

## **GE Healthcare (A):**

### **Innovating for Emerging Markets**

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This case was written by Jasjit Singh, Associate Professor of Strategy at INSEAD. It is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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*“If GE doesn’t come up with innovations in poor countries and take them global, the new competitors from the developing world will... GE has tremendous respect for traditional rivals like Siemens, Philips, and Rolls-Royce. But it knows how to compete with them; they will never destroy GE. By introducing products that create a new price-performance paradigm, however, the emerging market giants very well could. Reverse innovation isn’t optional; it’s oxygen.”*

GE CEO Jeffrey Immelt and co-authors<sup>1</sup>

## GE Healthcare

As of 2010, GE Healthcare was a \$17 billion division of the \$180 billion giant General Electric, employing over 46,000 people worldwide. It was created in 2004 after GE Medical Systems was merged with British bioscience/medical imaging firm Amersham and several healthcare IT firms as a part of CEO Jeffrey Immelt’s increased emphasis on R&D.<sup>2</sup>

GE Healthcare had a strong track record in selling high-end medical imaging and diagnostic products globally. It operated in India as Wipro GE Healthcare, a 51:49 joint venture with Wipro. Partnering with a leading Indian company had helped GE address the regulatory constraints and institutional complexities of operating in India as a foreign multinational.<sup>3</sup>

## India as a Base for Global R&D

GE had four major sites for its R&D efforts: the U.S. (Niskayuna), India (Bangalore), China (Shanghai) and Europe (Munich). Additional research centres in Brazil (Sao Paulo) and the U.S. (Detroit) were also being considered. In locating R&D overseas its chief considerations were availability of talent and being close to important markets.

The John F. Welch Technology Centre (JFWTC) in Bangalore was GE’s largest R&D centre outside the U.S. Opened in 2000, the \$175 million centre had grown to about 4,300 technologists (about 1,100 in Healthcare) by 2010.<sup>4</sup> India was an attractive base not just for cost reasons but also for an ample supply of world-class talent and the presence of some well-known educational and research institutions in an otherwise relatively less developed country.

JFWTC carried out R&D for GE businesses in areas as diverse as healthcare, energy, aviation and transportation. Its traditional focus had been addressing the needs of developed market customers. However, there was now an increasing emphasis also on products tailored for emerging markets like India, including those developed specifically for particularly low-income customers (the so-called “bottom of the pyramid” or BOP).<sup>5</sup>

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- 1 Jeffrey R. Immelt, Vijay Govindarajan and Chris Trimble, “How GE is Disrupting Itself”, Harvard Business Review, October 2009.
  - 2 Tarun Khanna and Elizabeth A. Raabe, “General Electric Healthcare, 2006”, Harvard Business School Publishing Case 9-806-478.
  - 3 “GE Healthcare exploring distribution tie-ups”, Business Line (The Hindu), March 10, 2010.
  - 4 Joe Leahy, “A nation develops”, Financial Times, January 11, 2010.
  - 5 Dibyendu Ganguly, “How GE’s Bangalore engineers are taking on technology challenges”, The Economic Times, October 2, 2010.

## India as a Healthcare Market

As of 2010, India's healthcare industry was worth about \$30 billion and was expected to double in size in the next five years. Estimates put the medical devices market segment somewhere in the \$3 billion to \$6 billion range, with growth of between 10% and 15% a year.

Of the 700 domestic healthcare device makers in India, most only made low-value products such as needles and catheters. Of the few that did produce more sophisticated equipment, few could match international players in terms of quality or performance. Nevertheless, they typically had a significant cost advantage, which made them formidable competitors in mass markets where customers had limited purchasing power and were highly price sensitive.

High-quality specialist products came mainly from MNCs like GE, Siemens and Philips, with GE being the #1 provider of diagnostic equipment like ECG, MRI, CT and ultrasounds. Given the price points, however, most of the \$400-500 million annual revenue of GE Healthcare in India had come from sales to large hospitals.<sup>6</sup>

GE Healthcare had recently launched a global \$6 billion "*Healthymagination*" campaign, with stated goals of reducing the cost, increasing access and improving the quality of healthcare around the world. This included significant investment in solutions for BOP patients.<sup>7</sup> In addition to providing growth opportunities and building new capabilities for emerging markets, this was expected to be good for GE's corporate social responsibility (CSR) image.

## GE Organization in India

In 2005, GE had set a revenue goal for India of \$5 billion across all businesses by 2010. But it had actually realized less than \$3 billion by 2010. Within the Healthcare division, India still accounted for less than 2% of revenues. Recognizing that this fell far short of potential, Immelt set an ambitious 30% annual growth target for GE India over the next five years in order for the Indian business to cross the \$10 billion mark by 2015.<sup>8</sup>

A key barrier to GE's growth in India had been its inability to fully tap into the mass market. Since sales from India comprised a tiny fraction of overall sales, the idiosyncratic needs of the Indian market did not get much attention in the highly centralized global organization. As a result, even R&D initiatives carried out in India had a tendency to gravitate towards meeting the needs of the relatively high-end segments that resembled GE's developed market customers. A senior leader at GE Healthcare summarized the problem: "We were selling what we were making [rather than] making what the customers here needed."<sup>9</sup>

To overcome the above challenges, GE introduced a new "in country, for country" strategy for India. This involved two key changes in the organizational structure. First, on the geographic dimension of the organizational matrix, India was now to be treated as an

6 Rina Chandran, "In India, for India: medical device makers plug in", Reuters, July 5, 2010.

7 "GE Healthcare recognized for its efforts to take healthcare to the masses in India", GE Healthcare Press Release, September 13, 2010.

8 Josey Puliyeenthuruthel "GE Learns New Tricks in India" Business Today October 31, 2010.

9 "Reverse Innovation: GE Makes India a Lab for Global Markets" Knowledge@Wharton May 20, 2010.

independent region (on a par with the U.S. and China). As a former GE Healthcare employee put it, “In our global meetings, India overnight went from getting only two slides in the GE International presentation to getting a whole presentation on its own.”

The second organizational change was that GE India was the first country to be made a profit and loss centre on its own. The Indian business heads were to now report primarily to the country CEO, with only a dotted-line link to the global business heads. Immelt said: “We will treat GE India just as we would any other GE business with its own growth strategy, leadership development and budgeting processes.” Managing the entire local value chain from India itself was expected to improve local adaptation and speed up decision-making.<sup>10</sup>

The 39-year old T.P. Chopra – an Indian who had been the country CEO in the old organization – was replaced by John Flannery, a senior vice-president from GE’s global leadership team. With the new CEO being well-connected with GE’s global business heads, it was hoped that decentralization of decision-making would not compromise on global integration of strategy and knowledge exchange would still take place across boundaries.

Rather than making development of “value-for-money” products targeting low-income markets also a responsibility for existing R&D teams, GE set up new product teams specifically for developing and commercializing such solutions. The local boost for R&D was complemented by enhanced efforts in local marketing, sourcing, manufacturing and service. Aggressive growth targets were set for adapting better to the Indian market, while also cutting costs drastically and achieving speedier decision-making through decentralization.<sup>11</sup>

## **A New ECG Device for India?**

GE’s Healthcare division was an early adopter of the new “in India, for India” approach, with several new initiatives in this spirit having been started even before the new organization was fully in place, as was illustrated by GE’s efforts to develop inexpensive electrocardiogram (ECG) products specifically with the Indian market in mind.

Cardiovascular disease was the largest and still growing cause of deaths globally, accounting for over 17 million (or 30%) of all deaths.<sup>12</sup> Non-communicable diseases had in the past been associated with the more affluent nations, but this was no longer the case. Over 80% of heart-related deaths now occurred in mid-to-low income countries, and over 2 million in India alone. Between 2005 and 2015, the Indian economy was projected to lose \$237 billion due to the most common non-communicable diseases like heart disease, stroke and diabetes.<sup>13</sup>

The number of heart patients in India was already over 60 million (30% below age 40). India was expected to soon be host to more than half of all worldwide heart patients, making ECG testing of tremendous value in early detection. But as mainstream ECG machines (such as the

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10 Such a restructuring was not needed for China because the Chinese business was bigger and able to directly influence global decision-making in response to its needs. Another strategic market being considered for such a structure had been Brazil, but less developed local R&D capabilities there made it less ideal.

11 “GE plans major investment in ‘for India’ facility” Business Line (The Hindu) September 17, 2010.

12 <http://www.who.int/mediacentre/factsheets/fs317/en/>

13 “Cardiovascular diseases in India” Report by Deloitte and Assocham India, 2011.

MAC 5500 machine shown in Exhibit 1, priced at over \$10,000) were designed to meet the needs and budgets of large modern hospitals, they only skimmed the top of the Indian market.

With per capita income just over \$1,000 per annum, few Indians could afford expensive testing using high-end machines. However, affordability was not the only issue. People living in small towns and rural areas lacked easy access to hospitals. Simply producing stripped-down versions of GE's existing products would therefore not suffice. There were unique challenges of the BOP to bear in mind, and the product and solutions would have to be suitable for the less sophisticated doctors that low-income patients typically relied upon. While price was generally important, these potential customers would also place a lot of importance on perceived quality and appropriateness of any product for their needs.

### **The MAC 400 ECG Device**

GE management assigned the task of designing an ECG solution for India to the JFWTC. Using local R&D turned out to have three benefits. First, the team had a better knowledge of Indian customers. Second, it had greater awareness of off-the-shelf components available locally. Third, development costs were much lower than for an equivalent project in the U.S.

An ECG device targeting the BOP – called the MAC 400 (see Exhibit 2) – was developed in just 22 months, with development costs of about \$500,000. (A similar global product development effort could have taken twice as long and cost several million dollars.) The device was small enough to fit in a backpack. At 1.3kgs it was much lighter than conventional models, which often weighed over 7kgs. It had rechargeable batteries that could be charged in three hours and allowed over 100 ECGs, or a week of operation, between charges.

The expensive printer typical of classic ECG machines was replaced by a small printing gadget adapted from a model used for portable ticket machines. The traditional 12-channel printer output in high-end ECGs was replaced by a three-channel output in the MAC 400. The full-scale keyboard was replaced by just four buttons, and the large graphical colour display by a small text-only display used for set-up. The machine had a simple one-touch operation, with embedded software interpreting the ECG data to print out a simple easy-to-read intuitive report. This eliminated the need for a specialist to tell whether a patient had a heart condition.

Importantly, the relentless focus on eliminating non-core features found in high-end ECG machines (such as on-screen display, advanced analysis, full network connectivity and interoperability, barcode and magnetic card scanning, data storage and export, security, etc.) did not mean that the development team compromised on the core functionality. Employing the industry-standard Marquette 12SL algorithm that all GE's ECG machines used, the analysis performed by the MAC 400 was as reliable as that of a full-scale ECG device.<sup>14</sup>

The MAC 400 was priced around \$1,000, a third of the price of medium-sized conventional devices and under a tenth of many full-size models.<sup>15</sup> The effective cost of a single electro-

14 "A special report on innovation in emerging markets: First break all the rules", Economist Intelligence Unit Executive Briefing April 19, 2010.

15 Jena McGregor "GE: Reinventing Tech for the Emerging World", Bloomberg Businessweek, April 17, 2008.

cardiogram turned out to be less than \$1, which was considered low enough for widespread adoption. Although the margins in selling MAC 400 were smaller than those on high-end equipment, GE hoped that the sales volume would justify the product nevertheless.

Some cost reductions naturally resulted from making a smaller size device with limited features, but savings also resulted from the creative use of standard parts available locally. Instead of using a customized processing chip, the R&D team came up with a clever solution relying upon a commercial chip that cost only a quarter of the price. Similarly, rather than developing a customized printer the team adapted one widely used in bus terminal kiosks.

As the MAC 400 was being developed, the local R&D team had access to all of GE's accumulated knowledge. For example, by borrowing a process originating elsewhere for building fast plastic-mould prototypes, the team was able to avoid costly changes later by getting early feedback from doctors. Similarly, it was able to take GE's past experience in developing printers for dusty conditions and fine-tune the printer's suitability for ECG.

Describing the full potential of ultra-portable ECG devices like the MAC 400, a senior official at the JFWTC said, "It will become the stethoscope of cardiologists."<sup>16</sup> According to another official, "The dream would be to sell at least one device to each GP (general practitioner)."<sup>17</sup>

For cost-effective distribution, GE hoped to rely not just upon the network from its JV with Wipro but also to explore novel partnerships with pharmaceutical companies, surgical companies and large pharmacies. To educate potential customers it conducted courses on the technical aspects of using an ECG device as well as making the business case for investing in one. To help potential buyers overcome financing constraints, it tied up with State Bank of India, whose extensive rural network was used to arrange no-interest loans for buyers.

At the time when the MAC 400 project was initiated, GE had limited market research and distribution channels in place for the new customers it was trying to reach. Therefore, rather than evaluating the project purely on a financial basis, the company viewed it also as an experiment into the BOP opportunity more broadly and as a way to build resources and capabilities for the future. Other product categories where GE Healthcare was similarly trying to tap into low-income markets included baby warmers, X-ray and ultrasound systems.

As a novel experiment for GE, MAC 400 could be considered a success, generating sales not only in India but also in other countries where it in fact often sold at higher price points. Commercially, it generated a few million dollars in revenues within the first two years. This was of course still a tiny fraction of the revenues for GE Healthcare as a whole, no surprise given that it was an early foray for GE into an unfamiliar market and that the entire ECG category anyway was a small part of its overall healthcare portfolio.

GE had hoped MAC 400 would make deeper inroads into the untapped market segments. Actual sales ended up being to a large extent within the traditional customer segments, and it was clear that GE needed significant investment into new sales, distribution and service networks to expand its reach. As an insider put it: "The technology is actually not hard. Succeeding in BOP markets is more of a distribution problem than a technical problem."

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16 "Frugal innovation", Business Standard, June 13, 2009.

17 "GE Healthcare exploring distribution tie-ups", Business Line (The Hindu), March 10, 2010.



In trying to increase sales of products like MAC 400, GE also ran into a dilemma in terms of organizational design: employees rewarded based on overall revenue and profits targets had limited incentive to prioritize BOP products – which were much cheaper and had lower margins. Several senior managers suggested remedies like refining the incentive structure to include specific targets by product line or even going as far as building a completely independent sales force for BOP products. Others pushed back, citing a likely increase in costs, decrease in overall revenues, more organizational complexity and channel conflict.

## **The MAC i ECG Device**

While the broader issues mentioned above were being debated, management generally agreed that GE also needed a product cheaper than MAC 400 to become a truly mass-market player. Relying upon the MAC 400 experience and more extensive market research, GE came up with a new ECG device, the MAC i (“i” for India), that weighed less than 1kg, used a single-channel printer output and eliminated even PC connectivity. Launched in November 2009, it was priced at just \$500. Like MAC 400, it was manufactured using off-the-shelf components. As differentiating elements for the new product, GE emphasized its technological reliability, user-friendliness, interpretation software and channel upgradability options.<sup>18</sup>

GE was not the only company targeting the BOP market. While other MNCs like Schiller, Philips and Siemens carried out similar efforts, the most successful had been an Indian player called BPL. Established in 1963, BPL had focused much of its time and energy developing the right products at low cost for the mass market, nurturing a strong local brand, and having a deep sales and distribution network. As one industry insider quoted, “For BPL, the value segment is bread and butter and jam. For GE, it is just an option.” However, GE hoped that BOP market being largely untapped and MAC i being an excellent GE-branded product at an affordable price (even if more expensive than BPL) would help it do well in the coming years.

BPL’s brand perception turned out to be as high as GE’s, and its single channel ECG matched MAC i in quality of print and user friendliness. In addition, many buyers assumed GE ECGs would be too expensive to even consider. The purchasing experience was also often smoother when buying from BPL. For instance, when a doctor wished to purchase from GE, he couldn’t make payment in cash and often had to wait a week for delivery. In contrast, BPL accepted cash orders, was more flexible in giving discounts and could make deliveries within a day.

As of 2011, the ECG equipment market in India stood at 39,914 in overall volume and \$27.7 million in total value (see Exhibit 3). Single-channel ECGs contributed to about 72% of the volume and 40% to the overall value in the industry.<sup>19</sup> GE’s sales for MAC i had only grown from 500 units in 2010 to 2,000 units in 2012 at the same time that BPL’s single-channel ECG sales had grown from 17,000 units to 22,000 units. Overall, BPL remained the ECG market leader in India with 58% of the market share, and the next five players - Schiller, Maestros (an Indian company), Philips, GE and Siemens - trailed significantly behind.

<sup>18</sup> Rina Chandran, “In India, for India: medical device makers plug in”, Reuters, July 5, 2010.

<sup>19</sup> “ECG Equipment: Diagnosis for a Smarter Planet”, Medical Buyer, Dec 15, 2012

## The MAC 800 ECG Device

While the MAC 400 was being developed in India, GE's R&D personnel in China built upon the idea to develop another portable ECG – the MAC 800 (see Exhibit 4). While many of the elements in its product development process and design came from MAC 400, the China team also tapped into GE's accumulated technology and knowledge from its prior global efforts in coming up with a whole range of ECG machines at different price points.

MAC 800 targeted not only remote locations but also the typical clinics and hospitals in China. Weighing 3kg, the MAC 800 was larger than the MAC 400, though still much smaller than GE's high-end ECG machines. Recognizing China's familiarity with SMS-texting, it incorporated a telephone-style keypad to allow users to input data. It included a full-size colour display (with multiple language options) based on an intuitive Windows-based platform, offering a preview of ECG results. It also allowed ECG data to be stored and sent.

The product design, the pricing strategy and the channels GE Healthcare relied upon to distribute MAC 800 exploited the fact that higher local income levels as well as greater involvement of the government in healthcare standard-setting and purchasing decisions led to lower price sensitivity in China than in India and opened up a different kind of opportunity.

Costing around \$2,500, the MAC 800 was over twice as expensive as the MAC 400, but still less than one third of GE's high-end ECGs.<sup>20</sup> Early indications were that it was selling well, exceeding 20,000 installations in more than 50 countries as of 2010.<sup>21</sup>

## “Reverse Innovation”

In an interesting development, GE started selling the MAC 800 even in developed markets. While it held a 34% share of the U.S. mainstream ECG market, GE saw an opportunity to use the MAC 800 to expand the ultrasound market to include primary care doctors, rural clinics, emergency rooms and accident sites.<sup>22</sup> Market studies revealed that U.S. physicians found the device user-friendly, and considered its SMS texting-style keypad acceptable.<sup>23</sup> The U.S. market was found to have greater connectivity requirements than those offered by the Chinese prototype, but GE was able to address that through adaptations like USB and Ethernet ports.

For a company that primarily sold products developed for developed economies in emerging markets, this exemplified a reversal in the direction in which innovation flowed. The phenomenon was labelled “reverse innovation” by Immelt, who considered such an approach critical to the very survival of Western multinational fighting the threat of emerging market companies going global with their own disruptive business models.<sup>24</sup>

20 John Schmid, “GE Healthcare advances global reach with new heart monitor”, Journal Sentinel, March 14, 2009.

21 Kala Vijayraghavan, “Products built on Indian innovations flowing into world markets”, The Economic Times, December 2, 2010.

22 Reena Jana, “Innovation Trickle in a New Direction”, Bloomberg Businessweek, March 11, 2009.

23 GE Press release, “GE's First Portable ECG, “Medical Texting” Arrives in US”, March 13, 2009.

24 Jeffrey R. Immelt, Vijay Govindarajan and Chris Trimble, “How GE is Disrupting Itself” Harvard Business Review October 2009.



## The Right Global Strategy?

The ECG story reflected just one of GE's several BOP efforts. Although GE earned favourable press coverage and awards for many such initiatives, it was too early to declare the strategy a big commercial success. The revenues generated were still small by GE standards, margins were thinner than GE was used to, and the competition was starting to heat up.

There also remained organizational issues, such as a tension between people involved in mainstream products versus BOP products. A former GE manager recalled how corporate R&D people often perceived employees working on low-cost products: "The people in the value segment do crazy things to cut corners. They break the rules all the time." The BOP teams, in turn, saw the headquarters as being too slow-moving and conservative.

The GE management put several mechanisms in place for breaking internal barriers like the above. In addition to appropriate systems and structures, these included global mentoring programs, conferences and cross-border assignments to encourage relationship building and knowledge integration throughout the organization. As a company that had always been on the forefront of management practice, GE felt confident that it could help define a new kind of global company in line with the needs of the 21<sup>st</sup> century.

Nevertheless, sceptics wondered whether GE really had a sound long-term strategy, especially as its competitive advantage in serving low-income markets remained unclear. Its past successes had come from delivering standardized technology-intensive products globally, relying upon scale to drive down costs and centralized organization to ensure control. For the company to now move into low-income markets and towards a more decentralized approach for specific countries seemed far from the obvious direction to take. So the jury was still out!

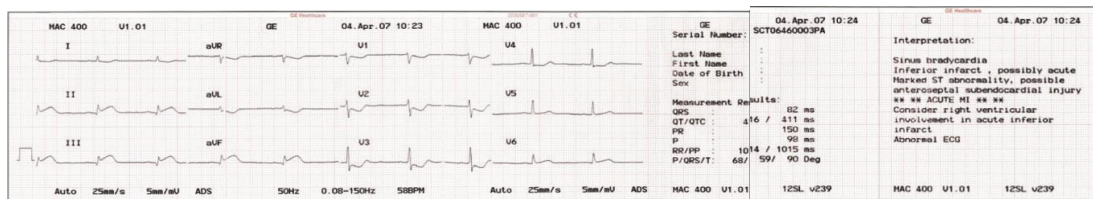
**Exhibit 1**

*GE MAC 5500 ECG System (Designed for Large Modern Hospitals)*



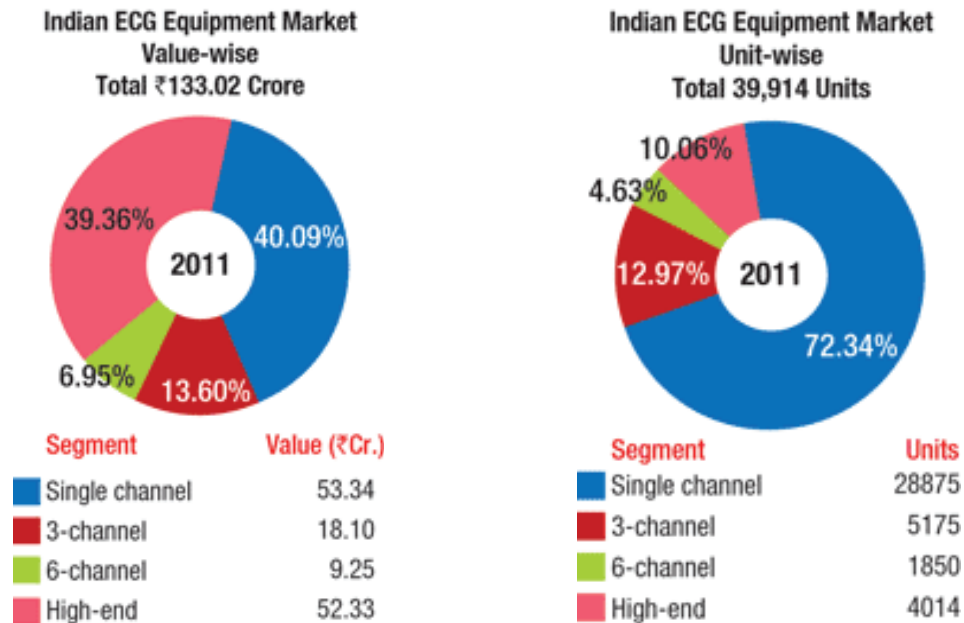
Source: <http://www.gehealthcare.com>

**Exhibit 2**  
*GE MAC 400 ECG Device (Designed for Rural India)*



Source: <http://www.gehealthcare.com>

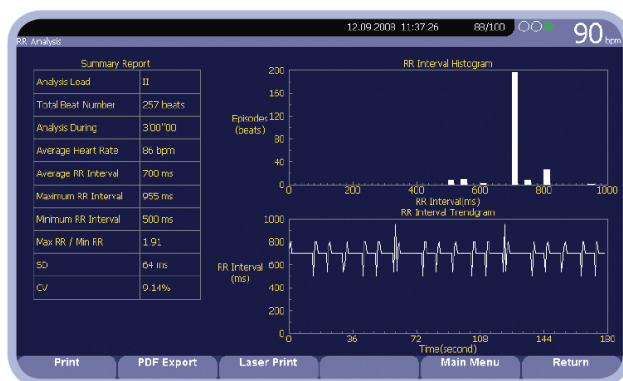
**Exhibit 3**  
*The ECG Equipment Market in India*



Source: "ECG Equipment: Diagnosis for a Smarter Planet" Medical Buyer, 12 Mar 2012.

Note: Overall market size of Rs 133.02 Crore translates into \$27.7m (1 Crore = 10 million; \$1 = about Rs. 48)

**Exhibit 4**  
*GE MAC 800 ECG Device (Designed for China Market)*



Source: <http://www.gehealthcare.com>