/plants/processes for managing their respective controls at micro level. All these PLC’s were centrally integrated and the main control used to be done from a “blast-proof control room”; and a giant controller was used to control the various processes through
the PLC, automatically. It used to give output signals to various PLC’s and analog controllers.

The system was made foolproof. In case the giant controller fails from the control room, the rest of PLC’s and analog controllers which are spread over the whole plant could independently continue to operate and control their own units and processes.

In case any emergency arises, “emergency shut down system” automatically gets activated and shuts down the boilers and the heaters and the complete plant in predefined sequence. Such a probability is 1:10,000! As a safety measure, every refinery is also well equipped with a cooling tower, too.

HPCL approached Tata Honeywell Co. for supplying the entire Distributed Control System with PLC’s and various types of sensors to detect precisely the various parameters of the purity of the product such as temperature, pressure, viscosity, humidity, and the world class quality.

Tata Honeywell team led by the author of this research study visited HPCL refinery site and studied the minute details of the required solutions to its problems. In this field Tata Honeywell has competition from Yukogawa and Foxboro. We came back and proposed a solution which was accepted by HPCL. HPCL then sent out the RFP to all vendors and we won the order after successful bidding and then developed the whole system for HPCL for operational efficiency.
Our Research and Development introduced a ‘Distributed Control System’ equipped with n number of PLC’s and analog controllers, plus the sensors to measure and judge various parameters of the purity and we wanted the whole system should work automatically and precisely by removing the costs and errors of human operations.

In the year 1992-93, Honeywell gave the first ‘distributed control system’ viz DCS under the brand name of TDC 3000! It was bought by the company at the price of Rs. 15 Crs. The company was very happy because it could produce the world class quality petro products. In the year 2001-02, Honeywell introduced a better and more efficient model of DCS: TDC 3000 II and sold it to HPCL at the price of Rs. 35 Crores.

HPCL was immensely benefited by this control system because its production per annum used to be worth greater than Rs. 10,000.00 Crs. The cost: benefit ratio to it was Rs. 35:10000 or Rs. 3:1000 by spending Rs. 3/- company was getting the quality petrol worth Rs. 1000/-. Due to the quality of HPCL; the sales turnover of the company went on increasing from 10,596/- Crs., in 1993, To Rs.13,329/- Crs in 1995 to Rs. 52,605/- Crs. In 2003 to Rs. 76,920/- to Rs. 112,098/- Crs. and above.

TDC 3000 became a hit product in the entire market of petroleum companies. It became popular in the entire market of petroleum companies. It was purchased by Bharat Petroleum Corporation, Indian oil corporation, Baroda, Vishakhapatnam, ONGC etc. In the year 1992-93, Tata Honeywell was a small company
having a business turnover of only about Rs. 20 Crores; it became a monopoly giant worth Rs. 2000 crores within 10 years by multiplying its business and market.

TDC 3000 has created record success in India as Honeywell with a clientele to Worlds giant refineries of ARAMCO, EXXON, Chevron, Shell etc. has done world-wide business and has become number one control system in the Oil and Gas sector of the global refineries, in the world.
Case Study 8

Huge Cost Reduction done by Software developed by Ecoaxis for diagnosis of ‘Boiler Health Intelligence’

Ecoaxis a firm emerged in 2004-2005; as a small firm providing complimentary ‘After sales Service’ to Pune’s Giant Factory viz. Thermax which produces Giant, large and medium boilers and sells them to its various clients like large power projects, chemical factories, sugar factories, refineries, paper and pulp industry etc.

Thermax happens to be India’s top ranking firm in the Boiler Industry. In recent years, five and seven star hotels, hostels, hospitals etc. also have started using boilers for saving electricity. Thermax also has extended its market and clients abroad in countries like Nigeria, Saudi Arabia and south-east Asian countries.

The boilers have different sizes, according to the needs of heating and producing steam which make generators work for production of electricity. They vary from six meter size upto sixty meters. Sugar factories require a boiler of ten meters long whereas power plants require them of the size of 45 to 50 meters; Refineries require very big viz. boiler of 50 to 60 meters, length.

The boiler has following parts; for example, a sugar factory boiler is 10 meter long, its drum is 2 $^{1/2}$ meters wide, it has one
meter open space, two meters long fire chambers followed after $1^{1/2}$ meters ash collector.

In case of power plants, there are two drums containing water and placed one above the other at a distance of approx 15 to 25 meters. These drums are connected with tubes through which water circulates between these drums. The whole area with drums and tubes is covered from all sides by metal sheets and a vacuum is created of about 20 meters wherein a giant fireball is produced to heat the water in the tubes and the drums. Once the boiler is superheated, it throws steam which is without one molecule of moisture and the steam activates and rotates the turbine. The turbine moves the generator on and power is produced. Sugar factories make use of their own sugarcane bagasse and save lots of costs paid to electricity boards. The hotels & hospitals which require thousands of units of electricity per day, also can save their energy costs by installing their own boilers.

In the course of the daily use of boiler, the smooth working of the boiler gets disturbed due to faults created by ‘Wear and tear’ of the boiler assembly. At time, a complete breakdown is also possible and because of the failure of boiler the entire production process of concerned industries become inoperative: till the team of technicians from Thermax visit the site and make necessary repairs and maintenance.

At the time of sale, Thermax assures its client ‘After sales service’ throughout the life of a boiler by charging four percent of
the sale value of the boiler. The clients also are happy and welcome this offer of ‘After Sales Service’.

Normally, after a breakdown; the boiler becomes once again operative within a time gap of minimum three days to maximum twenty days. The clients using these boilers suffer huge losses in crores of rupees in conditions of breakdown.

On an average, after a breakdown of the boiler a sugar factory faces a loss of Rs. 1 1/2 crore per day; 500 Mega Watt power project has a loss of Rs. 20 crores per day, chemical factories suffer from a loss of Rs. 50 crore per day and oil refineries loose Rs. 105 crores per day. No body wants any breakdown because it is unaffordable! Under such circumstances, Thermax also faced a lot of embarrassment and loss of dignified reputation and client’s goodwill, as well.

A young technocrat who had worked in Thermax and was fully conversant about the entire product assembly and process and knew the loopholes and vulnerable areas, had started a small firm which was interested in developing the entire diagnostic software package of Boiler Health Intelligence with embedded system of controllers and sensors which record the status of each component of the plant assembly. He approached Thermax company and offered his services for sharing the responsibility of ‘After Sales Service’ assured by Thermax to its clients. Thermax gave him the ‘break’.
Ecoaxis produced a ‘Distributed Control System’, by fixing sensors to different components of the plant assembly; by taking into consideration of all parameters of the ‘healthy status of a boiler’ like heating temperature, fire ball condition, content of molecules of moisture, swwot or carbon monitoring; Gun status, conditions of various valves, humidity, pressure, status of belts, the condition of motors, conditions of Turbine, power generators etc. It made assembly of sensors which read and report about the healthy or problematic status of each of them.

The whole software package identifies the existing faults or likelihood of occurrence of fault in near future, the exact therapy and timely action required for preventing a major fault and consequent breakdown, which parts are to be replaced, etc. This software sends the complete diagnostic reports and therapies recommended to the main service center at “Thermax HQ in Pune, minute after minute, round the clock, throughout the year.

Thermax Main Service Center started taking prompt preventive action in advance of the likelihood of a breakdown and minimized the days of total breakdown by about 80 percent. Clients therefore could save hundreds of crores of rupee losses and became satisfied with this new service.

Thermax by indulging the satisfaction quotient of their clients raised their maintenance charges up to eight percent of the value of the boiler assembly and clients were ready to bear them delightfully.
Thermax at present, gives two percent of the value of boiler assembly to Ecoaxis; for availing the latter’s diagnostic and therapeutic services.

A win win situation has been the result because now the clients are happy by reducing their heavy losses, Thermax the producer company gets six percent of the value of the boiler assembly.. (increment of 2% extra) and Ecoaxis gets a permanent and very charitable patron who grants a huge price for its diagnostic services.

Prior to 2005, Ecoaxis had a turnover of Rs. 20 lakhs per annum. At present, it has become Rs. 100 crores worth company and its progress has remained very rapid during the last three years.
Case Study 9

Energy cost saving by automation in the building complexes of Taj Hotel, Mumbai / Appollo Hospital, Mumbai, Manipal Hospital Bangalore and TCE, Mumbai

Construction of new buildings – at present – are done by total energy saving plan prior to the finishing of them. The problem of energy saving is seldom faced by them.

In case of old heritage buildings, like the one in front of gateway of India Old Taj Hotel or TCE building, Appollo Hospital at Mumbai and Manipal Hospital in Bangalore; Energy saving plans were not done because energy was cheaply available before 60 -70 years. Since there is absence of automatic gadgets for controlling the supply and use of electricity, and since not only electricity unit charges have sky rocketed but due to longer hours of ‘load shedding’, the costs of energy by using ‘inverters’ have gone up by ‘crores of rupees’.

In the year 2003-04; the author of this PhD research study was working with ‘Tata Honeywell Limited’.

The Managing Director of Taj Hotels, Mumbai made a query by approaching Tata Honeywell; whether they would be in a position to make ‘total energy saving plan by automation’ and solve the problem of overhead expenses of the hotel.
I was detailed to visit Taj Hotel and study the existing conditions and essential measures by which wasteful abuse of electricity could be avoided.

Our team made thorough examination of the ‘heritage building’ and found that the building was constructed fully by cut stones. The windows were old fashioned and they had only one layer of glass window panes. The glasses were white; therefore they used to radiate more heat from outside in the room therefore A.C. cut off temperature had to be set at 15 Deg C instead of normally required 22 Deg C for maintaining a comfortable room temperature. It used to consume greater electricity units. We proposed to use reflective window panes with a light blue tinge and recommended two layers of glass for windows – one outside and by keeping 3 inches of vacuum another layer from inside. The result was that outer layer of glass pane may remain heated during midday but it could not radiate heat inside the room, because of the second layer of glass shield designed by us.

Our team introduced automatic room temperature control at the desirable room temperature of 22 Deg C. After turning on the A/C, once the room temperature is lowered down to 22 Deg C, there was automatic arrangement of stopping the A/C; till such a transit period, when room temperature moves up to greater than 25 Deg C and above. Once again automatically A/C of the room would be turned on and brings down to the optimum temperature of 22 Deg C. There are huge and many corridors in Taj; which also need air conditioning. If a particular floor adjacent to a corridor; nobody occupies any room; still the A/C used to be on and it was of
nobody’s use! A room boy—by chance—makes a round; he used to switch off the button of the A/C.

There are many rooms on every floor of Taj building and the building has 5 floors. With partial occupation or no occupation; all the rooms of a particular floor used to get air conditioned by the central system of its switching on. Our Team recommended that each room and each corridor should have separate automatic control of ‘Switch on and switch off’ which could be operated by ‘movement detectors’ and embedded sensors. By the new system, which our team introduced, in case a person enters a room, his movement and presence were detected by the sensors and the lights and A/C used to be on: in case of his exit; the A/C and the light used to switch off automatically. In case of any visitor reaches a corridor, the A/C of the corridor and lights used to be on and after his exit it used to be switched off.

The very bright lights in the corridors used to continue burning even after 10am; during the broad day light. We introduced automatic dimmers which used to be automatically on after 8am up to 5 pm and during the rest of the hours, bright lights used to resume. Power consumption of ‘dimmers’ is less than 60% of the normal lights. We recommended a ‘common boiler’ instead of hundreds of separate geysers; which started supplying hot water throughout the day and night. That also reduced the heavy consumption of electricity.

To sum up, our new system introduced automatic control done by PIR sensors, movement detectors, centralized A/C system,
Centralized Lighting System by fixing dimmers. The wasteful consumption thus was totally removed.

Prior to the ‘energy saving by automation’ introduced by us, Taj Hotel expenses per year, per floor were as follows.

<table>
<thead>
<tr>
<th>Floor</th>
<th>Expenses (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Floor</td>
<td>Rs. 72 Lakhs</td>
</tr>
<tr>
<td>1st Floor</td>
<td>Rs. 1.2 Crores</td>
</tr>
<tr>
<td>II Floor</td>
<td>Rs. 1.15 Crores</td>
</tr>
<tr>
<td>III Floor</td>
<td>Rs. 1.37 Crores</td>
</tr>
<tr>
<td>IV i.e. Top floor</td>
<td>Rs. 0.98 lakhs</td>
</tr>
<tr>
<td>Total</td>
<td>Rs. 5 Crores 42 lakhs</td>
</tr>
</tbody>
</table>

After the installation of the ‘Automatic Energy Saving Plan’, the expenses per floor reduced as following.

Savings of Electricity expenses per annum

<table>
<thead>
<tr>
<th>Floor</th>
<th>Savings (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Floor</td>
<td>Rs. 19.5 Lakhs</td>
</tr>
<tr>
<td>1st Floor</td>
<td>Rs. 30.0 Lakhs</td>
</tr>
<tr>
<td>II Floor</td>
<td>Rs. 31.0 Lakhs</td>
</tr>
<tr>
<td>III Floor</td>
<td>Rs. 37.0 Lakhs</td>
</tr>
<tr>
<td>IV i.e. Top floor</td>
<td>Rs. 27.0 Lakhs</td>
</tr>
<tr>
<td>Total</td>
<td>144.5 i.e. Rs. 1 Crore 44 lakhs &amp; 50,000 only</td>
</tr>
</tbody>
</table>
Roughly our energy saving plan could reduce electricity expenses of Taj Hotel by about 23%.

Terms of completing our contract were also quite novel, interesting and very comfortably acceptable to Taj Management. The terms were following:

A) Tata Honeywell- partly belonging to Tata fraternity quoted and assured that we would save net Rs. 1 crore 45 lakhs from your yearly electricity expenses. Therefore Taj Hotel should reasonably pay that assured amount in advance! Our company actually required almost Rs. 1 crore 15 lakhs for refurnishing double window panes, lighting, fixation of PIR sensors and movement detectors, alterations in switches, wiring, equipment, plumbing material for Hot Water Supply etc. etc. So without spending a paisa from our own account; we could finish our job and got estimated profit of about Rs. 29 lakhs.

B) Our condition No. 2 was also acceptable to Taj Management that in case instead of Rs. 1 Crore 45 lakhs savings; suppose Taj Management actually saves Rs. 1 Crore only; Tata Honeywell will return Rs. 45 lakhs, because it is ethically bound to bear the responsibility of uncovered amount of savings. Taj Management very delightfully accepted it because it was assured of the total amount of energy cost saving of Rs. 1.45 lakhs.
C) Our third condition was also reasonable which was readily accepted by Taj Management. Taj Management was supposed to directly make payment of material, fixtures, alterations, equipment etc. to our suppliers upto the limit of Rs. 1 Crore 20 lakhs and Taj Management will give Rs. 25 lakh for our labour cost of installation, in all Taj Management has to pay advances of Rs. 1 Crore 45 lakhs.

D) Our fourth condition was that whatever Energy Savings will be due within the second year; after the installation of our automated energy controls; the Taj Management will give 50% share of the extra savings over and above the amount of Rs. 1 Crore 45 lakhs per annum. The Taj’s actual savings of energy happened to be Rs. 1 Crore 63 lakhs i.e. 18 lakhs over and above the target; therefore 50% share of that bonus savings plus Rs. 1 Crore45 lakhs of our consultation fee which we had deferred to receive after completion of 2nd year; in all, Tata Honeywell received an amount of Rs. 1.45 lakhs plus Rs. 91 lakhs!

E) From third year onwards, it was decided to share the net total energy cost savings equally. The actual savings amount stood to be Rs. 1 Crore 54 lakhs. Therefore Tata Honeywell received Rs. 77 lakhs.

F) From fourth year up to 10th year, Tata Honeywell went on receiving half amount of net savings and could earn Rs. 6 to 7 crores with a period of Ten years.
It became a win-win situation not only to Taj Management, Tata Honeywell but also to MSED because since the board is facing acute power-shortage and encouraging energy-saving, could save that energy and provide it to other clients.

Taj Management happily gave Honeywell similar contracts of all its hotels in the country. Tata consultancy (TCS) also gave another contract. ITC hotels, Apollo Hospital etc. also became new clients of Tata Honeywell.

In case of Apollo Hospital during the year January 2004 to December 2004, average Electricity bill per annum used to be Rs. 8 Crore 24 lakhs.

Honeywell gave the same solution and could save Rs. 2 Crore 95 lakhs. It had paid advance of Rs. 2 Crores; of which equipments required Rs. 1.70 lakhs and Rs. 30 lakhs for labors required for installation. After the second year; Tata Honeywell got Rs. 2 Crore 90 lakhs. After the third year Honeywell received half share of net electricity savings and earned about Rs. 7 Crores.

Due to the customer’s satisfaction and word by mouth, Tata Honeywell received contracts of energy saving of 26 very big properties.

Tata Consulting Engineering Company located on MG Road behind Kauveri Emporium which has 5 floors and many Halls of the area of 40000sq.ft. each; found colossal waste of energy cost. It has occupied a building on 99 years lease for annual rent of Rs. 1
lakh, but TCE has to bear and pay the monthly electricity bill. In large size hall, suppose there are about 100 tables and occupancy rate of tables is even about 20 to 30% , the entire hall used to remain air-conditioned and lighted. Tata Honeywell recommended separate lighting and A/C arrangement per table per cabin and installed sensors and movement detectors and introduced the automatic control of switch on and off depending upon the presence of a person working at a table. After the exit of last person from the hall, automatically A/C and lights used to get off!

After installation of our control system, TCE could save about Rs. 2 crores ((Its normal bill price to installation used to be about Rs. 6 ½ crores). By similar contract done with TCE on the pattern of Apollo Hospital and Taj Management, Tata Honeywell earned about Rs. 8 crores within 10 years.

Tata Honeywell has been a pioneer in launching the movement of ‘cost savings’ and many companies at present have developed special interest and concern in reducing the wasteful costs and raise their profits!
Case Study 10

Reduction in costs by removing communication Gap and Applying Six Sigma Methodology for minimizing errors in Manufacturing and Engineering.

Tata Honeywell buildings controls division used to take contracts of providing complete building automation for huge industrial and commercial buildings.

The implementation team used to prepare initial layout and plan of the proposed automation system to be used on the drawing received from the architects of the industrial and commercial buildings. This plan was handed over to the field team consisting of engineers and diploma holders having some background of construction and expertise on automation systems. After the visit to the local site these engineers used to make changes as required in the plan which many times were major changes as the site conditions would be quite different from the drawing given by the architects. Unfortunately these changes were never communicated back to the HQ where the ‘centre of excellence group’ team used to be stationed who were supposed to control the work proceedings. Generally the field team used to consist of persons having no sound and perfect knowledge and were having average competency.

This field team used to send us information regarding the installed and repaired material and the extra material to be ordered and supplied by our dealers but the information which they used to send, used to be vague and imperfect.
On the basis of their reports, COE team used to approach the dealers for supplying the automation material; on behalf of our client.

This author of the Phd. Thesis, that time had the privilege to work as head of the COE team. Because of wrong information received from our field teams, our orders used to be wrong and the client used to complain for the billing of 30 % unwanted material. If the installations used to be changed as per the latest amends done by architects; the entire material used to become scrap and additional costs used to be incurred on fresh orders of supplies. Client used to refuse to pay for such costs, and the company used to suffer losses. As a result, the bosses used to criticize the COE team.

The main cause of the crisis was that there was unpardonable laxity in keeping updated communication between field team and the COE team; as well as’ client and the COE team. Also at the same time while doing the assessment and benchmarking for Malcolm Baldridge business model for COE processes; it was observed that the COE team in Honeywell buildings control division was taking 30 % more resources.

At the same time, I had read literature about Six Sigma methodology and the success story of Mumbai’s daily Tiffin service (Mumbai Dabba Walla) and their record of maximum efficiency in avoiding errors.( less than 3 in 10 lakhs probable errors possible!). I decided to apply six sigma technique to improve the processes being used by COE.
As per six sigma method, we gave following solutions to make our system ‘error proof’.

A) Client / customer interaction directly with COE group, by use of Personal Computer and per minute, per day communication channel readily open.

B) We prepared (COE) standard data sheets, G.A. drawings, cable layout, Panel layout etc, and they were given to the field team. If any slight change was to be made, the field team had to communicate and justify to the COE team and COE would make the changes and mail the revised document to the field team. In this way all the changes were documented, vigilant control was maintained and all other agencies like suppliers were notified in time of the changes which avoided huge losses, due to supplies of unwanted material by our dealers.

C) We formed another team of ‘Quality Assessment Group” which consisted of few experienced and senior members of COE team. We made it mandatory to obtain the formal approval of ‘QAG’ group, without which no order could be given to the vendors / dealers.

D) We also started informing the customers and dealers of our standards of ‘reputed material’ for every job to our clients and dealers.

E) As per our study through six sigma we had noticed that one of the main reason for errors was also that our sales persons would submit the Bid documents directly to the customers
without getting the same checked from anyone and that would have a lot of errors which resulted in great losses to Honeywell. Hence we asked our sales persons to route the bid documents through COE and QAG for their approval. Also the sales persons were given the instructions to follow the ‘standard templates’ only.

By applying Six Sigma methods for bridging the communication gap; the results were the following.

1) 30 % of COE team engineer’s labour time was reduced. We had 27 engineers working in COE; by six sigma method, we actually started requiring only 19 engineers to manage the work as liaison between field team, client, dealers and Co. bosses. Eight engineers were transferred to another unit and our company saved lakhs of rupees spent on their salaries and overheads, (Approximately Rs. 22 lakhs on Salaries and Approximate Rs. 18 lakhs on overheads).

2) 30 % to 40 % of the automation and building material which used to be excessive, (more than required) used to be rejected by our clients. Our company used to bear annual losses of Rs. 1.8 Crs, after our solution, losses were reduced to only Rs. 18 Lakhs, because there was net improvement in preventing the errors, by perfect communication, system.

3) Our projects of automation of industrial housing and commercial complexes became successful and cost-effective, because the cost could not cross the estimated and guided limits.
4) The satisfaction quotient of our clients rose by more than 21.75%.

5) We got ‘Repeat Business’ by net increment of 52%.

6) COE team led by me got ‘Green Belt Certificate’ for applying successfully the six sigma methods.

**What is Six Sigma and standard practices of finding correct solution?**

We used the DMAIC model to tackle any managerial problem. D stands for define, M stands for measure, A stands for analysis, I stands for improve, plan, and potential solutions and C stands for control mechanism.

As per this logic, we initially understand the client’s problem. They make assessment of the correct and vulnerable areas of a working system, later we diagnose the root causes of the problem and accordingly we suggest value added steps and potential results. Control mechanism makes critical assessment of work done and maintains the consistency of raising the quality perpetually. We used number of tools and techniques to understand the customers problems (Customer Requirement Questionnaire was used – Sample is as shown below)
### customer requirements

<table>
<thead>
<tr>
<th>Operations Head / BU Head</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Panel Wiring Drawings</td>
</tr>
<tr>
<td></td>
<td>4. GA and Installation Drawings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Measures</th>
<th>Importance to Customer</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Satisfaction</td>
<td>1=Nice to have</td>
<td>1=Very Satisfied</td>
<td>2=OK-Could be better</td>
</tr>
<tr>
<td>2=Important</td>
<td>3=Critical, Must Have</td>
<td>2=OK-Could be better</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** We have given rating as per today's customer satisfaction level.

<table>
<thead>
<tr>
<th>Cost - Manhours required.</th>
<th>Error Free Devarables - Number of errors.</th>
<th>3</th>
<th>2</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard prepared for above mentioned outputs.</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Tool prepared for using the above mentioned standards.</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

| Delivery | On Time Delivery | 2 | 2 | 4 |

What is this customer's major complaint? What issue would they want us to work on?

1. No standards followed (everybody follows his own methods)
2. Many errors in documents produced
3. Lot of time & money spent on preparing documents at site
The current processes were mapped for various activities being performed in **COE** to find out the hidden factories viz,

1. CARE

2. GA and Installation Drawings

3. Data Sheets

4. Graphics

5. CAE

6. SDU

7. Layout etc

   a. Sample of the same is given overleaf.

(N.B. – COE means Centre of Excellence Team)
Further various tools and techniques were used in the measure and analyse phase as

1. SIPOC – Suppliers, inputs, process, output and customer sheet
2. Cause and Effect Matrix
3. Failure Modes and effect Analysis – FMEA etc
4. And Finally the Action and control plan was made as shown overleaf.
Please see Attached PDF Named SIPOC
Please see Attached PDF Named C & E
Please see Attached PDF Named FMEA
Please see Attached PDF Named FMEA
Please see Attached PDF Named Action Plans
Please see Attached PDF Named Action Plans
In case of our company, the standard deviation in our General Arrangement (GA) Drawings was about 3.02; we brought it to 1.75. Lesser the standard deviation, greater the sigma, it is a better condition.
Our layout standard deviation was horrible, being 26.7; by our intense efforts we brought it down to 16 as shown below,

FAS - Process Capability Analysis for Layouts - Before Six Sigma

FAS - Process Capability Analysis for Layouts - After Six Sigma
in case of panel wiring, the standard deviation used to be about 10. After applying techniques of six sigma, it came down to 1.8 only! The standard deviation in case of data sheets also was high up to 7, which was again reduced to 1.8.

We started using “MINI TAB software package” for finding out the standard deviation figures and we could get them within seconds. Our quality assessment group became successful by using six sigma techniques and MINI TAB software; for reducing our percentage of errors to probable errors.

In Tata Honeywell, the engineering services division used six sigma methodology for the first time and brought down the percentage of errors up to four sigma. But ideal and topmost sigma happens to be six that means the error free work reaches 99.9997% (in simple language, 3 error in every 10 lakh opportunities to make errors). Going from six sigma to seven sigma, entails huge expenditure which is not advisable because its cost benefit ratio becomes unfavourable.

Motorola Company was pioneer in using the technique of six sigma for the first time in the world but General Electric company actually derived maximum benefit from the usage of six sigma.

In short, what sigma level is to be achieved by any particular industry will depend on the market environment and the level of competition. Depending on how good your competition is and what is acceptable quality to the customer should determine how much
higher the sigma you should achieve in your companies operations as given below.

A) 5 sigma company means 230 errors in 10 lakh opportunities to make errors.
B) 4 sigma company means 6210 errors in 10 lakh opportunities to make errors.
C) 3 sigma company means 66,810 errors in 10 lakh opportunities to make errors.

Tata Honeywell building controls division, sigma used to be 1.8 (means roughly 1 lakh errors in 10 lakh opportunities to make errors) which was raised to 4.3 sigma by our persistent efforts of applying six sigma methodology for achievement of better control. (6.6 errors within probable 1000 errors).

This was good enough, because none of our competitors in India, had attained it!

I personally was very fortunate to learn this outstandingly successful managerial technique; not from the books only, but by learning by doing!!
Case Study 11

Case Study of Tata Honeywell Product XL 28

After 1995 there was a sporadic rise in construction of very huge buildings and sky scrapers required by five and seven star hotels, IT parks, corporate houses, Hospitals and industrial buildings as well as residential complexes. Paint shops, tea industries, textiles, food industry badly require maintaining the temperature and moisture at their shop floors. All these industries find heating ventilation and air conditioning controls as a mandatory infrastructure for maintaining the quality of their products and services.

Consequently, there was a fabulous rise in the aggregate demand of HVAC Controls in India and not a single Indian manufacturing unit was capable of supplying the world class controls to them.

American Honeywell company was the giant among them which used to produce two different systems by name XL 50 and XL 100 with facility of 22 Input / Output. XL 100 complete installation of HVAC control systems of a small building used to be sold at Rs. 5,50,000/- and XL 50 used to be sold at Rs. 4,87,000/-. Even a small shop used to buy it and a large industrial complex used to buy multiple units of the same systems as per their needs.
In order to gain the competing edge Johnson Controls favored the business out processing and it started getting its HVAC controllers manufactured in China because the overhead cost and the labour cost in China were comparatively lower than Honeywell’s cost of production which was carried out in Germany. Because of the comparative cost advantage Johnson Control could very well afford to sell its HVAC control system at Rs. 4,00,000/- which was a perfect substitute to the products of Honeywell.

When Siemens and Johnson Controls two companies captured almost 80 % of market share because they were selling their HVAC control systems at Rs. 4,00,000 when Honeywell was selling at Rs. 5,00,000/-. Because of this great price difference, industries preferred Siemens and Johnson control systems and Honeywell could hardly obtain a two percent share of the total market. A giant company like Honeywell who had great name and reputation as well as vast global marketing network faced miserable failure only because of the lack of competitive cost efficiency. This proves that market is more sensitive to the price advantage rather than glamorous name and reputation.

The actual cost of all these three variants of HVAC were Rs. 5,00,000/- of XL 100, Rs.4,37,000/- of XL 50 and Rs. 3,50,000/- of Johnson Controls / Siemens and both sold with a profit margin of about 10 %. Siemens and Johnson controls, both companies established their duopoly in the market of HVAC control systems and made very grand business turnover during 1995 to 2000 AD. During 1999 – 2000 the researcher of this project (Myself) was in-charge of Engineering and Technical support group of Tata
Honeywell and was assigned the task of being a technical interface between Honeywell USA and Tata Honeywell. During that period, Honeywell had a very grand business turnover of 27 billion dollars as against the meagre turnover of Tata Honeywell being just about 20 million USD. This researcher started a very innovative activity by launching a monthly technical magazine, covering only technical articles which used to be devoted on innovative modifications and original research. The magazine was published under the name of “Technowell”. Three colleagues from my department used to assist me. The quality of the magazine was of the international standard and therefore the parent company Honeywell USA not only recorded its appreciation but Honeywell very graciously included the best of the articles on their intranet. As a very good rapport was built up between the researcher and the parent company this researcher approached Honeywell technology head from Australia and requested him to get the Honeywell controllers manufactured in China. But he rejected this suggestion and posed a different challenge to me surprisingly by telling me to develop the product by yourself and market it from India. The reason was that he found my suggestion rather impracticable because Honeywell had most of its clientele exclusively in advanced countries and did not want to stake its business reputation by having collaboration with China because of the mediocrity and low technical quality of Chinese manufacturing. He was a great admirer of my articles and editorial ability of Technowell and therefore he suggested me to develop the product by myself. He relied on my ability to suggest alternative solutions in conducting of various programs by which he was himself benefitted because he got the appropriate solutions to his technical problems and being my superior, he assured me that he
will not create any obstacles in smooth conduct of my research and unofficially will protect me if any objection would be taken from the top management.

Honeywell USA had already established a R&D unit in Bangalore and Tata Honeywell Company which had a very meager business of 20 Million USD, was naturally not given any weightage for its proposal of making a new product in completion with the existing products of HVAC. Since Tata’s, as well as Honeywell both companies showed neither eagerness nor interest in entering into competition against Siemens and Johnson controls, surprisingly the business unit head of my department sponsored the project.

The challenge which was now opened to me became a great turning point in my life. When I seriously decided to carry out this project I made introspective assessment of my strength and weakness both. My strength was my intense will power and my weakness was my lack of knowledge of embedded technology which is must for producing controllers like HVAC controllers which require combination of two or more technologies together. Fortunately I was in Pune Hadapsar unit of Tata Honeywell and University of Pune had started a six months course in embedded technology. My immediate boss gave me permission to join the course and I used to very regularly attend all the lectures and practicals from 7 AM to 2 PM on all working days and then used to resume my work in Tata Honeywell unit in Hadapsar from afternoon to 11 PM. In the year 2002 after finishing the course I devoted my fullest concentration on developing the desired HVAC controller. My immediate boss was very gracious enough to grant the necessary funding for the
expenses incurred in research and development of the same. By the end of 2002, my product was ready and we found that my product and solution could easily be produced within about Rs. 1,09,000/-. 

Luckily as I was busy in producing this system, Larson and Tubro had given an assurance to purchase Rs. 1 Crore worth HVAC controllers for their huge complex in Madhapur a suburb of Hyderabad. That became a great booster to me and my team, to make the best product by tuning the modified software and finding out appropriate solutions to the complaints made by our patron client viz L & T. One complete year was required for stabilizing the sustaining quality of the product and by 2004, our product attracted a very large clientele consisting of Hyderabad Vidhan Bhavan, then Taj group of hotels, Appollo chain of hospitals, Tata Tea, ITC Grand Maratha and other ITC hotels, Tata Motors, TCS, Cipla, Wayeth and Venus Jewels etc.

Our first client L & T gave us a profit of net 36 Lakhs rupees instead of the loss of Rs. 12 Lakhs which we had anticipated because of the diffidence whether the product would be readily available on time. If my product would not have been ready my immediate boss was supposed to supply XL 50 controller system at the price lower than its market price.

After the successful completion of our first order from L & T; and as our unit earned a net profit of Rs. 36 Lakhs, within the first order itself, we could enter into a “price-war” against our very strong competitors viz Johnson Controls and Siemens. Both were charging around Rs. 4.3 to 4.5 Lakhs for the complete system including
installation and implementation of the HVAC system; but the actual cost of their products was approx 3.9 lakhs as their production was done in China. The third competitor in the market was U.S.A Based Honeywell which was forced to charge Rs. 5 lakhs because its production cost was approx Rs. 4.5 to 4.7 lakhs as the production was done in Germany.

When we realized that our cost of the substitute XL 28 system installation of HVAC happen to be not more than Rs. 1.9 lakhs; we offered the price of our product lowest viz Rs. 4 lakhs when our competitors were charging around Rs. 30,000.00 to Rs. 50,000.00 more than us. Naturally the buyers gave us the top preference and within a year and half, we captured the market share of 55 %. As per the process of Game theory and prisoners dilemma, our competitors also reduced their prices to Rs. 3.5 lakhs, assuming that our unit would be crushed thinking, we would run into losses if we came down to their value (considering 10 % of margin of profit). In retaliation, our marketing executives who were given autonomous discretion to reduce the price upto Rs. 3 lakhs; (still with a profit margin of 50 % plus); started quoting at Rs. 3 lakhs. The competitors also reduced it to Rs. 3 lakhs, by taking a risk of bearing temporary losses in order to drive us out of the market.

Since we had a very comfortable margin of profit we further reduced our price to Rs.2.8 lakhs and continued to supply the systems to a large number of clients. Eventually, our market share remained more than 55%. This price war continued for about 2 years; but after facing considerable losses, both the competitors raised the price to its cost plus pricing level. Our unit took the
opportunity of raising our price almost equal to their price and thus restored our huge margin of profit. Our unit also got clients from software parks, governments, industrial buildings, residential complexes, health care industries, etc. And earned more than Rs. 300 crores. By today, Honeywell India Automation Ltd. Happens to be the market leader of HVAC systems.

I was one of the most crucially important person, who was instrumental for the business success of Honeywell Automation India Ltd; and the root cause of the success was my innovative and creative thinking of reducing the redundant and wasteful cost of production.

During 2000 to 2004, our Research and Development Team got sumptuous funding because of the growing profits of the company. With the help of my colleagues, I introduced nine hardware products (embedded controllers) and six software products of which “GAMES”, (generic attendance monitoring and execution system) was the most successful software product like XL 28 embedded controller.

To mention a few of them which made roaring business success where

1. Repeater panel for fire alarm

2. MMI (man machine interface) for XL controller
3. GAMES – software program package sold to 70-80 companies

4. Energy meter – supplied to ML tower at Mahape, Navi Mumbai, various complexes in Delhi and Gurgaon, STPL (Government Software technology Park) at Hinjewadi, Pune, Government Software Technology Park in Andheri, Mumbai; which was the first biggest IT park of India.

   The tenants of these buildings are hundreds in number and their separate billing, as per their consumption of electricity was to be done by our program. In addition to their consumption, they were also supposed to be charged for the usage of common electricity facility in proportion to their consumption. Therefore large and small; AC buildings and non AC buildings, all these differences were sorted out and billing was made in fair and just manner. The tenants became happy, the owners saved their botheration and expenses to work out separate billing. The energy meter and this software combination has brought amazing success to our unit. At present, there are more than 100 clients for this service.

5. Auto PID (proportional, integration, derivative, control) – This is an instrument which stabilizes the temperature and humidity which are essential in health care especially pharmaceutical, textile industry, tea industry, paint shops, tire cord industry as well as in 7 star hotels. We generated new markets by introduction of this product.
All these additional products have contributed to our companies earnings by more than Rs.10 crores; within a couple of years only.

This case study therefore highlights the crucial role of the research and development and innovative efforts for reduction of wasteful costs; which happens to be the backbone of sustainable success of a production unit in modern economy, in which free and intense competition has been approved during the era of economic reforms.

Before closing the study, I would like to categorically mention the areas where I applied the “cost reduction efforts”.

1. In our modified and indigenized HVAC system, we completely eliminated heating functions; which take a huge toll on production costs and our reason was in India, except some parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Darjeeling temperature in winter also does not drop below 2 to 5 degree Celsius. Most of our clients have their industries and residential buildings and corporate houses etc. in the rest of India.

2. Honeywell controllers have wireless communication in addition to wired communication as it is mandatory to have both the communication supports in advanced countries; but in India, wireless is not dependable due to lack of tower signals and uneven
topography; and so instead of wireless, we relied on wired communication, which is “cable to cable” communication, being not only reliable but extremely economical, too.

3. Honeywell has used Texas instruments microcontroller for XL 50 and for XL 100, they have used “Intel’s” microcontroller which are extremely powerful and expensive. I selected a small and inexpensive microcontroller wiz MSP 430 manufactured by “Motorolla” as it was adequate for my requirement. This reduced my production cost.

4. Instead of various communication protocols i.e. languages, which were a part of Honeywell controller, I preferred to keep only one language in the program wiz MODBUS. Due to the combined effect of these decisions, I could reduce the net production cost of our HVAC system to Rs. 1.9 lakhs, which was incomparably very low compared to the cost of our competitors which was Rs.3.9 lakhs, made in China. Our product cost made in Hadapsar, Pune-India was about half of that of our competitors.

This became the KEY to our success!
Typical System Architecture of XL 28 HVAC System.

Honeywell EBI with THL developed series of HVAC controllers

EBI SERVER

REDUNDANT – NEW FACTORY and SITE TESTING COMPLETED

XL28V1 - 28 I/O
SUI (8AI or 32DI*)
8DI/8DO
and 4AO

XL28V1

XL9V3 - 10 I/O Modular Freely Programmable as This is the need of Indian Market.

XL9V3

XL99V4

Low End HVAC solution for Indian Market
XL 28 Controller without Enclosure.