

NOKIA INDIA: BATTERY RECALL LOGISTICS

Monali Malvankar wrote this case under the supervision of Professors Charles Dhanaraj, Narendar Sumukadas and Fraser Johnson solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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The dawn of 2008 brought a sigh of relief to employees at Nokia India headquarters in Delhi. It was almost four months since Nokia had initiated a recall program to replace defective batteries in some of its popular cell phone models. Since August 14, 2007, when Nokia first released its product advisory for the BL-5C batteries, Nokia India had endured a media assault citing exploding batteries that caused nationwide panic. It had taken a phenomenal amount of effort at various levels to manage the communication and product flows, and to keep the company's reputation. As of January 1, 2008, 95 per cent of the battery replacements had been completed and initial customer surveys showed that Nokia's reputation for reliability was bouncing back to its usual high level.

Sudeep Dhariwal, logistics controller at Nokia India, had led the operations team through this difficult process. Dhariwal was being asked by the chief executive officer (CEO) of Nokia India, D. Shiv Kumar, to conduct a comprehensive review of the recall process, and to suggest significant changes that should be made to ensure better preparedness for the future.

NOKIA CORPORATION

Nokia's roots lay in the paper pulp industry when, in 1865, Fredrik Idestam started a wood pulp mill on the banks of the Tammerkoski rapids in southern Finland. A few years later he started another mill on the banks of Nokianvirta river — the location that gave Nokia its name. Idestam named his company Nokia AB. In 1967, Nokia Corporation was formed by the merger of Nokia AB, Finnish Rubber Works and Finnish Cable works. As part of its diversification strategy the company forayed into consumer electronics; electronics accounted for more than 40 per cent of Nokia's sales revenue by the end of the 1980s. In 1984, Nokia introduced the world's first car telephone and in 1986 the company debuted the cellular mobile phone. The company also designed and installed the world's first digital phone system and created the largest information technology (IT) group in 1988 by purchasing Ericsson's data division. Later in 1991, the world's first Global System for Mobile Communications (GSM) call was made in Finland with equipment supplied by Nokia.

As of 2007, Nokia was one of the leading manufacturers of mobile devices, telecom equipment and mobile content services. Operating around the globe, Nokia offered a wide range of basic and high-end mobile devices for music, navigation, video, television, imaging, games and business mobility. The company was organized around two segments: devices and services. The devices and services segments developed and manufactured mobile devices and offered functionalities that improved user experience. Networks provided wireless and fixed-network infrastructure and services.

The Finnish multinational employed 128,445 people in 120 countries, and reported net sales of \$69,395 million for 2007, with an operating profit of US\$10,854 million. The top 10 markets in which Nokia generated the greatest net sales in 2007 were, in descending order of magnitude, China, India, Germany, the United Kingdom, the United States, Russia, Spain, Italy, Indonesia and Brazil, cumulatively representing approximately 50 per cent of total net sales in 2007.¹ The Corporate Development Office, responsible for corporate strategy and exploring future growth opportunities, was located in Espoo, just outside Helsinki, Finland, and the Asia-Pacific regional headquarters was located at Alexandra Technopark in Singapore. Nokia's manufacturing arm, Nokia Mobile Phones, manufactured its products out of 10 factories worldwide, including four major facilities in Masan, Korea, Beijing and Dongguan in China and Chennai in India. Outside Finland, Nokia also owned research and development (R&D) centres in Japan and China, including an industrial park in Xingwang (Beijing) that housed both R&D and manufacturing facilities. Nokia Siemens Networks operated technology and training centres in Australia, Japan and Thailand, and had six joint ventures in China.

NOKIA INDIA

India had one of the fastest-growing mobile phone markets in the world with 170 million mobile subscribers as of October 2007; an average of 8 million subscribers was being added every month. Since the mid-1990s, the Government of India continued to liberalize the market, allowing private operators to license and provide telecom services to the end consumer. In addition to government-owned service providers, such as Bharat Sanchar Nigam Ltd. (BSNL) and Videsh Sanchar Nigam Ltd. (VSNL), there were a number of private operators, such as Airtel, Reliance, Aircel, Vodafone and Tata. Mobile operators used both Code Division Multiple Access (CDMA) and GSM cellular technologies. Unlike in North America, mobile phones were not locked to particular service providers; although many alliances were in place, each mobile phone manufacturer predominantly marketed its devices independent of the service providers. Nokia served a wide range of market segments, which included entry-level, mid-level and top-end GSM and CDMA handsets. It was the market leader in the country's \$2.5 billion handset market, followed by companies such as Samsung, LG Electronics and Motorola. Nokia was also working closely with mobile service providers to increase geographical coverage across India.

Nokia entered the Indian market in 1995, and within a decade established itself as a leader. Nokia's market share in India was estimated at 70 per cent in 2004,² and had jumped to 76 per cent in 2006.³ Nokia set up a manufacturing facility in Chennai in 2006, and in the first 18 months produced 60 million handsets. Nokia also established three R&D centres based in Hyderabad, Bangalore and Mumbai. The company

¹ "Nokia in 2007," *Nokia*, 2007, pp. 2-3, www.nokia.com/NOKIA_COM_1/About_Nokia/Sidebars_new_concept/Annual_Accounts_2007/Nokiapercent20inpercent2007.pdf, accessed on October 2010.

² Abhijit Joshi, "In the top spot," *India Now Magazine*, 2(4), December, pp. 59-61, www.ibef.org/download/inthetopspot.pdf, accessed on October 2010.

³ "Nokia Made in India," *TMCnet.com*, March 28, 2006, www.tmcnet.com/submit/2006/03/28/1510361.htm, accessed on October 00, 2010.

grew rapidly, with its workforce increasing from 450 in 2004 to more than 5,000 in March 2007 (excluding Nokia Siemens Network).

Nokia had developed a strong network of sales and marketing centres within India, and boasted one of the largest distribution networks, with a presence in more than 130,000 outlets. The company's marketing organization consisted of more than 500 customer care centres (CCCs) and more than 600 Nokia Priority Dealers (NPDs) across India (see Exhibit 1); in addition, it operated several 'Concept Stores' in major cities, such as Bangalore, Delhi and Mumbai, to cater to the more technologically sophisticated customer. Some of the CCCs and NPDs were owned and operated by Nokia's alliance partners; for example, HCL Infosystems, an Indian company specializing in system integration technologies, was a strategic partner for Nokia and helped Nokia drive its distribution and reach strategy. Accordingly, in February 2006, Nokia and HCL Infosystems announced a go-to-market strategy to jointly address the coverage needs of both the urban and widely-dispersed rural areas.

Within India, Nokia organized itself along four regions — North, West, South and East; specific to Nokia Care, the company had regional care managers in Delhi, Mumbai, Chennai and Calcutta, respectively. Each region was further divided into two areas overseen by area care managers, who in turn were responsible for all the CCCs and NPDs in their areas (see Exhibit 2).

MOBILE PHONE MANUFACTURING

Mobile phones, despite their small size, required thousands of parts. Exhibit 3 provides an overview of the manufacturing process for mobile phones. Nokia's process involved producing a basic "engine" that was then customized according to the needs of different customers and mobile service providers. Listed below are the major components of a mobile phone, and the typical suppliers for these components within the industry. While European and American manufacturers dominated the semiconductor chip segment, Japanese and Chinese manufacturers dominated the rest of the component segments:⁴

Baseband (the technical core of a mobile phone): Texas Instruments, NXP Semiconductors, Freescale, Agere, MediaTek Inc., Analog Devices Inc., Qualcomm, Ericsson Mobile Platforms, Infineon, Broadcom, Skyworks, Toshiba and NEC.

Memory: Samsung, Spansion, Intel, Toshiba and STMicroelectronics.

Power Amplifier: RF Micro Devices (RFMD), Skyworks, Renesas and Freescale.

Radio Transceiver: Qualcomm, STMicroelectronics, Infineon, TI, Renesas, Philips, RFMD and Skyworks.

Passive electronics (capacitor, inductor and resistor, etc.): Murata, TDK, Kyocera, Taiyo Yuden, Panasonic, Rohm, Yageo, Ralec, Chilisin and Walsin.

Phone Cases: Green Point, Perlos, Nalato, Nypro, Foxconn, Unikun and Biente.

Printed Circuit Boards: Compeq, Unimicron, Unitech, Ibiden, CMK, Multek and Elec&Etek Group.

Display: AU Optronics, Wintek, Samsung, Kyocera, Sharp, Epson, Sanyo, Toshiba-Panasonic Display and Sony-Toyota LCD (STLCD).

Acoustic Components: Panasonic Electronic Devices, Hosiden, Cookson, Foster Electric, Merry, Philips, Mayloon, Xuanwei and Knowles Acoustics.

Battery: Matsushita, Sanyo Energy, Sony Chemical, BYD and SCUD.

⁴ "Global Mobile Phone Industry Chain Report, 2007-2008," *Research in China*, June 2008, www.researchinchina.com/htmls/Report/2008/5404.html, accessed on October 2010.

Nokia had an extremely complex supply chain. In 2006, this chain handled 900,000 mobile devices per day that were produced in 10 factories worldwide,⁵ and were made up of more than 100 billion components sourced from more than 60 strategic suppliers.⁶ New product introductions were especially complex, as a single “phone could represent 170 handset variations and 250 sales package variants.”⁷ Nokia required all products and services sold under its brand to be sourced according to practices that upheld internationally accepted standards. Sourcing activities were divided into two main categories at Nokia: direct and indirect. Direct sourcing included materials supplied for Nokia product components, parts, packaging, contract manufacturing, software development and R&D. Indirect sourcing covered equipment such as office furniture and computers, as well as services such as catering, IT consultancy and marketing.

Since 1995, Nokia had been working on creating a demand-driven supply chain, linking the consumer with a host of suppliers, factories, telecom operators, channel partners, contract manufacturers, banks, sales and logistics service providers. In 2007, AMR Research ranked Nokia number one for excellence in supply chain management.⁸ According to the report, “excellence in the demand-driven supply chain is a combination of visibility, communication and reliable processes linking together the three key areas of supply management (including manufacturing, logistics and sourcing), demand management (including marketing, sales and services) and product management (including R&D, engineering and product development).”

LOGISTICS CHALLENGES IN INDIA

The diverse topography of India, as well as varying consumer habits and diversity of languages and customs in each of the 25 states posed a significant challenge for logistics management in India. Infrastructure constraints — including highly congested airports, ports and roadways, as well as inadequate warehousing and distribution facilities beyond the major cities — were hurdles for most companies attempting to provide national logistics support; for example, in many instances Nokia India had to create its own infrastructure of specialized storage and distribution facilities to meet its distribution needs. The complex tax regime, with significant variations across the 25 states and high bureaucratic control were often cited as major hassles faced by the best of third party logistics (3PL) service providers in providing logistics solutions for their clients.

Despite these problems, logistics was a potentially lucrative sector. There were several government-owned companies, such as Transportation Corporation of India (TCI), Container Corporation of India (CCI), Food Corporation of India (FCI) and Central Warehouse Operation (CWO), that provided national logistics support. A large number of privately owned operators were also expanding their networks within the country: Blue Dart, Gati, Allcargo, Safeexpress, Shreyas Shipping and Reliance Logistics were some prominent private operators. Since the liberalization of the economy, some foreign entrants were also investing heavily in the logistics market, and prominent among them were DHL (Germany), FedEx (United States) and TNT (the Netherlands).

⁵ Andy Reinhardt, “Nokia’s Magnificent Mobile-Phone Manufacturing Machine,” *BusinessWeek Online Europe*, August 3, 2006, www.businessweek.com/globalbiz/content/aug2006/gb20060803_618811.htm, accessed on October 2010.

⁶ Jean-Francois Baril, “Supply Chain Transformation: Scope Dimension,” *IBM Global Business Services: 2006 Supply Chain Executive Summit*, p. 3, www-935.ibm.com/services/us/gbs/bus/pdf/bcw00617-scm_executive_summit_2006_insights.pdf, accessed on October 2010.

⁷ *Ibid.*

⁸ “AMR Research ranked Nokia’s global supply chain number one in the world,” *Nokia*, 2007, http://press.nokia.com/PR/200706/1130632_5.html, accessed on October 2010.

THE BATTERY PROBLEM

During a routine data analysis of consumer complaints, Nokia's head office in Finland discovered that Nokia phones using particular batches of Matsushita BL-5C batteries (see Exhibit 4) were likely to swell. In the few months preceding July 2007, Nokia received nearly 100 consumer complaints from around the world about batteries that swelled during charging. As with all components sourced by Nokia, the batteries complied with established international standards: the Matsushita BL-5C batteries had been tested against internationally recognized quality standards as well as Nokia's own stringent quality requirements. Using its sophisticated data analytic capability, Nokia was able to pinpoint that the defects appeared in particular batches of batteries manufactured by Matsushita between December 2005 and November 2006. It appeared that in some cases the battery overheating while charging caused the battery to dislodge. In keeping with company policy, senior management decided to issue a product advisory regarding the particular batches of BL-5C batteries. India was one of the few countries affected by these batteries.

Following the directive from top management, Nokia's global communications team in Finland activated the standard protocol for such events and proceeded to issue a product advisory. The global team had devised a solution whereby customers could visit the website and determine whether their battery was affected by keying in a 15-digit battery number. An affected battery could then be registered online and a new battery could be shipped to the customer's address within 15 days. The global communications team worked in conjunction with its counterparts at Nokia India, headed by Poonam Kaul. Kaul recalled:

On Saturday, August 11, 2007, about 10 a.m., I received a call from Finland informing me about a forthcoming product advisory about some batches of faulty BL-5C batteries made by Matsushita. The advisory was supposed to be a routine one. Nokia phone owners would be able to check if their battery was affected by the advisory by going to Nokia's website and keying in the batch number of the battery in their phones. If faulty, Nokia would replace it.

Over the next couple days before the advisory was issued, Kaul and her team kept close contact with headquarters.

As soon as Shivakumar received the formal information he called Dhariwal to notify him about the advisory. Dhariwal commented on his preparations for the advisory:

At that time, we all thought that it would be a small-scale operation and would probably last a week. We estimated that we might have to ship 50,000 to 60,000 replacement batteries to the affected customers. Given the small volume, we were confident of handling the shipment from the Delhi port itself. I needed to contact Blue Dart (a courier company, recently acquired by FedEx) about handling the shipments. We had to get system readiness in SAP (business management software database) from a sales tax point of view. Each of the 25 states had a different set of sales tax rules and we had to go through every state's VAT (value added tax) laws to ship the batteries in and out of Delhi.

The operations team in Delhi was familiar with the tax issues in the North region, but was not sure of the other three regions because these were typically managed by the ports in Chennai, Calcutta and Mumbai. Dhariwal commented:

Some states required forms from the regional distributors (RDs) to ship into and within the state. Since it was a zero cost item, we needed to provide a lot of details to the tax authorities as to why we were giving the batteries free and what the estimated cost of a

battery was. Our SAP system did not have the provision for a zero priced item and so all documents and invoices had to be done manually.

We had to get further information regarding the terms and conditions that must be specified on FOC (free-of-charge) invoices, the specific requirements of delivery documentation for different states and any other requirements of the VAT Act. We did manage to get all this done within the same day.

MEDIA FUROR

Nokia issued the product advisory on August 14, 2007.⁹ One television channel started reporting that Nokia phones could potentially burst, following which several other television networks began broadcasting the story. The networks reported sensational instances of battery explosions totally unrelated to the current product advisory.¹⁰ Nevertheless, the extensive media attention generated public fear, which quickly turned to panic and spread widely.¹¹

The next day, customer requests for replacement batteries began flooding the Nokia CCCs;¹² however, no replacement batteries were available yet, as August 15 was a national holiday and many establishments were closed.¹³ Nokia's global solution of asking customers to key in a 15-digit battery number on the company's website did not seem to be effective:¹⁴ it became apparent that many customers rarely used the Internet, especially in rural India.

To handle the fallout from the media panic, two teams were immediately formed: a crisis management team comprised of D. Shiv Kumar, Sudhir Kohli, Poonam Kaul and Devinder Kishore, and a logistics team comprised of Dhariwal and Kohli. It was clear that a local solution needed to be developed to replace the web-based service, rather than wait for a solution from corporate headquarters or the regional office in Singapore; thus, an SMS (Short Message Service, or text message) solution was activated whereby customers could text their 15-digit battery number to determine whether their battery was affected. If the battery was affected, it could be registered by texting the customer's address, and a new battery would be shipped to the customer's address within 15 days.

Shivakumar contacted headquarters and got clearance to replace a battery in person if a customer came to the CCC and to courier a battery if a customer registered through the Internet. This new solution required that batteries be shipped to CCCs as well as couriered directly to registered customers. Dhariwal commented:

⁹ "Nokia warns about 46 million Matsushita made batteries," *The Times of India*, August 14, 2007, <http://timesofindia.indiatimes.com/articleshow/2280732.cms>, accessed on October 2010.

¹⁰ "Nokia blasts in Palanpur," *The Times of India*, August 29, 2007, <http://timesofindia.indiatimes.com/articleshow/2318217.cms>, accessed on October 2010.

"Nokia battery blows up on woman," *The Times of India*, August 31, 2007, <http://timesofindia.indiatimes.com/articleshow/2324760.cms>, accessed on October 2010.

"Nokia mobile explodes at Asansol," *The Times of India*, September 1, 2007, <http://timesofindia.indiatimes.com/articleshow/2328386.cms>, accessed on October 2010.

¹¹ "Nokia 'batteries' spark panic," *The Hindu*, August 15, 2007, www.thehindu.com/2007/08/15/stories/2007081559730300.htm, accessed on October 2010.

¹² Sandeep Joshi, "Anxious callers throng Nokia showrooms," *The Hindu*, August 17, 2007, www.thehindu.com/2007/08/17/stories/2007081758100100.htm, accessed on October 2010.

¹³ "Nokia 'batteries' spark panic," *The Hindu*, August 15, 2007, www.hinduonnet.com/2007/08/15/stories/2007081559730300.htm, accessed on October 2010.

¹⁴ *Ibid.*

In addition to shipping directly to customers, we decided to also ship these batteries to the RDs, who in turn could forward [them] to the CCCs and NPDs. They in turn could reach the local customers. HCL Infosystems was our distributor taking care of the North and East regions. We could have contacted HCL and had them contact the RDs. Instead, to save time, we directly contacted the RDs. We did not have any shipping agreements with these RDs, so we had to ship on behalf of HCL, and invoice HCL who then invoiced the RDs.

Many of Nokia's models used BL-5C batteries, and the Chennai factory had some batteries in stock. Sachin Saxena, head of the Chennai factory, was contacted to consider redirecting the batteries even if that affected production commitments, as the batteries were needed urgently. The first shipment from the Chennai plant, of 10,000 batteries, arrived in Delhi on August 15, India's Independence Day; however, due to heightened security concerns on Independence Day, entry restrictions were in force in every state and trucks were unable to operate. Thus, the first shipment of batteries from Delhi to various CCCs and NPDs started on August 16.

In total, Nokia was bombarded with more than 150,000 phone calls and text messages within a couple of days¹⁵ and more than 3 million requests within a week.¹⁶

COMMUNICATIONS WITH CUSTOMERS

As noted earlier, mobile phone customers in India bought their devices independent of the mobile service. It was not feasible to reach customers directly on their mobile phones since the impacted consumers were a subset of the large subscriber base. To make matters more complex, the BL-5C batteries were used in several different Nokia models.

Thus, Nokia started an advertisement campaign aimed at its consumers. The focus was to allay consumer fears regarding the battery recall, and to provide information regarding how to check for a faulty battery and request a replacement battery. A toll-free telephone helpline was also activated. Each CCC and NPD was assigned a promoter, an employee specifically designated to help walk-in customers find out whether their batteries were affected.

COMMUNICATIONS WITH LOGISTICS SUPPLIERS

Dhariwal had managed to scrounge some batteries from the Chennai plant, and more had been flown in from Singapore and Düsseldorf; however, Blue Dart couriers were not able to handle the large volume of shipments. Dhariwal contacted Nokia Singapore to work with DHL, Blue Dart's parent company. Upon Singapore's intervention, DHL agreed to step in and assist with the extra demand. DHL's solution was to set up a makeshift packing and shipping facility where it could make courier packs (to protect batteries from damage) and then ship them out via several other courier companies.

DHL was able to muster 40 employees for its makeshift operation, but needed at least twice as many more. The Nokia warehouse in Delhi was unable to release any of its employees to assist DHL. In addition to

¹⁵ Sandeep Joshi, "Anxious callers throng Nokia showrooms," *The Hindu*, August 17, 2007, www.hindu.com/2007/08/17/stories/2007081758100100.htm, accessed on October 2010.

¹⁶ "Nokia gets support from Airtel, Hutch," *The Times of India*, August 20, 2007, <http://timesofindia.indiatimes.com/articleshow/2293077.cms>, accessed on October 2010.

their regular operations, the Delhi warehouse had now been charged with handling the recall shipments to CCCs and NPDs. Dhariwal commented:

We needed more workforce to make courier packs as well as additional space near our warehouse so that our employees could work with the 40 DHL employees. To get additional workers, I called my previous employer, a textile company in Okhla (suburb of Delhi), which used to hire workers for projects.

Dhariwal secured 80 temporary workers, so DHL now had 120 people at the makeshift facility. DHL rented an empty warehouse that was in front of Nokia's warehouse and began a three-shift operation, each with 40 workers. The first step was to unpack cartons, each containing batteries that were pouring in from Nokia's warehouses in Chennai, Singapore and Düsseldorf. Each battery was then wrapped in a bubble sheet four times to protect it from damage when couriered. The wrapped battery was placed in a DHL courier bag with a "not for sale" sticker to make it non-taxable. The bar codes of the battery and its courier bag were scanned to track the battery. To avoid double delivery of batteries to customers who had put in multiple requests, such as on the web as well as in person at a CCC, each CCC also captured the numbers of the batteries it replaced. The list of batteries to be couriered was verified against this unified database.

Once the batteries were packed and scanned, DHL handed them off to different courier companies that covered the different parts of India, as well as to India Post. Although several local couriers were available in every state, many of them were found unsuitable as they did not have an adequate MIS system to track the batteries. The courier companies selected were Blue Dart, Gati, XPS, Overnite, First Flight, TNT, FDC and FedEx. Nokia paid DHL a flat rate per battery; DHL then negotiated the rates with the remaining courier companies.

Since September 2007 was the Diwali season (festival of lights in India), all the courier companies were in the midst of their peak business season of delivering Diwali cards and gifts. Dhariwal suggested to DHL that they offer special incentives to the courier companies during this Diwali season for working extra hours.

Another challenge that the team faced was that some customers were not receiving the couriered batteries. The typical reasons for non-delivery included incomplete address, inability to locate the address, addressee not found that or nobody at home. In many villages, people were delivered their mail at the village *panchayat* (village government) office or at the local post office since many customers had texted only the names of their city/town/village and state as their addresses. Furthermore, almost half of the addresses gathered had missing PIN code numbers (Postal Identification Number, equivalent to the postal code or zip code in North America). Thus, the couriers were unable to confirm delivery to customers in many towns and villages. In other cases where nobody was home at the time of delivery, the couriers left a call back number. If nobody called back, they went once more to deliver. If they were still unable to find anyone at home, they shipped the battery back to Nokia.

In addition to the direct-to-customer couriers, batteries were also shipped to the RDs and CCCs in bulk. The logistics team created a temporary packaging area in the Delhi warehouse where batteries were repacked in bulk. Nokia did not have any direct agreements with the CCCs, and thus could not ship directly to them; therefore, the trucks with batteries departed from the Nokia warehouse, but travelled via the HCL warehouse. Dhariwal emailed HCL the invoices for the shipments from HCL to RDs and HCL to CCCs. HCL printed out these invoices and gave them to the trucks arriving from Nokia, and the same trucks then went on to deliver the batteries to RDs and CCCs.

REVERSE SHIPMENT

In late September, Nokia global headquarters issued a guideline regarding environmental concerns, stipulating that the old batteries be collected and disposed of in an environmentally-friendly fashion. An empty insulated envelope, which Matsushita shipped to Nokia from its factory in China, was sent in a DHL courier bag to each customer address to which a replacement battery had been delivered. Customers were asked to send their old batteries back in that envelope. At the CCCs, disused batteries were collected and at the end of the month, the CCCs packed these collected batteries in the same cartons in which they had received new batteries and shipped them in bulk to the Blue Dart courier hub in Bangalore. Blue Dart then collected all the old batteries and shipped them to Nokia India headquarters in Delhi by air. Finally, all the batteries were shipped to Matsushita.

To ensure that customers were given sufficient time to check for faulty batteries and request replacements, the recall of batteries continued for almost four months. Nokia concluded its advisory in December 2007. At the end of the recall operation, Nokia ceremoniously distributed mementos to everyone involved in the recall; fittingly, the memento displayed a BL-5C battery.

ALTERNATIVES

As Dhariwal pondered over the processes and policies that had been so rapidly constructed to recall the batteries, it struck him that his task over the past few months would have been considerably easier had a streamlined set of procedures — a recall protocol — been in existence. He would need to apply the lessons Nokia had learned during this ordeal to construct a recall protocol specifically designed for the local context. Dhariwal also recognized that the success of future recalls would depend on the cultivation of several important capabilities within the supply chain. He commented:

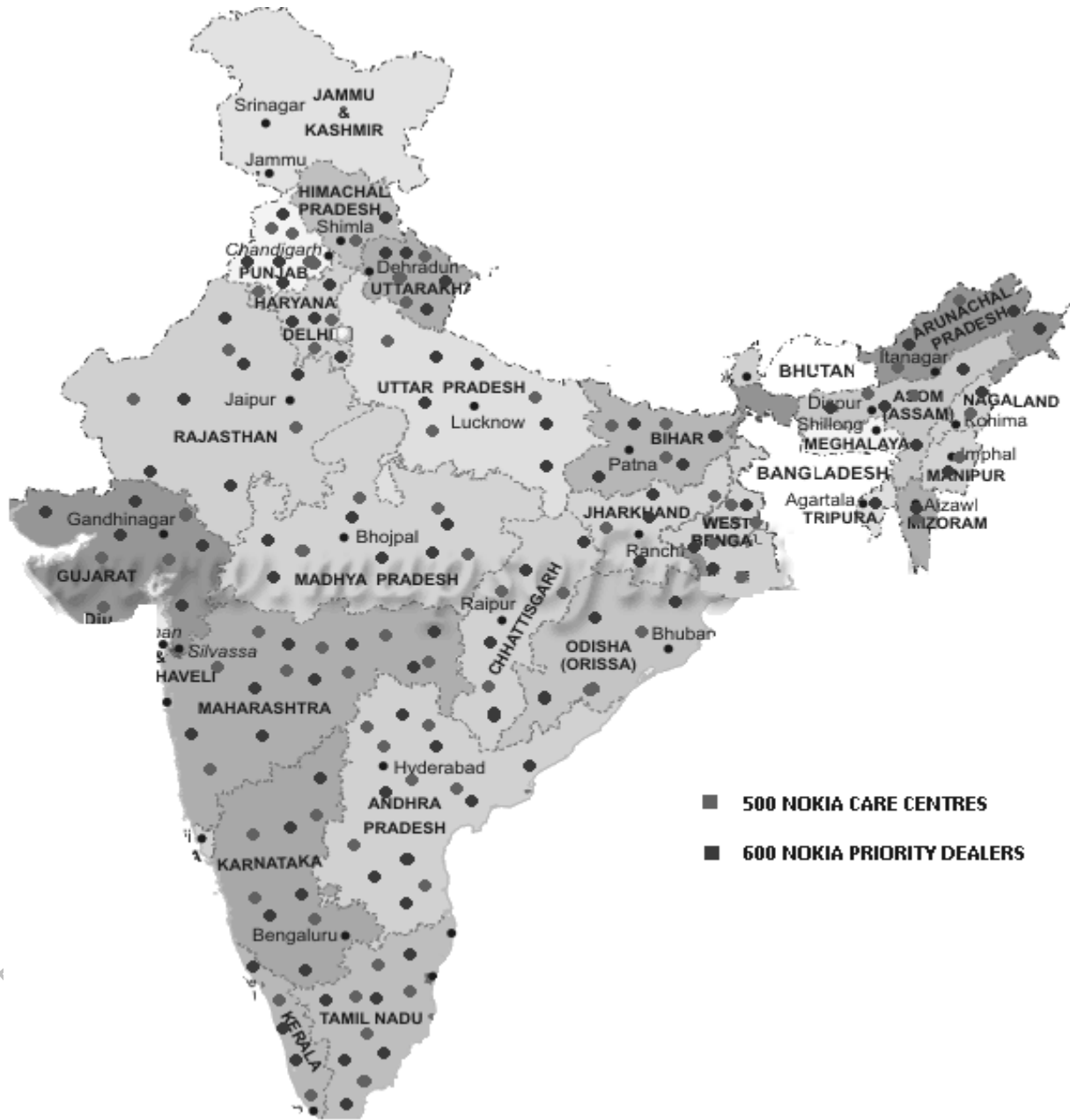
We need a supply chain capability and strategy to adapt and deliver in case we have similar advisories in the future. We need an organizational structure that can be called upon during such a crisis. We might need to consider third party logistics to handle such exigencies. The key is to create agility, adaptability, and alignment with our strategic focus.

In addition to reviewing the recall logistics process, senior management was keen to extend Nokia's reverse logistics capability beyond the small-scale capture and return of recalled batteries. The decision by the global teams for the collection and recycling of the recalled BL-5C batteries was a clear signal that Nokia India would hereafter be expected to recover an increasing proportion of outgoing items, especially environmentally-sensitive items such as batteries.¹⁷ Dhariwal wondered what lessons from the battery recall operation could be applied to the development of a reverse logistics operation. Having a reverse logistics chain in place would also support any future recalls/advisories, should any occur.

¹⁷ "Nokia India announces 'Take Back,'" *The Times of India*, December 31, 2008, <http://timesofindia.indiatimes.com/articleshow/3918246.cms>, accessed on October 2010.

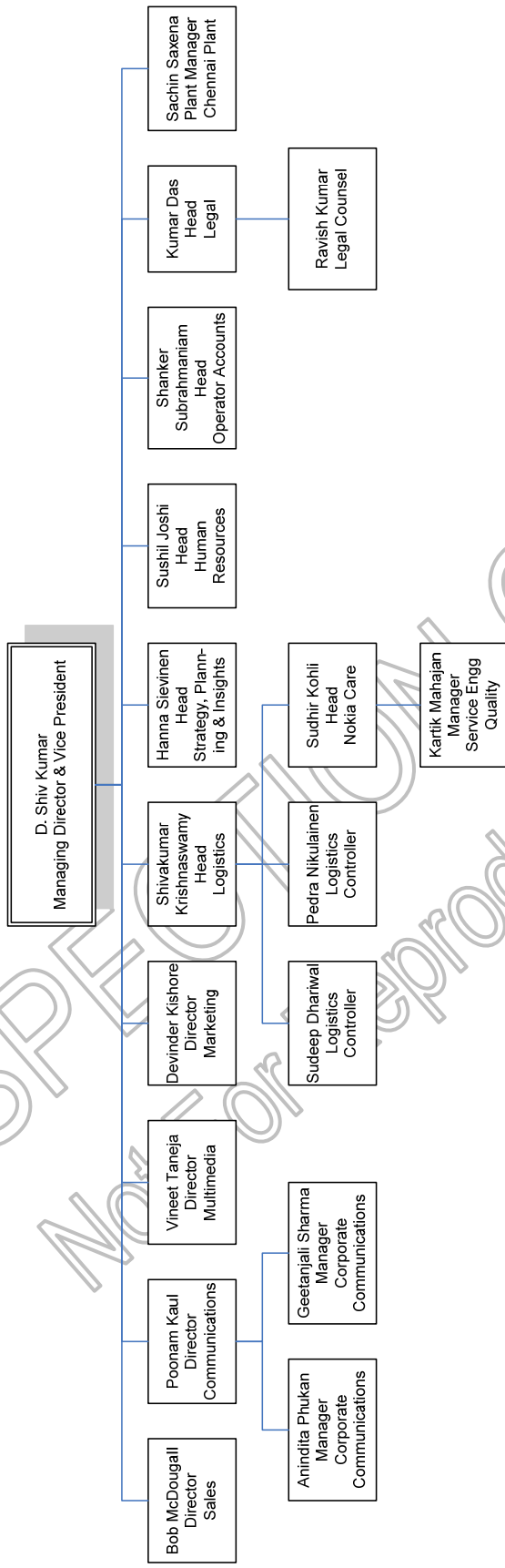
Exhibit 1

NOKIA'S CUSTOMER CARE CENTERS AND PRIORITY DEALERS



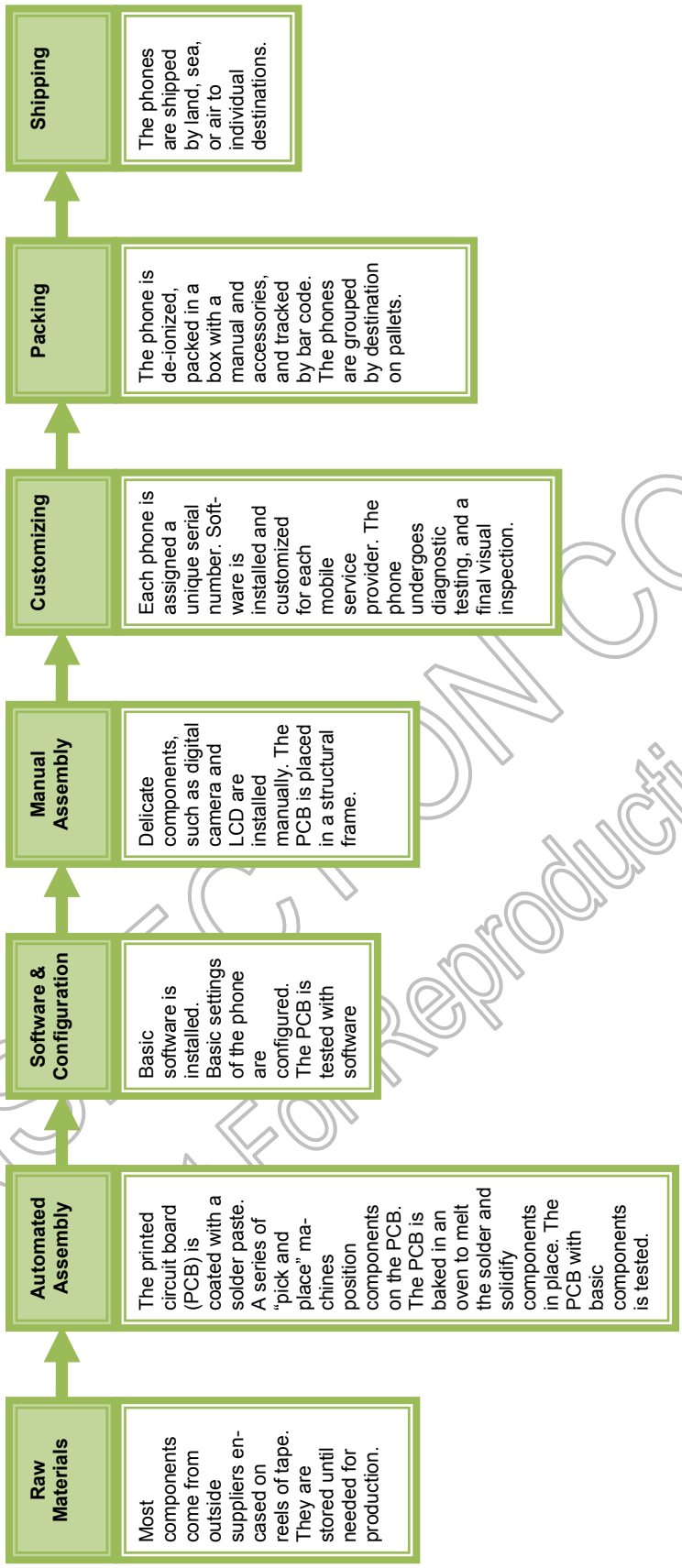
Source: Company Documents

Exhibit 2
NOKIA INDIA'S ORGANIZATION STRUCTURE



Source: Company Documents

Exhibit 3
NOKIA'S PRODUCTION PROCESS



Source: Adapted from Businessweek http://images.businessweek.com/ss/06/08/makingof_nokia/index_01.htm Accessed November 2009

Exhibit 4
NOKIA BL-5C BATTERY



Source: Nokia Corporation, "Product advisory: Nokia BL-5C battery," 2007, <http://batteryreplacement.nokia.com/batteryreplacement/en/advisory-2007.html>, accessed on October 2010.