Abstract

Disruptive innovation is considered by practitioners and researchers as a means for developing new markets. The bottom of the pyramid (BOP) markets, i.e., the 4 billion strong low-income segments in emerging markets are the ideal grounds for deploying disruptive innovations. Disruptive innovations, particularly new-market disruptions, compete against non-consumption as these enable new groups of people to begin using these products who previously lacked the money or skills to use them. Several examples of potentially disruptive innovations created for the BOP market, particularly in the healthcare sector, are emerging in India. These are both product innovations, namely Tata’s water filter and GE’s portable ECG device, as well as service innovations namely, focused, low-cost hospital chain like Aravind Eye Hospital and Narayana Hrudayalaya. My research will analyze this phenomenon and the disruptive potential of innovations created for the BOP markets. Counter to theory of disruptive innovations, established companies like Tata and GE, have also been successful in developing disruptive innovations. As the next phase of my research I aim to investigate the resource allocation processes at these companies, which have led to the successful implementation of these disruptive projects.
Note to the Faculty and Participants

This paper, prepared for the oikos UNDP Young Scholars Development Academy 2011, is an initial draft of my research questions as part of my PhD. I will start my case studies in August in India, just before Academy. Thus, at the Academy, I will be able to present the first round of empirical data.

However, depending on my interviews, my research focus could also change slightly. Since my empirical research would continue in the next round of in-depth interviews, I’m also open to suggestions regarding my research questions.
Introduction

Companies are increasingly seeking growth in the Base-of-the-Pyramid (BOP) - that is, the roughly 4 billion people living in low-income markets (Prahalad & Hammond, 2002). In his seminal book, C.K. Prahalad argued that companies serving these markets profitably not only created new growth pockets but also improved millions of lives (Prahalad, 2004).

Clayton Christiansen argued that a major source of growth for companies could be to offer products and services to a wider range of customers through disruptive innovation (Christensen, 1997). Disruptive innovations, particularly new market disruptive innovations, significantly open up markets, by introducing large populations of non-consumers to the product/service by making it more affordable, more convenient or easier to use (Christensen & Raynor, 2003). The PC and the ink jet printer are examples of such new market disruptive innovations.

Merging these concepts, Hart and Christiansen (2002) posit that companies should “take the great leap” to the base-of-the-pyramid through disruptive innovations. The authors highlight the example of Galanz, a microwave manufacturer from China that initially produced low-cost microwaves for the growing middle-income segments in China. Gaining experience in the low-cost model, it moved to developed markets and eventually grew to become the market leader globally (Ge & Ding, 2008). This example shows that companies can drive growth by serving middle-income segments through disruptive innovations.

In the first part of my research, I will examine the disruptive potential of innovations created for the BOP. Several examples are available in India, particularly in the healthcare sector. There are examples of product innovations, e.g., a sub USD 15 water filter, as well as service innovations in healthcare delivery such as low-cost hospital chains that give focused care. Further these service innovators addressing the BOP have created, by themselves or with partners, a series of product innovations that are potentially disruptive. In this context, I would like to investigate the capacity of these hospital chains to create and incubate potentially disruptive innovations.

In the second part of my research, I will analyze the success factors that led to the successful development of disruptive innovations in established companies. Two cases stand out who developed affordable products targeted at the BOP, namely the Indian conglomerate Tata and the American healthcare giant GE. It has been pointed out previously in literature that large established firms generally ignore or are incapable of introducing disruptive innovations (Christensen, 1997; Walsh, Kirchhoff, & Newbert, 2002). The key reasons for this, Christiansen notes, is the existing resource allocation processes and senior executives’ decision making process that favor ideas and innovations that cater to the companies’ main and most profitable customers (Christensen, 1997). Researchers attribute this to both resource dependency, i.e., companies focus on problems that are their resources (high-margin customers) support (Christensen, 1997) and the organization’s lack of market-facing competence to anticipate shifts in consumer demand (Henderson, 2006). Through exploratory case studies of these companies, I will examine the processes of resource allo-
cation in these companies and the role senior leadership that led to the successful implementation of these projects.

1 Theoretical context

1.1 Disruptive innovation theory

Disruptive innovation, pioneered by Christiansen through his seminal book (Christensen, 1997), is considered by practitioners and researchers as “a powerful means for developing and broadening new markets” (Gilbert, 2003; Govindarajan & Kopalle, 2006). According to the theory, there are two types of innovations, sustaining and disruptive. To attain growth, companies improve product/service features that their mainstream customers appreciate through sustaining innovations. Sustaining innovations thus improve the product along the primary performance dimension in an evolutionary or radical way.

Disruptive innovations, however, appear inferior initially from the perspective of mainstream customers but are appealing to emerging customers in low-end or new markets as it performs better on an alternative dimension. As these innovations improve over time, they overtake the existing technologies, by satisfying current market needs.

A key concept to disruption is that performance demanded or utilized by customers increases at a rate lower than the rate of performance improvement of the technologies. This happens because companies innovate for their most demanding customers but in reality the majority of the market is overserved. Thus when the disruptive innovation reaches an acceptable level of performance for the market, they switch over to the new technology and disruption occurs (Christensen, 1997).

Christiansen, in his sequel book, replaced the term disruptive technology with disruptive innovation to include service and business model innovations (Christiansen et al., 2003). In this book, the authors further categorized disruptive innovations into two types: low-end disruption and new-market disruption. In case of low-end disruptions, the initial customers of the disruptive technology are price-sensitive customers at the low end for whom the low performance is acceptable. Low-end disruptions occur when current technologies are overpriced because their performance overshoots the performance expected by the market. Thus lower-priced alternatives with “good-enough” performance have a chance to disrupt the existing technology. Alternatively, new-market disruptions “compete against non-consumption” as these enable new groups of people to begin using these products that previously lacked the money or skills to use them.

Govindrajan and Kopalle (2006) contributed to this categorization by adding “high-end” disruptions. These disruptions refer to innovations that are typically more expensive than mainstream technologies, but offer a secondary performance attribute. The authors present mobile phone technology as an example of radical and high-end disruption. Similar to low-end disruptions, initially mainstream customer segments fail to see value in high-end
disruptions. Consequently they also pose a dilemma to incumbents. Incumbents also tend to estimate the initial niche market as small and thus ignore the disruptive technology.

Along with wide spread praise, the disruptive innovation theory by Christiansen has also attracted criticism (Danneels, 2004; Tellis, 2006). The main criticism revolves around the lack of a comprehensive definition of disruptive innovation.

The following table of attributes summarizes the characteristics of disruptive innovations generally acknowledged by recent research as key attributes and shows the type of disruptive innovation (low-end, new-market or high-end disruption) it applies to:

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristic</th>
<th>Applicability</th>
<th>Source</th>
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<tbody>
<tr>
<td>1</td>
<td>The disruptive innovation initially underperforms on the performance attribute valued by mainstream customers</td>
<td>All</td>
<td>(Christensen, 1997)</td>
</tr>
<tr>
<td>2</td>
<td>The disruptive innovation, however, has features that are valued by fringe or new customers and introduces a secondary performance criterion</td>
<td>All</td>
<td>(Christensen, 1997)</td>
</tr>
<tr>
<td>2a</td>
<td>A disruptive innovation can create new markets, as it attracts people who previously lacked the resources or skills to use it</td>
<td>New-market</td>
<td>(Christiansen et al., 2003)</td>
</tr>
<tr>
<td>2b</td>
<td>A disruptive innovation is typically simpler and lower cost</td>
<td>New market, Low-end</td>
<td>(Christensen, 1997)</td>
</tr>
<tr>
<td>2c</td>
<td>A disruptive innovation can involve radical technology and attract high-end customers</td>
<td>High-end</td>
<td>(Govindarajan et al., 2006)</td>
</tr>
<tr>
<td>3</td>
<td>Generally mainstream customers do not initially value these additional features and thus the disruptive innovation is commercialized in new market segment</td>
<td>All</td>
<td>(Christiansen et al., 2003)</td>
</tr>
<tr>
<td>4</td>
<td>The disruptive innovation initially seems to be financially unattractive for leading incumbents to pursue</td>
<td>All</td>
<td>(Christensen, 1997; Christiansen, 2006)</td>
</tr>
<tr>
<td>5</td>
<td>The disruptive innovation steadily improves in performance and attracts mainstream customers to it; either it improves along the main performance attribute or market preferences shift towards the secondary performance</td>
<td>All</td>
<td>(Christensen, 1997; Henderson, 2006)</td>
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</table>
The disruptive innovation displaces the traditional product/service/technology in the mainstream market

(Christiansen et al., 2003)

<table>
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<th>Characteristic</th>
<th>Description</th>
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<td>6</td>
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Table 1: Characteristics of disruptive innovations

It is worth mentioning here that “disruptive innovation is a process, not an event” (Christiansen, 2006) and thus hard to pin point a particular point in time when a certain product becomes disruptive. Displacement of the dominant technology/product/service can be measured only ex-post. Cases of disruptive innovations show that this process can take years (Christiansen et al., 2003, pg 37). Thus to evaluate the disruptive potential of innovations early in the process of disruption, characteristic 6 would have to be excluded.

1.2 Base of the pyramid markets and disruptive innovations

Bottom of the Pyramid or Base of the Pyramid (BOP) refers to the lowest socio-economic segment in the world. Since roughly over a decade, companies have shown growing interest in serving the BOP markets. C. K. Prahalad and S. Hart in 2002 (Prahalad & Hart, 2002) argued that MNCs world over should create products and services for the 4 billion strong low income markets, that MNCs tend to ignore. The authors positioned this approach as having two key advantages: Firstly, it meant creating new profitable revenue streams for MNCs as they enter largely un-tapped markets. Secondly, they viewed it as a new market-based approach to poverty alleviation for the world’s poor. The BOP approach is recognized as a key emerging frontier of international business strategy research (Ricart, Enright, Ghemawat, Hart, & Khanna, 2004).

The World Resource Institute defines the BOP as people with an annual income in 2005 PPP terms of less than USD 3260. This definition leads to the BOP segment being 4 billion people strong. The World Resource Institute suggests that the BOP segment has a total household income of USD 5 Trillion, making it a market of significant importance in the world market. Food, housing, and household goods are the largest industries in the BOP followed by transportation, education, ICT and healthcare (Guesalaga & Marshall, 2008). Even though food is the largest consumption item, even the poor spend a small percentage of their income on non-essentials and have the propensity to own goods such as TV and radio (Banerjee & Duflo, 2007). However, most people in the segment lack access to basic necessities such as water, electricity and proper healthcare.

The BOP market is an ideal ground for disruptive innovations for 2 reasons:

1. “Good-enough” performance to tackle non-consumption.

One of the characteristics of disruptive innovation is that it attracts non-consumers or low-end customers that are satisfied with its “good-enough” performance (see characteristic
2 in Table 1). BOP markets have vast populations of people with limited or no access to services and products who are willing to adopt affordable products with acceptable performance (Hart et al., 2002).

2. Creation of simple and affordable products and services

Disruptive innovations are typically simpler, are offered at a lower price, particularly low-end disruptions (Christensen, 1997; Govindarajan et al., 2006) (see characteristic 2b in Table 1). Creating products and services that are simple and affordable to low-income segments is most crucial for adoption and success in the BOP (Anderson & Billou, 2007; Prahalad, 2004). Thus products and services that succeed in BOP markets could be disruptive to dominant products and services in the higher-end of emerging markets as well as developed markets.

2 Empirical research context

2.1 Disruptive innovation in health care

Today every country is facing severe healthcare challenges. Rich countries face challenges of aging population and rising health care costs against financial constraints. Poor countries lack access to affordable healthcare against a backdrop of fundamental health challenges such as infant mortality, deaths due to preventable diseases and other poverty-related issues.

Even though new technology is introduced in the healthcare industry on a regular basis, the innovations have been sustaining, i.e., helping their mainstream customers, doctors and hospitals solve more complex problems (Hwang & Christensen, 2008). Moreover most healthcare innovations arise from developed countries (PwC, 2010), where cost of treatment plays a small role as treatment is paid by third party insurance companies. This results in a lack of focus on affordability when developing medical technology in developed countries.

However, emerging markets, like India, with weak healthcare infrastructure and low health insurance penetration (<10%) are leading the way to creating simpler and more affordable innovations in healthcare (Ehrbeck, Henke, & Kibasi, 2010; PwC, 2010). In the next section, 4 case examples are analyzed, which are “frugal innovations”, i.e, simple, low-cost innovations, focused on improving affordability and accessibility in healthcare for the poor in India.

2.2 Cases

2.2.1 Low-cost water purifier: Tata Swach

The challenge
Access to clean drinking water is a dire challenge in many developing countries (UNDP, 2006). Over 75% of rural India does not have access to safe drinking water and annually about 450,000 people succumb to preventable, water-borne diseases like diarrhea (UNDP, 2006). Moreover, water is increasingly contaminated with toxins, such as arsenic, well above the limits permissible by World Health Organization (Chowdhury & et.al., 2000) that have serious health effects.

Water purification systems in India have a very low penetration, both in urban as well as rural settings. Besides a price barrier, lack of running water and electricity are reasons people do not purchase water purifying systems.

The innovation

The Indian conglomerate, Tata, has created an ultra low-cost water purifier called Tata Swach (meaning pure in Hindi) priced at INR 899 (EUR 14) and INR 499 (EUR 8) for high and low capacity models respectively. Tata Swach requires neither running water nor electricity, making it an attractive buy for Indian households that lack these requirements. The Tata Swach Bulb, capable of purifying 3,000 liters, is easily replaceable and costs INR 299 (EUR 5). The total monthly cost is about INR 30 (EUR 0.5) for drinking water supplies for a family of five.

The key innovation in the product is the use of Rice Husk Ash, a common waste available in large quantities as well as nano silver particles in the filter.

The disruption and impact

The initial model, launched in 2001/02, was distributed over NGOs and sold about 250,000 pieces. The initial technology used Rice Husk Ash, pebbles and cement in the filter. This however, filtered only about 85% of the bacteria and thus was below WHO standards. However this solution was “good enough” for the millions living without access to low quality drinking water.

Reports mentioned that non-profit organizations who have helped Tata Research Development & Design Centre (TRDDC) in distributing the initial model in rural areas, were satisfied with the technology (Rodrigues, 2011). Meanwhile Tata continued R&D to improve the filtering process and introduced silver nanoparticles in 2006. This improved the filtering capabilities of the water-purifier and the purifier now meets the US Environmental Protection Agency standards.

In India, the majority of water purifiers target the upper middle and high-income segments. Prior to Tata Swach, electricity driven water purifiers working on UV or reverse osmosis technology were priced above USD 100. The remarkable low price of the filter made it a runaway success. According to reports, the team sold to 345,000 households in the first 9 months of fiscal year 2011 (Tata, 2011).
The product is also reported to be selling well in urban areas, although the product was meant for rural India, suggesting a possible encroachment up-market. Reports also suggest initial interest from abroad, both developing and developed countries (Rodrigues, 2011).

### 2.2.2 Low cost medical devices- GE-MAC 400 and GE-MACi

**The challenge:**

As mentioned earlier a key challenge in the Indian health care sector is affordability. One of the largest capital investments for hospitals is bio-medical equipment and hospitals in developing countries like India tend to be poorly equipped because of lack of funding. The per capita spend on medical technology is approximately USD 2 compared to USD 5 for China or USD 231 for Germany. Further, to improve accessibility, equipment needs to be portable, robust, easy to distribute and easy to use.

One of the important diagnostics devices is the Electrocardiogram (ECG). ECGs typically cost about USD 10,000 in developed markets, which makes it out of reach for several hospitals and nursing homes in countries like India.

**The innovation:**

GE Healthcare launched the MAC 400, a portable ECG priced at USD 1500 designed and developed in India. The MAC 400 has been successful in India and in over 100 countries. As a next version, GE Healthcare India launched the MACi, an ECG the size of a laptop priced at USD 535. At this price the cost of delivering an ECG is reduced to 0.20 USD, about 6 times lower than prevailing rates in India.

**The disruption and impact:**

Despite of its small size and low price, the MACi incorporates the Marquette 12SL analysis program, which is standard in GE's premium ECG devices. This way the important feature of reading ECG accurately is kept intact. Additional features are removed to keep the product simple. It also includes a built-in software that interprets the ECG in English, a feature that previously was available only in GE's very high-end ECG machines.

MAC 800, a version that uses the same technology is now being used in the developed markets for new applications such as for diagnostics in accident sites (Immelt & Govindrajan, 2009). Further, the MAC 800 is battery operated and easily portable, and intended to be used by mobile healthcare workers. To ensure easy serviceability (especially in remote areas) and lower costs, it comes with easily available components instead of customized and proprietary parts.

The MAC 400 and MACi are new market disruptions as their low price point, small size and their portability have opened up new markets in developing countries, as well as for new applications such as diagnostics at accident sites.

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1 Source: Deloitte Report, Medical technology industry in India Riding the growth curve, July 2010
GE has announced its commitment to invest USD 3 Billion over the next six years to develop 100 health innovations that would substantially decrease cost and ensure access to quality healthcare (Immelt et al., 2009). GE’s motivation to disrupt its markets is two-fold. Firstly, new markets in developing countries are growing increasingly important and developed countries are saturating. Secondly, by entering these markets with low-cost devices, it is pre-empting emerging companies from such countries who are developing low-cost products and would otherwise attack GE in developed markets.

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<tr>
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<th>Applicability</th>
<th>Tata Swach</th>
<th>GE MAC 400 and MACi</th>
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<tbody>
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<td>1</td>
<td>The disruptive innovation initially underperforms on the performance attribute valued by mainstream customers</td>
<td>All</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>2</td>
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<td>All</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2a</td>
<td>A disruptive innovation can create new markets, as it attracts people who previously lacked the resources or skills to use it</td>
<td>New-market</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>2b</td>
<td>A disruptive innovation is typically simpler and lower cost</td>
<td>New market, Low-end</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>2c</td>
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<td>High-end</td>
<td>✓</td>
<td>✓</td>
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<td>All</td>
<td>✓</td>
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6 The disruptive innovation displaces the traditional product/service/technology in the mainstream market

Table 2: Disruptive characteristics of Tata Swach and GE MAC

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2.2.3 Low-cost, focused hospitals:

The challenge:

About 72%\(^2\) of the population in India lives in rural and semi-urban areas. Access to healthcare for these populations is very limited, mostly due to the lack of skilled doctors and nurses in these areas. Not only does India have a severe lack of doctors (about 6 per 10,000 population vs. 33 per 10,000 in Germany\(^3\)), but 80% of Indian healthcare facilities are based in urban areas\(^4\). As a result there is a major gap between health service accessibility in rural and urban India.

Moreover, affordability of quality healthcare services is still a challenge. Public hospitals that offer services for the poor are of low quality, typically understaffed and underfinanced. As a result, over 80% of healthcare is provided by privately run hospitals and nursing homes. Lack of health insurance also results in out-of-pocket health-care expenditure of 98%\(^5\). Very often families become indebted if a family member is hospitalized. Over 40% of hospitalized Indians borrow heavily or sell assets to cover expenses and over 25% of hospitalized Indians fall below the poverty line because of hospital expenses\(^6\).

Thus, availability, accessibility and affordability of healthcare are all key challenges in India.

The innovation:

A few hospitals in India are rising to this challenge of providing affordable healthcare to the poor. In this section, I will describe innovations in healthcare delivery of two focused, low-cost hospitals, namely Aravind Eye Care hospital and Narayana Hrudayalaya (cardiac care).

The Aravind Eye Hospital is a chain of 9 hospitals in India, providing eye care to the poor. About three quarters of the 302,000 surgeries performed in FY 2010 were for free or at a steeply subsidized fee of about USD 10.

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\(^2\) Source: CIA Factbook  
\(^4\) Source: World Health Organization Global Health Workforce Alliance  
\(^5\) Source: 2002 Census of India  
\(^6\) Source: National Rural Health Mission India, Mission Document
Narayana Hrudayalaya (NH) is a group of hospitals in Bangalore mainly focused on cardiac care and is most renowned for its world-class pediatric cardiac treatment unit. Through a series of innovations, NH has managed to drive down cost of open-heart surgery (OHS) to about USD 2000 (Khanna, Kasturirangan, & Manocaran, 2005).

Aravind and NH employ a range of strategies to bring down their cost and serve the poor profitably:

1. **High volumes and operational efficiency**
   Aravind performed 2.5 million outpatient visits, 302,000 surgeries in the fiscal year 2010. These volumes are generated mainly due to the large number of outreach camps Aravind organizes with help of its partners such as Lion’s Club and Rotary Club in neighboring districts. In each camp, thousands of patients are screened and those requiring further treatment, e.g., cataract surgery are brought to the closest Aravind eye hospital.

   At the hospital, patients are prepared in an “assembly line” fashion. Most of the preparatory work is done by trained nurses and assistants so that the surgeon concentrates on the surgery alone. As the surgeon is about to finish a surgery, the next patient is brought in prepared for the next surgery. This takes place in surgery halls with two or three beds for fast movement.

   This way of working ensures extremely high productivity of surgeons and a high utilization of medical equipment, which together entail a large portion of surgery costs. A surgeon at Aravind performs 5 times the number of surgeries as a typical Indian ophthalmologist. All this without compromising on quality- Aravind has proven to have same if not better success rates compared to UK hospitals (Mashelkar & Borde, 2010).

   Similarly NH is one of the largest hospitals focusing on cardiac care in the world. It sources patients through its wide network of partner clinics connected through telemedicine facilities. NH performs over 32 heart surgeries a day. This brings the per patient costs down tremendously by increasing surgeon productivity and utilization of capital equipment.

2. **Narrow clinical focus**
   The narrow focus allows Aravind and NH to specialize and streamline operations. The focus also hones expertise and allows doctors to specialize in rare and complex operations. Even uncommon conditions are seen relatively often because of the large number of patients. For instance, NH has experts who have performed the largest number of rare and complicated pediatric cardiac procedures in the world (Khanna et al., 2005).

3. **Tiered-pricing**
   In the Aravind model about 30% of the paying patients subsidize 70% of the poor. Paying patients receive more comfortable treatment, e.g. private rooms and beds vs. shared dorms and floor mats and are charged slightly lower than market rates.
for their surgeries. However the treatment remains the same, i.e., the same surgeons perform the same treatment to patients irrespective of their fees.

NH charges the majority of its patients rates lower than comparable Indian hospitals. Subsidized patients pay about EUR 1000 for an Open Heart Surgery (OHS) vs. 4 times the amount in a comparable Indian hospital. NH charges its paying patients about EUR 1900 for the OHS procedure, which can cost over EUR 40,000 in the US. For patients who are unable to pay the subsidized rate, NH offers a micro-insurance scheme for its members at 11 US cents per month. This scheme is also partly supported by the Government and includes several million members.

The disruption and impact

Aravind is now the largest provider of eye care services and trainer of eye care personnel in the world. It has proven to have world-class quality and has been awarded numerous awards, most recently the FICCI award for India’s best private hospital. It has setup a consultation arm and brought the Aravind model to 270 eye hospitals worldwide. Through capacity building measures these hospitals have shown significant impact in terms of cost effectiveness.

Medical tourism, where people travel abroad to seek medical services, is growing at NH. This shows that NH is not only attracting low and middle income Indian patients to seek treatment in its centers because of it reputed and highly experienced doctors, but also attracts customers from abroad (14,000 foreign patients have been treated). These are typically patients from developing countries and the middle east, where quality medical treatment is unavailable. However, the founder of NH, Devi Shetty, is planning to open up a health center in Cayman Islands to serve American citizens. These talks are currently underway with the Cayman Islands authorities. This could be potentially disruptive to the healthcare delivery systems in the USA. However, the concept of low-cost focused healthcare deliver might be difficult to replicate in developed countries due to regulatory restrictions of hospitals.

The concept of low-cost, focused treatment is being applied in other areas as well: Lifespring, a recently launched maternity hospital, also follows a no-frills high volume strategy. This way it brings down quality health care facilities to low and middle income women to a fraction of the cost. Lifespring typically charges about USD 30 for a delivery vs. USD 200 in private nursing homes. Similar to Aravind and NH Lifespring’s gynecologists perform 100-150 deliveries, a productivity increase of about 3 times compared to comparable private nursing homes.

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7 Source: www.business-standard.com
Creating and incubating potentially disruptive innovations

As these hospital chains have been striving to offer low-cost services over the years, they have devised several workarounds and process-driven and product innovations to cut costs. These innovations have been created in-house and through development with partners:

In-house development:

1. Aurolab, an off-shoot of Aravind developed several devices and equipment required for eye surgeries, such as Intra-Ocular-Lenses (IOLs), sutures, and other surgical instruments. An example is the IOLs that Aurolab developed together with Aravind Eye Hospital that dropped the market price from roughly USD 100 to USD 5. Aurolab now has a worldwide market share of 7% (Ibrahim, Bhandari, Sandhu, & Balakrishnan, 2006).

2. Low cost telemedicine systems have been developed by Aravind Eye hospital to link outreach campsites to the nearest Aravind hospital. Using simple digital cameras, slightly modified to be used as retinal cameras, referral doctors can capture the eye images and send the patient data for diagnosis through software called eyesTalk created by Aravind. Other salient features include the use of standard equipment (PC) and software (MS Access) while not having to be online continuously (AEH, 2010; Bai, Murali, Kim, & Srivatsa, 2007).

Partnerships:

1. NH and Texas Instruments jointly developed X-Ray plates and managed to drive down the cost from USD 82000 to USD 300 (Kothandaraman & Mookerjee, 2007).

2. Bangalore based Forus Health, a developer of a low-cost, portable, non-invasive, eye pre-screening devices that can be used by practitioners with basic skills, partnered with Aravind in the initial stages of product development.

3. Tata Elxsi, an industrial design division of Tata, entered a strategic alliance with NH group to “develop affordable, high quality healthcare solutions” at the end of 2009. Although no results from the alliance have been published, reports from Tata have confirmed, that the reason for partnering with NH is to leverage “domain knowledge to develop medical devices for the mass market” (Tata-Elxsi, 2009).

4. Discussion and future research

In the sections above, I have cited several examples of innovations with a disruptive potential developed for the BOP. Tata’s low cost purifier and GE’s MACi are product innovations with disruptive potential and the hospital chains are examples of business model innovations, all with BOP as the primary target market. Further, it was shown that Aravind and NH also function as incubators for disruptive innovations by partnering with companies that create potentially disruptive technologies or by creating potentially disruptive technologies.
themselves. Thus the BOP market can be a source of potentially disruptive innovations as well as a test bed for the same.

To investigate this in detail, my research will consist of three parts:

Part 1

Through the case studies, I would first like to analyze and describe the phenomenon of potentially disruptive innovations created for the BOP markets. In this part, I would like to answer the following question:

- To what extent can innovations developed for the BOP be disruptive, both for customers in India and outside India?

Part 2

As described in the cases above, hospital chains addressing the BOP are incubators of disruptive innovations. In this part, the phenomenon behind this is to be explored with the following questions:

- What are the types of partnerships formed?
- What are the types of innovations created?
- What are the benefits for the hospitals and the partner companies?

Part 3

Researchers argue that for reasons of resource dependency and lack of new-market competence, large companies are unable to launch disruptive innovations (Christensen, 1997; Henderson, 2006). BOP markets add further uncertainty as companies are catering to new and extremely low margin markets.

Research suggests that among various reasons, the following are cited most often for companies' inability to foster disruptive innovations:

(1) A lack of strategic awareness
(2) A lack of opportunity generation or recognition
(3) A lack of funding for potentially disruptive projects
(4) Inappropriate management of ideas that "leads to radical and potentially disruptive concepts being ignored, killed or not vocalized" (Thomond, Herzberg, & Lettice, 2003)

All these reasons can be attributed to leadership cognition and managerial decision making. Christiansen also pointed out that resource dependencies lead to managers not allocating funding to disruptive projects (Christensen, 1997). However, among the cases discussed, 2 companies, namely Tata and GE are counter examples of Christiansen's argument. These established companies have managed to successfully launch potentially disruptive innovations for the BOP. As part of this study, I would like to analyze the managerial cognition and managerial actions taken to push these projects forward in the respective companies. The sub questions are:
- What is the role of senior leadership in pushing the projects forward? What special attention did these projects receive compared to others in the organization?
- To what extent do these projects need support of a business executive “champion”? What type of support do these projects need/receive?
- Were there any actors/processes suppressing the progress of these projects?
- To what extent did the social motivation play a role in the success of these projects?

This will be linked to studies undertaken to analyze the role of champions in innovation management (Chakrabarti, 1974; Howell & Higgins, 1990). Recent research has concentrated on organizational and managerial influence on radical technological innovation. Success of radical innovation projects with regard to support from high-ranked organizational members are shown to have a positive (Leifer, 1997) as well as a negative impact (Gemünden, Salomo, & Hölzle, 2007). However no such study exists with focus on disruptive innovations. My research question would thus also contribute to this area of research.

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