Chapter III

Overview of EMD Equipment, Market and Marketers
CHAPTER - III

OVERVIEW OF ELECTRONIC MEDICAL DIAGNOSTIC EQUIPMENT (EMDE), MARKET AND MARKETERS

3.1 INTRODUCTION

The last two decades witnessed rapid strides of development and use of electronic equipment in clinical medicine for diagnostic and therapeutic purposes. Marketing development attempted to keep pace with this phenomenon. This development was predominantly brought about by the application of micro processors and computers to heretofore virtually electro-medical equipment. Continuing customer-oriented research led to newer medical electronic equipment.

The health care market is now flooded with medical electronic equipment serving the doctors needs in diagnosing their patient's ailments and treating them as well. They also serve important functions of monitoring the progress of the patient through the course of illness as well as follow-up care, not to mention preventive medicine. The advent of this electronic phenomenon resulted in precision, accuracy, timeliness, promptness and adequacy of clinical management of patients. This was brought about by a range of user-friendly electronic equipment.

The human body is a source of numerous signals, highly significant for diagnosis and therapy. These signals are picked up from the surface of the body or from within. Also, non-electrical signals of parameters such as temperature, blood flow, blood pressure, respiratory functions, etc. need to be routinely monitored. The medical electronic
equipments pickup these signals through electrodes and transducers respectively.

After picking up the signals, they are processed and presented in a form most convenient for interpretation. Display is through visual or on graphic paper.

An extensive use of computers and micro processors is now being made in medical instruments designed to perform routine clinical measurements, particularly in these situations where data computing and processing could be considered as part of the measurement and diagnostic procedure.

3.2 ELECTRONIC APPLICATIONS IN MEDICAL FIELD

The ability of electronic computers to store very large quantities of data and to have it readily accessible for further processing makes them extremely useful in medical diagnosis and therapy.

The object of the use of computer is to make a contribution to better and quicker diagnosis and treatment free from subjective errors. Procedural sophistication is rendered simple. Extensive use has been made of microprocessors in medical instruments designed to perform routine clinical measurements. Particularly in those situations where data computing and processing could be considered as a part of measurement and diagnostic procedure. The incorporation of microprocessors into instruments enables to have a certain amount of intelligence or decision making capability. The decision-making capability increases the degree of automation of the instrument and reduces the complexity of the man-machine interface.
The low cost and amazingly high computational capability of the microprocessor have almost resulted in a revolution in respect of their utilisation. The capabilities of expensive mini computers are now available to the designers in the form of just another integrated circuit chip. However, their application has changed the entire design process. The designer must have knowledge about programming (Software) in addition to the circuit design capability (hardware). The instrument functions can be easily altered by software changes and this can make the instrument more versatile without making the cost prohibitive.

This resulted in an exclusive group of EMDE collectively known as IMAGING systems. The last decade saw an unprecedented progress in this area and resulted in the evolution and development of ultrasonic, CT and MRI scanners, U/S has proved a useful imaging modality because of its non-invasive character and ability to distinguish interfaces between soft tissues. U/S imaging systems are now applied to obtain images of almost the entire range of internal organs in the abdomen. CT scanners are the most significant development since the discovery of ‘X’ Rays. Thermography – the science of visualising and interpreting the thin temperature pattern – is another technique which stands alongside X-ray, ultrasonic and clinical examination as an aid to medical diagnostics.

3.3 TYPES AND CLASSIFICATION OF EMDE

The above 'Foreword' gives and insight into the wide array and range of medical equipments – electrical and electronic with application in either diagnostic or therapeutic medicine or both. Diagnostic medicine is a vital area of the clinician's responsibility and therefore a myriad of
instruments have been developed fulfilling the needs of various specialist doctors in diagnosing specific organs and systems of the body's function. Blood parameters, cardiac parameters, lungs and respiration, kidney, brain, bones are some areas of evaluation for an accurate diagnosis.

3.3.1 Types of EMDE

i) RECORDING EQUIPMENT

ii) MONITORING EQUIPMENT

iii) MEASUREMENT & ANALYSIS EQUIPMENT

iv) MODERN IMAGING EQUIPMENT

(Table overleaf)
TYPES / CLASSIFICATION OF MEDICAL EQUIPMENT

Clinical Medicine
- Mechanical
- Electro-Mechanical
- Electronic

Research Medicine
- Mechanical
- Electrical
- Electronic

TYPES / CLASSIFICATION OF EMDE

I. Recording & Monitoring Equipment
   1. ECG
   2. EEG
   3. EHG
   4. Phonocardiograph

II. Monitoring Equipment
   1. Bedside Monitors
   2. Central Monitors
   3. Ambulatory Monitoring Equipment
   4. Foetal Monitor
   5. Cardiotocograph

III. Measurement & Analysis Equipment
   1. Doppler blood flow meters
   2. Cardiac output Computers
   3. Pulmonary functions analysers analysers
   4. Blood Gas Analysers
   5. Blood Cell counters
   6. Audiometers
   7. Biochemical Analysers
   8. Oximeters

IV. Modern Imaging Equipment
   1. CT Scanner
   2. Whole body scanner
   3. PET
   4. NMRT
   5. CC Lab Equipment
   6. Ultrasonic Imaging
   7. Medical Thermograph
3.4 OVERVIEW OF EMDE MARKET AND MARKETERS

3.4.1 In India the population of various kinds of scientific instruments and equipment was estimated to be worth Rs.98.7 billions (Rs.9870 crores). This figure is projected to rise to Rs.156 billions (Rs.15,000 crores) by year 2001, according to a study by the Technology Information Forecasting Assessment Council (TIFAC) and the Central Scientific Instruments Organisation (CSIO), Chandigarh.

The study has also indicated that the potential annual maintenance business was of the order of 3.52 percent, which translated to around Rs.3.48 billions (Rs.348 crores). As per the growth projections the demand was expected to reach Rs.5.5 billions (Rs.550 crores) by 2001.

The TIFAC-CSIO study found the medical instruments business in 1996-97 was Rs.5.02 billions (Rs.502 crores) and that it would reach Rs.7.84 billions (Rs.784 crores) by 2001.

With the demand for medical facilities increasing every year and with the spread of hospitals to several parts of the country, the need for procuring more instruments and their continuous maintenance is tipped to be a prominent technology and business opportunity.

The Indian medical industry now concentrates only on about 250 million people, who can afford such facilities. The rest, constituting nearly 750 millions are being ignored.

The Electronic Medical Diagnostic Equipment (EMDE) market witnessed a spurt in growth from the early nineties. Ever since, the business has been gaining greater visibility with more and more players entering the fray in the Indian market. The import of EMDE is
gradually coming down. Currently, nearly 60 percent of the country's medical equipment requirements are being met through imports. The 1980s witnessed an expansion of medical infrastructure in the urban areas, with an increase in the total population of medical equipments. This was followed by liberalisation of the economy, corporatisation of health care facilities, entry of MNCs in several businesses and industries, reversal of medical brain drain creating a situation demanding high investments and availability of state of the art equipment facilities to meet the growing awareness and demand of health care activities.

The medical equipment industry is in the pink of health. This is being spurred by the slew of superspeciality hospitals that are ready to come up over the next few years. A host of medical equipment makers are ready and set up shop in India as these hospitals are lapping up modern equipments. Medical equipments manufacturers have been encouraged by the fact that the government has cut import duties from about 120% five years ago to 30% now.

German conglomerate Siemens is setting up a Rs.30 crore factory in Goa to manufacture medical equipment such as contemporary CT scanner models, ultrasound devices and X-ray machines. Philips Medical Systems is planning to launch flat screen ultrasound and fractional CT Scanners.

3.4.2 Growth of the market:

Ten years ago, only five or seven cities had CT scanners, today, more than 100 cities have such scanners. Similarly, only five cardiac centres
across the country had catheterisation labs or angiography equipment a few years ago, today, almost 50 cardiac centres have this equipment.

Curiously, even as the market grows, the prices of equipment have not fallen. CT scanners are priced in the high Rs.1.5 and Rs.5 crore range, MRI services cost between Rs.1 crore and Rs.5 crore. The result, an array of finance schemes have come up to help hospitals buy new equipments. A new rush area emerged in medical electronic equipments.

The past few years have seen a spate of tieups. Wipro forged an alliance with US monolith General Electric (GE) and Indchem with Advanced Technology Labs (ATL). Usha joined hands with Draegerwerk of Germany, while others like Blustar and L&T entered into marketing deals with Japanese giants Hitachi and Shimadzu, respectively.

In the past, growth at 12-15% a year has been nothing to write home about. The mid nineties saw a temporary stagnation in the overall medical electronic equipment market, largely due to the rupee depreciation and strict import curbs.

The short term phase passed away and the growth picked up gradually and kept rising from 18 % to 20 % and beyond.

The industry in India was dominated largely by Siemens, whose range of local and imported equipment covers almost every discipline of medicine ranging from cardiology to urology and electro-medical therapy. Philips was the closest competitor with a considerable base in the low and medium end of the ultrasound market and the radiology
segment. Other competitors are Wipro-GE, Hewlett-Packard, Hitachi, Picker, Shimadzu and Toshiba.

3.5 THE MARKET PLACE

The medical diagnostic equipment market is segmented into three categories

1. Imaging instruments
2. Recording instruments
3. Clinical chemistry instruments.

The market place is also changing somewhat. The fastest growing segment today is ultrasound (Sonography). There are three reasons for the popularity of ultrasound.

- It is non-invasive
- Less expensive
- Easy to install

However this did not affect the sales of X-rays and CTs. This is because of the usefulness of ultrasound for broad initial diagnosis. CT scanners and MRI would be needed for detailed investigations. Although the ultrasound market seems to be booming, the entry of newcomers with the backing of large business houses necessitates the existing players to alter their marketing strategies. The steep hike in cost of imported equipments has made it imperative for players to indigenise.

Siemens and Wipro-GE which were importing the ultrasound machines have made investments and set up CT and ultrasound manufacturing
facilities in India. However, the pace of technology changes, forces companies to be allied with foreign names.

3.5.1 **Imaging instruments** form the bulk almost 60% of the EMDE market of about Rs.900 crores. They compromise of X-ray machines, ultrasound scanners, CT scanners and MRI predominantly.

3.5.2 **Recording instruments** form 30% of EMDE market. Of this, cardiology equipments such as ECG machines, cardiac catheterisation lab (angiography) equipment, stress test equipment, all types of monitors form 90% of this market. The remaining 10% is spread across pulmonary function analysers, Fetal monitors, Audiometers etc.

3.5.3 **Clinical chemistry instruments** take an approximate 10% of the total EMDE market. They are the auto and semi-auto biochemistry analysers, blood gas analysers, oximeters, etc.

**TOTAL EMDE MARKET SIZE - Rs.900 CRORES**

![Diagram showing the distribution of EMDE market](image)
This is the reason for the presence of many players in the "Imaging" segment while cardiology equipment segment consists of not too many players and clinical chemistry segment has only a few players.

3.6 DECELERATORS OF THE EMDE MARKET

The path of the EMDE is not rosy all the way. The path is steered with thorns here and there leading to caution in new product launches and innovations which are a hallmark of a growing market. While some companies are closing down operations, others are regrouping, breaking down alliances and re-alienating with new partners.

3.6.1 Governmental policy deterrents

1. Indigenous EMDE attracted about 15% duty on raw materials and about 5.5% excise while imported systems attracted none.

2. While clamping import duty (15%-40%) on imported medical equipments by private hospitals, government hospitals which enjoy a large share of the market are allowed to import medical equipment duty-free. Since finished equipment in India will always be outpriced by imports and government procurement procedure makes it incumbent on purchasers to place orders for the lowest quotation, the indigenous medical equipment industry will be cut off from a major segment of the market.

3. Budget provisions such as bringing customs duty on finished products and components on par and the abolition of intervailing duty on imported equipments will make indigenously produced equipment more expensive than imported
equipment, since the former remain subject to high excise duties and sales tax.

4. The Department of Electronics, Government of India certification being mandatory to permit importing of components, delayed indigenisation activity.

The point at issue is whether the government wants to strengthen medical care facilities through the easy route of imports or the harder, but more logical, option of promoting indigenous industry.

3.6.2 Inadequate demand

The EMDE buyers are in the metropolitan cities and Class I cities only. The market has not spread beyond these limits. Though the demand is up from previous years, demand in India is nowhere near the levels required to support major growth. The quantities are too low making in difficult attaining economies of scale. The low economies of scale and consequent high variable costs lead to higher prices than necessary.

3.6.3 Obscure export performance

Large scale production, independent of prices and the size of the domestic market, is possible only through exports. Currently, only 5 percent of the total Indian production is exported.

The poor export scenario is the direct result of the conditions under which the industry has developed in India.
India had no medical equipment industry to speak of until the mid-sixties. After this political factors rather than economic ones, such as policies of self-reliance and import substitution, led to emergence of private manufacturers of medical equipment. Manufacturers were forced to procure specialised intermediate inputs from other protected producers. Lack of competition lowered both quality and safety standards.

Protected by high tariff walls, manufacturers remained indifferent to technological change. The virtual absence of indigenous research and development meant that technology development took the route of technology transfer through collaboration with foreign companies which had no real commitment in India. Thus these transfers gave little scope for the development of local skills. Moreover, often obsolete technology was at hand, yielding products restricted to the local markets and cannot be exported.

R & D has become virtually impossible given the present facilities in the country and the pace at which technology is changing.

3.6.4 Low customer satisfaction

The accuracy of diagnostic test results of patients' investigations is suspect by doctors. Different equipments come up with different results. The problem is that most hospitals, government and private, do not have their diagnostic and therapeutic gadgets checked and calibrated regularly. In the absence of reliable data, doctors are compelled to resort to other means, which may delay diagnosis and treatment as well as increase the cost to the patient.
Some manufacturers attempt calibration of their products before selling them. But once the machines are sold, few manufacturers return for calibration corrections. Since most doctors are unaware of the efficiency levels of the machines, wrong diagnosis can be made and go undetected.

3.6.5 Inadequate medical equipment finance infrastructure

Medical equipment finance business has not kept pace with the EMDE growth. The business is sluggish. A high default rate and poor re-sale value (owing to technology obsolescence) after repossession have limited the growth opportunities in this segment. Finance companies are treading this area cautiously.

While Alpic Finance (Cipla Group) and Wipro Finance (Wipro Ltd) are doing quite well. Birla Global Finance has phased out this business from their portfolio following a few defaults. It is felt that since the pharmaceutical firms are closely associated with the medical profession, their finance companies can click good deals with nil defaults.

Medical equipment finance basically involves the funding of specialised equipment for private practitioners or hospitals which runs into crores of rupees. The viability of high value equipment is perceived to be more risky. Severe competition makes it difficult to generate enough funds to meet both operating expenses and instalments of the finance companies, leading to defaults.

3.6.6 High cost of medical spend

In India, health care and delivery is extremely expensive. The costs are borne out of the individuals pocket. The state is unable to bear the
cost of advanced state of the art medicare. The insurance sector does not provide innovative medical insurance packages. This high cost has been a major deterrent for a large section of population staying out of the reach of the high care medical centres. The hospitals, in turn too were constricted to stretch beyond their means to reach out to this segment of the populace. With the impending opening of insurance sector, it is only hoped that medical insurance would witness an upheaval and break socioeconomic barriers to reach to every nook and corner of this century. This would facilitate installations of EMDE all over, leading to an increase in demand and expansion of the market.

3.7 EMERGING EMDE MARKET OPPORTUNITIES

3.7.1 Refurbished equipment: The seconds market

Though the concept of procurement and sales of refurbished equipment is still in the nascent state, the secondary market in India is said to be growing at a rate of 20 percent per annum. The life of most of the critical medical equipment is so short that technological obsolescence is more and return on investments for many hospitals is poor. As a result, hospitals are not prepared to make heavy investments in acquiring the latest medical equipment.

Consequently, EMDE would be sourced across Europe and America, refurbished and transported for remarketing to the end users in Indian market.

3.7.2 Applications software

Software applications are a key component of diagnostic equipments. Creating software to all new applications with the existing hardware, is
an opportunity opening in the imaging segment. Particularly, software-driven ultrasound imaging is a pioneering effort, about to break into the markets.

India's vast pool of skilled but inexpensive engineers is an invaluable asset, since foreign companies service the products designed here to other countries as well. Software development is a very fast growing market in the world.

3.7.3 Servicing and maintenance

A. The TIFAC-CSIO study indicated that the potential annual maintenance business for the entire population of various kinds of scientific instruments in India is around Rs.3.48 billions (Rs.348 crores) which is about 3.52 percent of the total market of these instruments. The demand is project to reach Rs.5.5 billions (Rs.550 crores) by 2001.

B. Another important business potential the study found was in the area of disused equipment which could need repairs by the turn of the century. The figure is expected to touch at least Rs.5 billions (Rs.550 crores).

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Thus medical equipment business related share among these two would be almost 5 percent in each A and B respectively.
The CSIO has taken the first step in this direction. The CSIO proposes to generate a reservoir of 1000 entrepreneurs in the next five years through its Entrepreneurial Development Programme on repair and maintenance of bio-medical equipment.

The opportunity for maintenance is bright when one takes into consideration the oft heard line from doctors that Indian customers import the latest equipment, but in most cases, the manufacturer just supplies but does not provide any maintenance.

With very few service providers in the country, the problem gets compounded further. The TIFAC, an autonomous body under the Department of Science and Technology (DST) has also formulated a three pronged strategy to meet the maintenance demands in the country.

This strategy involves starting franchised private entrepreneurs, with defined areas of specialisation, setting up centres of excellence and integrating each service, repair and maintenance centre with the proposed franchised entrepreneurs. The TIFAC-CSIO, which has formed a board on instrumentation would act as the apex body monitoring the activity at the national level.

3.8 MARKETING MANPOWER

The EMDE market is technology driven as well as user based. The customers are primarily medical specialists. Predominant specialists are:
Radiologists
- Cardiologists
- Obstetrician/Gynecologists
- Pathologists and Biochemists
- Physicians/Intensive care units
- Nephrologists/Urologists
- General Surgeons
- Neurosurgeons/Neurologists

The different business activities include:

- Marketing and sales
- Service and repair
- Project consulting
- End-user training
- Product demonstration

The product range is vast and varied involving different technical expertise. Such a complex marketing effort can be successfully accomplished through a team of people with different qualifications, expertise and exposure.

3.8.1 Marketing and sales personnel

- Electric/Electrical engineers
- Biomedical engineers
- Related graduates with sales experience and / or management background
3.8.2 Service and repairs

- Electronic/Electrical engineers
- Biomedical engineers
- Relevant Engineering diploma holders

3.8.3 Project consulting

- Management consultants with exposure to medical equipments
- Relevant medically qualified doctors

3.8.4 End-user training

- Electronic/Electric engineers
- Biomedical engineers
- Relevant medically qualified individuals

3.8.5 Product demonstration

- Electrical/Electronic engineers
- Biomedical engineers
- Relevant qualified medical doctors

Other areas, such as, Logistics, Administration are undertaken by the marketing/sales service staff as the companies are wont to keep the teams small and proportionate to the scale of business volume.