CHAPTER 3

STUDY OF
COMPUTERISATION
OF PASSENGER RESERVATION PROJECT
OF INDIAN RAILWAYS

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3.1 INTRODUCTION:
Indian Railways is Asia’s largest system and world's second largest system under one management. The Railways are the life line of India's transport system. Daily about 1060 mail/express trains are run on the broad gauge and 177 on meter gauge carrying over 2 million passengers per day in addition to 10 million suburban commuters carried by over 3000 suburban trains all over India. The Indian Railways (I.R.) operate with a four tier organisational structure. The Ministry of Railways functions under the guidance of the Minister for Railways and the Minister of State for Railway. The day to day affairs and formulation of policy is managed by the Railway Board comprising the Chairman, Financial Commissioner and functional Members. Wide powers are vested in the Railway Board to effectively supervise the running of the nine zonal railways (recently six more zones have been carved out of these nine zones but as yet they have not become fully functional) headed by General Manager and Metro-Rail Calcutta, the five productions units, construction organisations each with a General Manager as well as other railway establishments. The zones are further grouped into 59 operating divisions for better management. The divisions and zonal workshops together form the third tier. Each division comprises of various operational units such as stations, yards, transshipment points and goods terminals etc. which form the last tier. The railways also have various public sector undertakings namely Rail India Technical & Economic Services (RITES), Indian Railway Construction Organisation (IRCON), Indian Railway Finance Corporation (IRFC), Container Corporation of India (CONCOR) and
Kokan Railway Corporation (KRCL) where the I.R. is the majority share holder. The work activity of all these wok centers is monitored by the Railway Board, which also performs the dual role of Ministry Of Railways. The board is further broken up into numerous functional directorates each headed by a senior railway officer called an executive director.

3.2. COMPUTERISATION ON INDIAN RAILWAYS:

In early sixties IBM set up IBM 1401 computers in a big way on the railways. Since then IBM continued to suggest various areas where computerisation could be introduced. However after IBM left India in 1970, till 1977 there was precious little done to increase the scope of computerisation. No new projects were taken up for computerisation. But various schemes for increasing the scope of computerisation were being discussed time and again as a result of which a task force was set up in 1977 under the charge of adviser finance, a very senior officer in the ministry to consider all those areas where computers could be usefully utilised. This officer along with his team studied all possible areas of computerisation and submitted a report in a year’s time. It was a very exhaustive report. Passenger reservation system was mentioned in this report as one of the possible area for computerisation amongst others. Development of a Freight Operation Information system was also mentioned in this report. Since freight operation is an area of vital importance to the Railways the R.B. in their wisdom chose to take up the freight computerisation first. It was decided to send a high level team abroad to study various railway systems and assess how they had computerised their freight operation. This team led by Mr.Gill then
adviser finance went to France, Germany, U.K., U.S.A. and Canada. This team while recommending a plan for freight computerisation also suggested taking up the activity of passenger reservation on the stand by computer required for the freight management system. At this time world bank also showed interest in these projects and recommended formation of a separate directorate of Operation Information System (O.I.S.) to conceive, develop, execute and monitor computer related projects on the Indian Railways. This directorate thus was set up in 1984 headed by a senior officer designated as executive director. His work consisted of coordinating and planning all works related to various computerisation projects on the railways.

3.3 RAILWAY'S PASSENGER RESERVATION SYSTEM:

3.3.1 This system is an area of mass public interaction and immense visibility. Every day over a few lakhs persons queue up at various reservation offices all over the country for their rail journey requirements. Image of railways depends in large way on the quality of service they receive at the reservation counters. Over 6,00,000 berths and seats are available each day on over 1200 inter-city and long distance mail and express trains run on the Indian Railways. Taking into account cancellations and waiting list transactions, these account for over 8,00,000 reservation transactions every day. Now computerised reservation system has been made available at 319 locations having railway stations and 4 centers such as Srinagar which do not have a railway station. Further, with the introduction of new trains each year, the reservation workload has been growing at an average rate of 7% per annum.
3.3.2 The workload of passenger reservation by booking clerks was comparatively small, up to the late 60s. It could be managed fairly efficiently by manual process. But the continuous increase in long distance passenger trains in the late sixties and early seventies resulted the daily volume of reservations increasing substantially. By late 70's it became almost impossible to handle the ever increasing workload in this way as can be seen from the table given below.

GROWTH IN NOS. OF PASSENGERS ORIGINATING (IN MILLIONS)

<table>
<thead>
<tr>
<th>Year</th>
<th>Upper Class</th>
<th>Mail/Express(II Class)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-61</td>
<td>15</td>
<td>96</td>
</tr>
<tr>
<td>1970-71</td>
<td>16</td>
<td>155</td>
</tr>
<tr>
<td>1980-81</td>
<td>11</td>
<td>260</td>
</tr>
</tbody>
</table>

With such a quantum jump in the daily transactions to be handled, procedures became cumbersome, the number of records required to be kept became far too voluminous. This resulted in the reservation office outputs becoming inefficient. The manual system involved each reservation clerk exclusively handling reservation of particular class of travel on two to three trains. With the reservations being available two months in advance, each clerk was required to handle 10 to 12 voluminous registers wherein he entered particulars of each transactions, viz., name of the passenger with the age and sex (to protect against the transfer of reserved tickets which on the Indian Railway is considered illegal) particulars of reservation requested, viz origin and destination of journey as well as particulars of tickets issued along with the status of reservation, i.e., whether the accommodation asked for has been blocked and if so the coach as well as berth/seat number allotted or else wait list position on the day of the journey. This register was referred
for preparation of reservation charts which meant rewriting the names and related details of passengers, from the reservation registers maintained on the counters, which were written in more than one handwriting, in charts for display at the stations. Each chart was prepared in five copies, which was a tedious and error prone work as full cross checking was just not possible, with the result some times wrong birth / seat nos. were shown or the spellings were wrong etc. leading to increasing passenger complaints.

3.3.3. Reservation offices were located at different locations in the city for different trains and classes. This meant long journeys through the city systems for the travellers. On top of it the service was slow and inefficient and often meant waiting in queues for as much as 3 to 4 hours by the passengers or their representatives in uncomfortable environment. Further a limited number of clerks handled a specific number of trains, and therefore were open to charges of manipulation of available berths and adjustments of wait listed passengers. At end of each shift the counter clerks had to close their accounts by noting down the last number of tickets sold from each tube (stack) on the counter, enter the same in a register, account for the total cash due and deposit that amount in railway cash office. All this took two to three hours after the shift was closed. If there was an error, the concerned clerk had to make good such shortages from one’s pocket. If this happened repeatedly, a charge sheet for disciplinary action was also issued. The customers were dissatisfied, while staff grumbled and management was perplexed. Efforts to rationalise the system had failed to have significant impact on quality of service.
3.4 REASONS FOR SELECTION:

3.4.1. Thus it was realised that the only solution lay in computerising the reservation system. There was one more reason for choosing this project; the proposed passenger reservation system was a much smaller ‘On line real time’ project which could have established Indian Railway’s preparedness to handle such a technological change. It would also indicate whether the railway organisation was capable of developing and implementing successfully such a technical activity like a real time computer system. Further it was also thought that such system will give railways a good index for judging whether railways should sink a huge sum in developing a freight computerization system.

3.4.2 Once this decision was taken the financial viability was evaluated and it was found that the project would be remunerative only if railways were prepared to levy additional surcharge on all tickets issued by a computer. But the Ministry did not feel it proper to levy such a charge at that time and decided to take up this project as a passenger amenities work, rather than capital work. The railways have a separate fund called Passenger Amenities fund, from which all projects related to developing works related to passenger comforts such as water coolers, sheds over platforms, additional booking counters etc. are taken up. Since this project would give lot of benefits to passengers, the OIS directorate recommended to the R.B. to take up this project under this head. They also recommended to take up this project in time for the 1982 ASIAD games being held at Delhi. This was because a lot of new projects were being sanctioned quickly for these games as the
government was keen to put up a good show. But it also meant fast work and a time pressures on railways to complete the project. Further it was thought that it also afforded Indian Railways an opportunity to display her capability in developing a complex software system to the world. The OIS directorate thus pleaded the case with the Railway Board very strongly to develop and implement this system for the entire city of Delhi in time for ASIAD-82 at least for some selected trains. But the Railway Board felt that the experience of the then EDP activity on the railways which was by and large handling off line applications was not adequate and also the fact that the expertise available in the country then for developing an on line application of such magnitude in a short time was not available hence this project should not be linked with ASIAD-82. A number of senior officers in the board felt that although by itself the project had excellent potential yet by some chance if railways failed to make a success of this project in time for these games the negative publicity railways may earn will do more harm than good. So it was decided that while all clearances will be given to it, it should not be linked with opening of the ASIAD games in 1982.

3.5 OBJECTIVE OF THIS PROJECT:
The ministry set certain definite objectives for this project which are enumerated below:
1) Improve efficiency of the Passenger Reservation Service by reducing the time taken for service at reservation counters
2) Reduce waiting time in queues
3) Universalize the service so that each counter serves all trains, all classes and for all types of transactions
4) Improve staff productivity
5) Improve working environment of staff
6) Eliminate or reduce scope for manipulation of records that existed in the manual system
7) Improve overall image of railways that was being tarnished by large number of complaints in public, press and parliament.

3.6 PROJECT PLANNING:
First of all a decision had to be taken on the aspect of development of software. Two choices were available i.e. whether, should it be developed indigenously or should a suitable reservation package be imported from some of the railways abroad? After considerable deliberations it was concluded that the requirements of Indian Railways were distinct from those of Indian Airlines where an imported software called United States Air Lines System or USAS for short was being used but not very successfully. None of the railway systems abroad were handling such a heavy quantum of reservations (about three lakhs reservations per day then). This also meant the efforts involved in modification of an imported software were likely to be enormous and results perhaps far less satisfying. Discussion were also held with Department of Electronics (DOE) the nodal ministry of Government of India, which cleared all computer related projects; which led to the conclusion that while no indigenous manufacturer was in a position to offer the type of hardware required for the system, sufficient expertise was available with indigenous software houses, such as M/s Computer
Maintenance Corporation (CMC), a Government of India undertaking to undertake development work of this nature and magnitude. Accordingly, it was decided that while the hardware platform would be imported, software development would be undertaken by CMC. CMC had some Digital Equipment Corporations (USA)'s VAX computers and their software personnel had considerable experience of working on these machines. CMC was confident of developing the required software on VAX computers as these systems were having the necessary system features required for developing a reliable and sturdy software package. The VAX hardware also had well established reputation for providing excellent 'up-time' i.e. giving uninterrupted service. M/s DEC, the manufacturer of these computers, had also announced that they would be supporting cluster architecture in near future thereby providing for excellent modular growth. This capability of architecture allowing growth of additional CPU power and expansion of database without having to replace the old machine was considered very desirable, as passenger reservation loads were expected to go up continuously requiring expansion of the system. A decision was accordingly taken to develop the package on VAX machines. Delhi was selected as the first place where the pilot project should be taken up because it was situated right next to the Railway Board which meant the progress of the project could be monitored better. Further New Delhi and other stations in Delhi area handled the largest number of reservations on daily basis in India. Accordingly a pilot project was taken up to computerise the passenger reservation system in Delhi in
1984, inspite of the fact that the senior managers of Northern Railway showed least interest.

3.7 FORMATION OF CHANGE TEAM:

3.7.1 The OIS directorate felt that outside agency such as CMC would have found it rather difficult to fully appreciate the complexities of the existing reservation system as well as the work ethos of a mammoth organisation like railways, it was therefore decided to form a core project team under a senior officer from Northern Railway, to not only assist CMC in development of software but also to handle all related problems that can arise in the development and implementation stage. Care was taken in selecting a team leader who had work study background and was fully conversant with the intricacies involved in the reservation work and had excellent rapport with colleagues and staff. He was given a free hand in selecting his project team which consisted of 4 / 5 group A railway officers and at least one representative from each category of staff working in the manual system at Delhi. This team maintained close liaison with CMC who also selected 7/ 8 people from their company for this work. Thus the project team consisted of about 20 / 25 people.

3.7.2 It was at the pilot stage itself all the features required for future expansion and linking were discussed and included. Planning for all eventualities and requirements of future were meticulously discussed and provided for. Provision in the software for giving telex links to roadside stations was one such example. The officers from Railway Board (R.B.); the senior representatives from CMC the and team leader
from N.R. all worked as a team and had respect for each other. They treated this project as a project of national importance. As a team they were discussing even matters related to CMC’s internal management of their personnel assigned to this project. CMC did face some problems in development of software leading to their developing cold feet midway. But Dr. P.P. Gupta who had helped railways in the initial stage as secretary Department of Electronics DOE had by now become the chairman of CMC. The rapport developed by E.D., of the OIS directorate with him and his no nonsense approach and clear resolve to honour a commitment at any cost helped CMC in overcoming these ‘development blues’. This team used to take each aspect of passenger reservation and discuss it threadbare and at great depth. By working everyday for 12 / 14 hours in such a manner for this purpose for almost a year the development work was completed. The association of field staff in the development work at this stage helped the team tremendously. This team used to debate for hours together on conversion of each aspect of working of the manual system before arriving at some agreed format in the new system. However if such agreed aspect came up at later stage in connection with some other feature and if it was felt that the original conclusions had to be changed, revisions were done number of times untiringly until maximum possible match was ensured, with the result the completed the work was more or less a perfect one which almost emulated the manual system then in vogue incorporating all the powerful features of a computer system.
3.8 FEATURES OF THE NEW SYSTEM:

3.8.1 The railway’s reservation system is quite complex. At the time of implementation of this project, there were six types of train services, seven classes of travel, over 70 kinds of concessions, 25 different types of reservation quotas, and 66 types of coaches with different accommodation layouts. There are complicated rules based on the Indian Railway Act which apply to break of journey, modification of earlier transactions, refunds on unused tickets, fare structure, routing of journeys, allocation of accommodations etc. The software was developed to take care of all such complexities.

3.8.2 The computerised system was developed using conventional ‘time sharing ‘option as was the recommended practice for VAX machines. In this process the computer shares it’s processing time equally between all ‘logged’ or ‘live’ or ‘on line ‘ termini. The software was written in Fortran 77 using available features of the language and it followed a modular structure. The code was re-entrant and shared between all users. Important static data was kept in the memory in the form of global sections. Extensive recovery procedures were built into the system for transaction recovery, media recovery and recovery from system failures to make this software, a fault tolerant system with total built in redundancy. Back-ups of database were planned to be taken every night to ensure quick recovery from all types of failures. The initial development of data specs and software was done within a time frame of 15 months and software released for testing in October 1985. The software was given an acryoname IMPRESS (For Indian Multitrain Passenger Reservation System.) Response time to any query achieved
was of the order of 3 to 5 seconds for normal working data. Ticket printing took 10-15 seconds. On an average a customer could be served in two and half to three minutes.

3.9 PROJECT EXECUTION:

The execution was done in stages. First two southbound trains were taken up. Computer terminals were set up in parallel with the manual counters and both systems were run simultaneously for at least a month. At end of the day the printouts from computers were tallied with the manual registers. There were occasions when the manual record showed non availability of a berth while the computer had allotted a berth. On cross checking the position given by computer was found to be correct. This motivated the team to end parallel runs ahead of time and start withdrawing the manual system train by train. By Feb.86 thirty more trains were brought on line. By this time the project team had placed order for a more advanced VAX 8600 machine. However this was delayed as USA government was hesitant to release such a powerful computers to India at that time. This problem was sorted out when in 1986 when the then Minister For Railways was changed and Mr. Madhav Rao Scindia took over as the new minister. He took tremendous interest in this project & set revised tight targets and took up the matter of delay in supply of this super computer with the High Commissioner of USA in India for early release of this machine. He also set tight targets for completion of the work at New Delhi. With the result by May 1986, the entire reservation system and all related activities such as accounting procedures etc. at new and old Delhi stations were completed. The manual system was completely stopped.
3.10 EXPANSION OF THE PROJECT:

3.10.1 The new system was opened with lot of publicity and was
generally welcomed by public whole heartedly. But soon there
developed a departmental controversy about actual efficacy of this
project. The project team and the OIS directorate declared the project as
a total success; while the senior officer of commercial department of
Northern Railway (N.R.) who was the head of department under whom
this project was implemented declared it as a failure. Mr. M. Scindia
therefore asked the OIS directorate of R.B. as well as General Manager
Northern Railway both to present their case. Before the presentation he
visited the new set up incognito so as, to assess first hand the utility of
the project. He mixed with the passengers and had a direct feedback
from them. He not only gave a clean chit to the project but also ordered
immediate introduction of this system at other major cities. Accordingly
between July 1987 to Dec 1987 the work of introducing IMPRESS was
taken up at Mumbai, Calcutta and Madras.

3.10.2 The same modus operandi for management of change was
adopted at all these places, with New Delhi acting as a beacon. In the
mean while the project team at Delhi further refined the software as a
next phase of the project and complete version incorporating further
additions and alterations based on the experience gained during the
first two years was released in 1987. In 1989 the fifth computer was set
up at Secunderabad with total software being developed by Center for
Railway Information Systems (CRIS), another wholly owned
undertaking of Railways. At this center an indigenous computer named
Media, manufactured by ECIL was initially used but the same proved
totally inadequate and therefore VAX machines were set up at Secunderabad but with for CRIS software. Today as many as 323 centres have been hooked up with the five major computers. At most of the places at least one terminal has been provided which is hooked to all other centers. Thus today this system on all India basis handles about 92% of the seats and berths available for travel to the general public. This system today is perhaps the biggest on line reservation system anywhere in the world.

3.11 BENEFITS DERIVED BY CUSTOMERS :-
1) The system successfully provides universalised service, viz., one can now do reservations, as well as cancellation, modifications etc. from any reservation counter for any train wherever the counter is situated e.g. one can get tickets for trains starting from Delhi towards Calcutta at Pune and so on.
2) The system provides efficient service with fast moving queues and substantial reduction in waiting time. Normally one could be served within a total period of 10 to 15 minutes. During peak hours of summer rush, the queue then did not exceed 20 to 25 with average waiting time of 45 minutes.
3) Possibility of staff indulging in malpractice has been almost totally eliminated. In the manual system it was possible to manipulate records.
4) With air-conditioning, improved layout and effectively designed direction boards environment at reservation offices has improved
substantially. Standing in a queue to get a train reservation is no longer an ordeal but often a pleasant experience.

5) Tickets and passenger charts are well designed and printed neatly and legibly. They now provide all the necessary information to the passenger.

6) The system provides quick response to enquiries such as on which date or train is the next accommodation available from a particular station in a specific class etc.

7) Status of wait-listed passengers keeps on updating automatically all the time as cancellations take place. As such it is now possible to obtain the latest reservation status. (In recent years at Delhi, Mumbai etc. an automatic telephonic inquiry system has been set up for inquiring about status of one's waiting list)

8) In the metropolitan cities, facility for return reservation and onward reservation has become available.

9) The reservation staff seem to have become more pleasant and courteous.

3.12 BENEFITS DERIVED BY THE STAFF:

1) The system has taken away entire responsibility for fare calculations from the counter operators and shifted it to the computer system itself. In the manual system, the staff was responsible for undercharging and had to recoup it from their own wages.

2) Drudgery involved in repeated manual references to registers for making checks and entries has been eliminated.
3) The new system requires very little effort to recall status of availability of accommodation, details of earlier reservation transactions, fare, etc. It is possible to reply to various queries quickly and politely.

4) The working environment has improved significantly with air-conditioning and very convenient counter layout.

5) Whereas in the manual system reservation staff were universally condemned as being inefficient and prone to be corrupt, the new environment gave them a new image.

6) Under the manual system, the reservation clerks had to put in two to three hours of work beyond their duty to reconcile ticket sale accounts. The system does this for them now in a matter of few minutes. Now they reach home two to three hours earlier than before.

3.13 REVIEW OF THE MANAGEMENT PRACTICES ADOPTED:

The review of the management practices indicates that in this project the participative or democratic approach was extensively adopted at all stages of change.

3.13.1 The issue of selecting this activity for computerization was looked at number of times by expert committees. The decision to separate it from freight computerization another mammoth on line, real time project, was also taken after lot of deliberations. First a pilot project was taken up at New Delhi and only after it was complete and withstood all critical examination, its expansion at other centers in India namely Mumbai, Calcutta and Madras was taken up. Initial planning for expansion however began much earlier but
implementation was started only after Delhi project was successfully completed. This approach had a crucial advantage that the officers and staff from other centers where the new systems were to come up could be brought to see the system in full operation at New Delhi and thereby develop confidence in the system. Once the advantages emanating from the new system for the passengers as well as the railway staff were evident, the passenger associations and labour unions at other centers also started clamouring for implementation of the new system at their centers. The implementation of new system thus became that much simpler at other centers. This systematic planning work helped in moving the project further.

3.13.2 The creation of OIS directorate was extremely useful. As it undertook the responsibility for proper analysis, planning, implementation and planned expansion of this project on all India basis. This directorate effectively worked as link between the top management and the field team. In Government Of India any projects of this type have to cleared at every stage by Department of electronics (DOE). The rapport developed by E.D. OIS in the R.B. with the secretary DOE and his additional Secretary was very useful in speedy completion of this project as at that time DOE was considered to be the biggest stumbling block for any such computer based projects. A monitoring and coordinating cell was created in OIS directorate to expand the system to Calcutta, Mumbai & Madras, only after it proved successful beyond doubt at New Delhi. After these system were successfully running attempt was made to develop a new software on computers manufactured in India. This was tried at a new center Secundarabad,
without disturbing the existing systems. But the Indian computer failed miserably, therefore VAX system was used but a new software developed with the help of CRIS a railway undertaking. A new software is also under development now for linking all these systems and providing termini at more junctions on each railway has been taken up simultaneously. This continuous monitoring and planning by a separate directorate has helped in this change not only getting stabilised but progressing all the time.

3.13.3 This project really gathered momentum when Mr. Madhav Rao Scindia took over as Minister for Railways. The interest exhibited by him and the guidance and support that was given by him kept a number of bureaucrats in the Railway Ministry as well as Northern Railway who could have otherwise caused serious hindrances in progress of this project keep low. The minister sometimes bypassed the members of the Railway Board and communicated directly with the Executive director, Operations Information Systems, who in turn was maintaining close liaison with the project team. The way the M.R. handled the issues of procurement of advance computer (VAX 8600) by approaching the High Commissioner of USA & the way he judged the efficiency of the pilot project are instances indicating total backing from top most authority which helped the project team leader to complete the pilot project even with no co-operation from his immediate superiors in Northern railway.

3.13.4 This was the first system of its kind in government of India which was totally planned, developed and implemented in India without any foreign help. Entrusting this responsibility jointly to a
mixed team i.e. the external team of software experts and internal team for departmental expertise was a successful experiment. There was excellent teamwork between the entire team as brought out in para 3.7.2, which helped them in gaining necessary confidence and mastery of the new system. At the time of debugging of software, an element of healthy competition was introduced by awarding prizes to that subgroup who could detect maximum bugs and so on. This had a good effect on the moral of the team members, and they developed confidence in the new system. Thus they became the ‘early adopters’ of the change.

3.13.5 To ensure that the new computerised system fulfilled the requirements of the railway rules fully, was workable and efficient and acceptable to the staff as well as the management, the internal project team included representatives of management at all levels, starting from the head of department, middle-level management, field supervisors, counter clerks and even support staff. Since the size of this team, which designed the new system was large care was taken by the team leader to include only those persons especially from staff who were positive in their approach, displayed some degree of originality and creativity, were non-controversial i.e. persons whose opinion was expected to be respected by others. This team ensured that the changes required for the new system were suitably tailored to the needs of workers i.e. they matched the old system as closely as possible but were still acceptable to management and the software experts. Each issue which generated controversy was discussed thoroughly & patiently number of times until the team as a whole agreed on the issue at hand. This method though a
bit time consuming at the initial stages yet it smoothened the process of formal as well as informal acceptance of new system, at the time of implementation.

3.13.6 The manual passenger reservation system was quite sensitive & open to interference from vested interest. It was manned by staff, a large number of whom had risen from ranks. In I.R. especially there are two very powerful unions and therefore winning their approval & cooperation was very essential. The unions were assured that there will be no retrenchment of serving employees due to computerization. Surplus staff will be re-deployed without transferring them to another station and even with the reduction of cadre strength, promotional prospects of existing staff will be protected. It was clarified that a technical innovation like this will certainly make the working conditions much more comfortable. This assurance and the actual relief which the field staff got on introduction of the new system at New Delhi helped in eliminating resistance from unions so much so that on Eastern Railway (E. R.), a communist dominated railway where any changes consisting of such technical innovations were likely to be resisted strongly, instead the trade unions started pressing for introduction of computers in reservation offices at Howrah & Calcutta on the same lines as at Delhi.

3.13.7 The manual system suffered from work drudgery and posed risks to good workers. The counter clerk was a harassed person, always doubted by everyone as a manipulator. Most of them had to spend long hours after regular duty for closing the daily accounts. In case a cash shortage was noticed, the counter clerk had to make up the same from
his/her pocket. With the new changed system all this was done away, the needle of suspicion moved away from them. The computer would give instantly the cash balance etc. for correct closure of accounts. As data updates such as fares, inter station distances, type of coaches etc. was done centrally the problem of wrong fares was eliminated, any error in destination stations, sex, age etc. was readily located and corrected. Thus the staff found tangible benefits in their work surroundings and reduction in labour with substantial increase in productivity. This is what motivated the staff in switching over to computers on their own in spite of not being offered any special pay for working on the new system. During field trials a stage came when the female operators would virtually break down if they were shifted from a computer terminal to a manual counter.

3.13.8 The project involved major change in technology, thereby causing resultant change in work environment and work culture. Computers were already being used in India, but not for an application of this magnitude. It was going to be an extremely sensitive system, which could cause revenue losses if improperly used & which was to be operated by staff many of whom were not even graduates. The experience of Indian Airlines of implementing their computerised reservation system was of little help in this direction as it handled far less transactions, served altogether a different class of clientele and the counter operators had much higher educational background and different selection criteria. Many railway managers openly wondered whether the caliber of staff that manned the railway reservation counters could at all pick up the new skill of operating the computer
terminals efficiently. Even the railway staff itself was highly apprehensive. This was achieved involving a few supervisors & workers from the reservation offices at Delhi in the development of the new system right from initial system study. As a result of such active participation in the project, the staff representatives on the project team gradually realised and learnt the power & capabilities of computers. This in turn boosted their confidence in the new system, so much so that many of them became whole hearted supporters or informal ‘change agents’ for the administration by starting to teach to others even before full system was ready. This developed confidence in the minds of the fence sitters and silenced the ‘doubting Thomas’s’. Thus the positive atmosphere created by the informal change agents at ground level helped in whole hearted acceptance, faster assimilation of this change by the staff.

3.13.9 When the system was being developed it was subjected to intensive testing. The project team analysed every change suggested by the team and tested them by running the related programmes. A competitive atmosphere was developed for detecting defects or ‘bugs’ as they are called in computer jargon in the programmes developed by the sub teams. This gave the entire group a complete ‘feel’ of the system. The new system design also improved gradually due to such exhaustive analysis to ultimately give the team the confidence that it was working according to the logic they themselves applied in the manual system but unlike the manual system, it made no errors. As the staff representatives were on the project team they passed on these developments and the confidence they had developed in them to their
other colleagues through the departmental ‘grape vine’. This resulted in widespread acceptance of the computerised system by the reservation staff even before it was fully implemented. The acceptance of the new system also became much easier as the new system actually provided adequate security features such as no one could enter transactions against their accounts which made their accountability for cash transactions secure. The computer gave information quickly and correctly which helped them in quick dealing of transactions. All such things helped the staff in developing total faith in the new system, which is very essential for long term acceptance and growth of such a basic change. Such development of faith ensures that even if the top management eases on the monitoring, the work tempo at grass root level does not slow down and the change process does not slide back.

3.13.10 The reservation system in Delhi under the manual system was manned by about 600 staff. About 30% these constituted employees who had been promoted as reservation clerks from lower grades. With education barely up to primary level. Utmost care was taken to design the screens in such a manner that once a passenger reservation clerk had gone through the first familiarity session on the training terminal, the clerk could learn the subsequent screens on his/her own. Prompts were added at each field level to assist the computer clerk in the learning process and to guide him/her to the next step. The mistakes committed are flashed on the screen thereby enabling self correction. Today these user friendly features have become a common feature of all standard software but in 1985, it was a unique concept. As a result of such designs a counter clerk required just 6 days training at the end of
which the clerk was competent enough to operate the reservation terminal on his/her own and within a months time was able to reach the highest level of proficiency attainable. On an average, it takes two to three minutes to serve one customer on this system. This includes the time taken for money transactions. These highly user friendly screen designs have been largely responsible for doubling staff productivity.

3.13.11 By the time the system was developed, tested and proved, a nucleus of staff from all relevant categories was available, which had been part of the project team and had picked up enough expertise and proficiency as well as confidence in using the system. A few from amongst them were selected and trained to become Trainers. Thus, the remaining staff learnt to work on the system from their own colleagues. This helped in demystifying the new technology for them in that they felt that if their colleagues could not only learn the new system but also teach it they could also learn it. This increased their confidence in themselves and in turn the staff involvement in the project. Staff were further motivated to speed up learning process by a system of monetary awards along with issuing of letters of appreciation. At end of each course the toppers were given certificates etc. in formal functions on completion of training. This introduced an element of competition and recognition and generated interest during training. Performance of each staff working on the terminals was monitored each day and individual performances were displayed on notice boards giving names of those who had excelled as well as those who had not done well. Cash awards were not only given to the best workers but also to the laggards if they showed improvement subsequently. This helped in improving the
performance of the staff, so much so that individual performances of serving about 200 customers per shift became common as against 60 to 80 earlier, in spite of the working shifts having been reduced from eight hours to six hours.

3.13.12 The project leader of the internal team at Delhi while handling the development process ensured that there were no major disagreements, everyone felt involved in the decision process. In view of the situation of not receiving much cooperation from immediate superiors, he took the responsibility of taking number of decisions related to the new system, which were beyond his power of sanction. If these were to be obtained through usual procedures they would have stalled the progress of the development work. This resulted in quick and smoother progress of the project. He resolved conflicts with patience and never allowed any issue to be left in doubt by holding repeated discussions on the issue until a workable solution acceptable to all parties was evolved. This had a two way impact firstly it developed a keen sense of involvement in the entire team and secondly it brought out some good innovative concepts such as two types of wait listing etc. which were not given any attention earlier.

3.13.13 Members of the core team at the zonal level as well as those of O.I.S. directorate remained unchanged during the entire term of this project right from the start of preparation of feasibility report to final implementation. The team leader on N.R. fought with his seniors to prevent some changes in the middle level managers suggested by them & insisted on promotions being given to the team members on the same project, instead of shifting them. This aspect is very important for
success of any project. Any change in the team can slow down the progress and if such change happens in case of the team leader the result can be sometimes very damaging. Continuity of core group of managers in such a project is most vital. This resulted into firstly a good motivation to all managers, as they could continue to remain in Delhi longer and secondly they were asked to execute what they had designed. This generated a sense of continuity which made the implementation smooth.

3.13.14 As soon as the efficiency of the new change was established, the crucial step of eliminating manual working completely was taken. It did not leave any other choice with the laggards; with the result the change not only stabilised but progressed also equally well. A change of this magnitude must be an irreversible and finite process after the pilot project is proved successful, otherwise the stage of ‘refreezing’ as defined by Lewin cannot be hoped to be achieved

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