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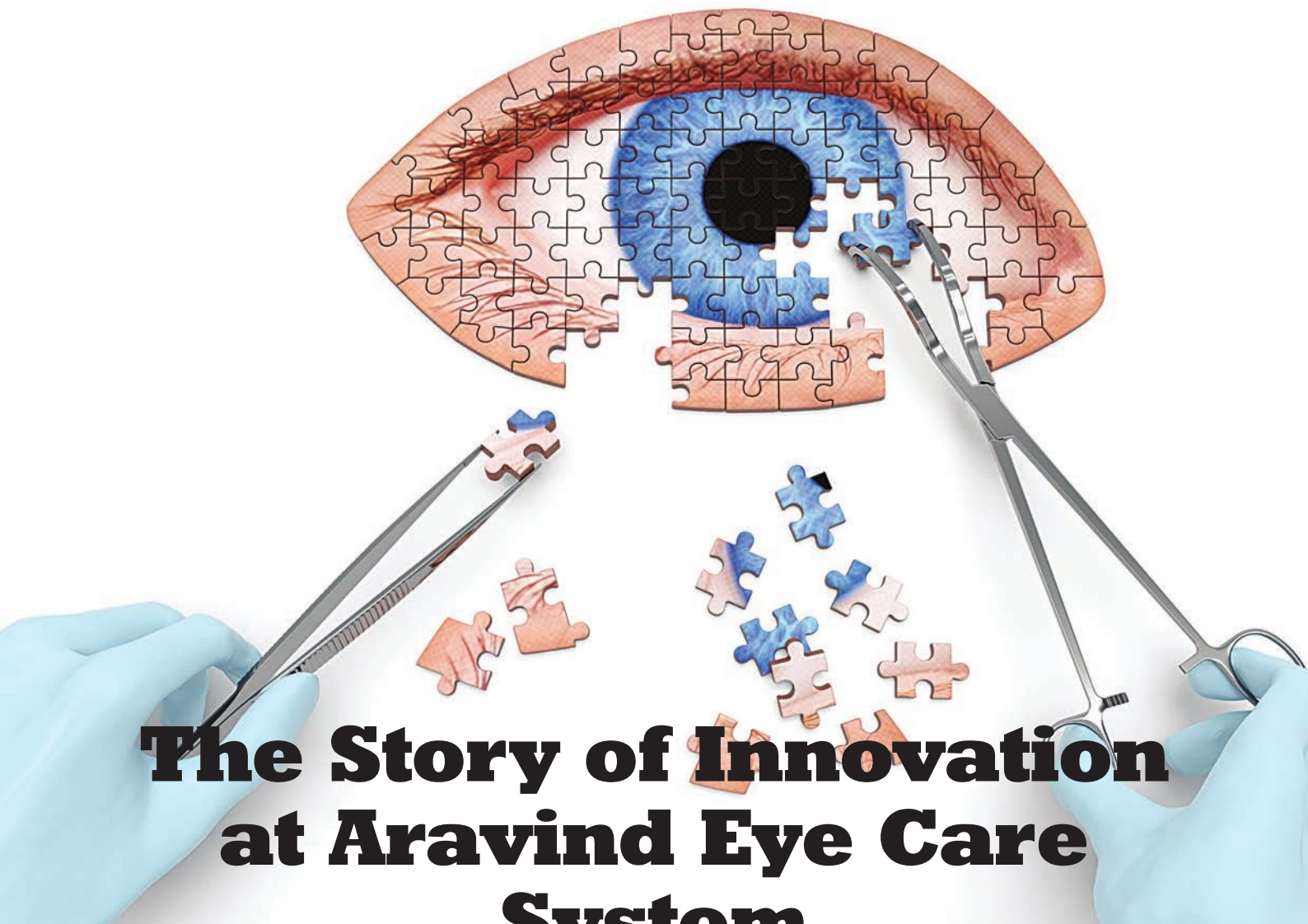
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The Story of Innovation at Aravind Eye Care System

Thulasiraj Ravilla

Innovation is inevitable when there is a relentless focus on purpose and a mind-set to achieve it with what is available. It is often about harnessing existing or emerging knowledge, resources or technology to address the challenges in the journey towards achieving the purpose. The organizational values or self-imposed non-negotiables which define the means of achieving the goal, is also a driver of innovations. This also helps in developing a different and often an effective perspective to a situation, which in turn results in efficient solutions and approaches. In this paradigm of continuously experimenting with whatever is necessary to solve the social problem, innovations are often recognized in hindsight or by people from outside the organization. The Aravind case study chronicles a series of innovations which helped Aravind grow from an 11 bed hospital in 1976 to become one of the largest provider of eye care.

Context

Loss of sight is not just a physical disability; some have compared it next only to death. In India's rural communities, loss of sight not only strips a person of his means of livelihood, it also robs them of their dignity: a person suffering this condition is stripped of their position within the household and their status in society. They

are essentially viewed as a burden, another mouth to be fed - a mouth not contributing in the provision of that food and, often, even tying up another able-bodied and potentially earning member of the family as a caretaker to take care of the blind person.

In 1976, when Aravind Eye Hospital came into existence, it was estimated that 1.5% of India's 637 million people

were blind. This translated to roughly 10 million blind people. In some ways, this blindness was only the tip of the visual disability iceberg. The number of people who could not see 'good enough' was a significantly larger proportion, being roughly one out of every four Indians. This would have translated to every single household having a person who was either blind, visually impaired or not having the best possible vision. For a country like India, we were talking about over 200 million individuals in need of eye care. That magnitude of need certainly looks like a daunting challenge. However, there was some very good news: Over 80% of this blindness or visual impairment was not necessary. Some of it was preventable, while the vast majority of people would be able to regain their sight with a simple cataract surgery or a pair of glasses of the right power.

So, why did this unnecessary suffering exist? There were a number of reasons. A lot of these problems occurred either amongst the poor, who didn't have adequate economic means to obtain treatment, or amongst those living in rural areas, who had access challenges...or both. Imagine living your life, with seriously impaired vision and how that would change your opportunities and interactions in the world. Now, imagine that there is a way for you to have your sight restored but you are unable to obtain that treatment. Either you are unaware that it exists or you do not have the means to access and pay for it. So you struggle on, resigned to your dismal fate. This situation existed for many people in India and Aravind's prerogative was to address it.

The management Guru, C.K. Prahalad, studied this phenomenon and came out with a game changing book in 2005. In *"The Fortune at the Bottom of the Pyramid"*, he examines the phenomenon of large, underserved populations in developing countries and how a variety of innovative organisations, including Aravind, are finding unique ways to serve them. This book gives readers a good conceptual insight into why people remain blind in spite of the existence of a simple solution. He characterizes this large underserved population in the following ways:

- they are scattered,
- have poor access to logistics,
- have no economic means, and
- are uninformed about the solutions available to them.

This challenging marketplace became the first source of innovation at Aravind, with its stated purpose as "eliminating needless blindness". Medical solutions were available - we were offering them for free - but we had to find a way to reach all people with these solutions. And we found that this large, underserved population in need was ready and eager to have their sight restored or improved.

It is in this context, that Aravind came into existence. Its founder, Dr. G. Venkataswamy, known affectionately as Dr. V, retired from government service with a small pension but a large vision: *to eliminate needless blindness*. The only capital Dr. V had, which was also the most critical, was strong passion and unbending determination. He didn't come from a wealthy family and had no philanthropic backing; yet he stepped forward to make a humble beginning.

In a rented house, in the South Indian City of Madurai, Tamil Nadu, an eleven-bed hospital with its own operating theatre came to life. No one, except may be Dr. V, could have imagined the tremendous transformation this small eye hospital would undergo over the next four decades. This transformation was driven in large part by Aravind's ability to innovate. And what drives innovation? In the case of Aravind, innovation has been driven by

- a need in the society or marketplace,
- a passion and vision to meet that need,
- ability to face and overcome challenges and obstacles,
- organizational actions rooted in a patient-centric outlook,
- non-negotiable values - such as equity, compassion - which enabled us to achieve outstanding results, and
- the attitude that anything is possible when we work in a spirit of service for the uplifting humanity.

Early Days

In the early days, we did not experience a high volume of private patients. In a community that was mostly unaware of the services available to them, demand was not yet there. There were many potential patients who could benefit from cataract surgery but they did not know it was available to them. We referred to this type of potential patient as the 'non-customer.'

Innovation #1: Outreach to the non-customer

In the afternoons and on weekends the small band of Aravind doctors went out into the areas surrounding Madurai to screen patients and offer free surgery to those who needed it. It was apparent that the local community was eager to help. They would quickly spread the word and, soon after, there would appear a small assembly of patients. It was obvious that our services were much needed; the community simply had to be made aware that they were available. These forays into the community continued and increased. These frequent forays into the community to screen people and refer those needing surgery to the hospital was both practical and cost-effective when contrasted with the surgical eye camps, which was then the norm. In addition to high costs, quality was also an issue in surgical eye camps on account of having to operate and house patients in makeshift facilities with inevitable compromises. Evidence was also coming on the superior outcomes of screening in the community and operating them at hospitals. This approach has now become the global standard, recommended by WHO and mandated by the Government of India.

Innovation #2: Free food and return transportation

Over time, thousands of patients had been advised to undergo cataract surgery, enabling them to again see the world around them. At that time, our small hospital did not have any sophisticated systems nor any computers. Even still, the pattern was obvious: Despite being advised to visit the hospital for free surgery, many of the patients were not coming. We didn't understand why this should be the case and, truth be told, it all felt a bit depressing. From the Aravind perspective, we were working hard, with total generosity and commitment to helping these patients. What was going on? Doubts started creeping in about community perception and trust. And then something happened - in one of the subsequent eye camps a patient named Sambavan came in for screening. He was advised to come to the hospital so that he could get a free cataract operation. At the same time, Aravind staff members asked him directly if he was actually intending to make the trip to the city. Sambavan's answer would be the indicator of a much broader issue that led to a new innovation.

Hailing from a village called Therku Theru, Sambavan managed his life by begging at the entrance to a temple. In this way, he was able to obtain just enough money to get some food each day. He said that he was certainly eager to get his eyesight back but that he would not be able to come to the hospital for the operation. We were perplexed as to why he did not immediately, and gratefully, accept the offer of free surgery. Instead, he explained that he still needed to find money for transportation to the hospital, to feed himself for the one week recovery time and then for the return trip back to his village. Unfortunately for Sambavan, with his low and unpredictable income, the cash flow required to receive this 'free' surgery did not exist. Could it be that Sambavan was not the only one experiencing this barrier to receiving treatment?

During 1979-1980, a study was conducted by Ms. Girija Brilliant and Dr. V, with the support of the American Foundation for the Blind, the Seva Foundation and the Govel Trust (that was formed by Dr. V). Its purpose was to probe the issue more deeply by following up with patients who had been advised to undergo cataract surgery. A pattern emerged and a report was published in the *Journal of Visual Impairment and Blindness*, titled, 'Social and Economic Barriers to Cataract Surgery in Rural South India: A Preliminary Report.' It was revealed that of the patients advised to have cataract surgery, only 14.6% actually had the operation while the remaining 85.4% continued to remain blind. This, despite the vast majority of patients interviewed indicating that they wanted sight and were willing to undergo the operation. Why?

This study turned out to be one of the very first articles published on barriers to cataract surgery. It led to the realisation that socioeconomic factors were a significant obstacle to accessing care. We discovered that many patients needed someone to escort them to the hospital and back. This escort - usually a family member - had to forego wages for that period of time. Also included in the economics of having the operation done was the cost of transportation, to and from the hospital, and food for the patient and escort. It all added up to a few hundred rupees which was a significant sum of money at the time. We learnt that not charging for the services and offering them free didn't translate to it being free to the patient.

In 1981, the insight given by Sambavan, and reinforced

by the above cited study lead to Aravind's first major innovation: providing free food and return transportation, in addition to the free surgery and hospitalization already being offered. With the implementation of this offering, in the very first camp, over 65% of those advised underwent a cataract operation. The local community organizations which organized the camps were willing to cover these additional costs.

Within Aravind, this process became the norm and continues today. The approach has now become one of the standard guidelines for conducting outreach programs and is now promoted, throughout India, as a preferred practice for ensuring greater compliance to surgery. As part of its national program, the Government of India provides a subsidy for cataract surgery on patients brought from outreach camps, with cost of transportation being listed as a reimbursable item.

Improving Efficiency

The community outreach process continued without any change for the next ten years. In 1990, at Aravind's annual planning meeting, a decision was made. In order to help us achieve our mission, we would increase the number of surgeries, done through outreach, by at least 30%. Based on that target, a couple of questions arose. How many more camps would need to be created? What were the associated resource implications for the

increase in surgeries? During this conversation, a look at the patient acceptance rate (for cataract surgeries) showed that it was around 60%. What could be done to increase this acceptance rate? How to convince the remaining 40% from the outreach camps? These patients were not undergoing cataract surgery even though it was advised by Aravind's doctors. If we could make this work, we would meet or surpass our goal of a 30% increase in the number of cataract surgeries done through outreach without doing more camps.

Through organisational introspection, and analysis of our processes, we made a key discovery: we needed to spend more time with each patient advised to have cataract surgery. This additional time would be devoted to counselling them on the advantages of undergoing the surgery, the quality of the facilities being offered and directly addressing their concerns about undergoing the procedure. We were led to believe that this extra attention to the patients who needed surgery, given in order to empower their decision making process, could result in higher levels of acceptance.

There was, however, a barrier to making that happen. In a camp setting, when the patient volumes were very high and there was pressure to close the camp by a specific time, it just wasn't practical for the doctors or other staff to spend additional time with every patient who could benefit from cataract surgery.



Innovation #3: Patient counsellors

Continuous discussion on this challenge resulted in the idea to experiment with a brand new cadre of staff. Their sole responsibility would be to counsel patients and become patient advocates. Over the following weeks, this idea was acted upon by recruiting girls, who had just finished high school and were from the very same rural areas as the patients. For the selection process, we used our judgment to pick girls who exhibited two features:

- they should have a high level of empathy and
- they should enjoy talking.

The first batch of ten girls resulted in creation of a new cadre within Aravind's team - patient counsellors.

They were initially posted only to eye camps and all patients advised to undergo surgery were routed through the counselling station. This station was located right next to the final doctor's station so that patients easily transitioned into counselling. This input had an immediate impact, shifting the acceptance rate to over 80%. This simple innovation not only helped us meet our enhanced target but allowed us to do it in a much more efficient and patient-centric manner. Over time, the significance of empowering the patient garnered greater appreciation and the patient counsellor work was expanded to cover the free hospital and then various sections of the paying hospital. Today there are roughly 250 patient counsellors within the Aravind system and they play a critical role in ensuring patient compliance to surgery, medication and regular follow-ups.

Around the same time that we were implementing the patient counsellors, Geographic Information System (GIS) technology was becoming available - both digital maps and GIS software.

Innovation #4: Utilizing GIS technology

We immediately recognized that this could help us to visualize neglected service areas and plan for eye camps in those areas. Over the years we had realized that an eye camp, given its short duration of five to six hours, got patients feeding in from a radius of five to eight kilometres. GIS technology would help us to build on this insight through systematic identification of the villages within that radius. We could then list these villages, organized by road routes, so that the community partner

could carry out the publicity efficiently. Our community partners were advised to do intense publicity in the selected villages rather than going beyond, as had been the practice earlier. Intense publicity was critical because we had learned that this would determine the success of an eye camp, as measured by the number of patients showing up.

Another successful innovation had occurred. In the year that the GIS approach was introduced across all eye camps, we saw a 30% increase in the number of patients attending and a similar number for those being operated on.

Closing the Service Loop

In all our outreach work, we were very particular to do a comprehensive eye examination and advice appropriate treatment. We also realized that such advice was merely a piece of information to the patient. However, successful treatment was dependent on one thing: the patient actually following through with all aspects of the advised treatment process.

As mentioned in the case of the surgery acceptance rate, the innovations to provide transportation and counselling had significantly increased the level of acceptance. However, we were not sure this was happening when it came to the acceptance rates for the prescription of glasses. We only had anecdotal feedback that may be around 10% of those prescribed glasses were actually buying and using them. This bothered us for a long time and we were not clear on how to address the situation. The ideal solution would have been to make the prescribed glasses available right at the camp site but that seemed impossible at the time. Since an individual's refractive error (which determines the prescription) could not be predicted ahead of time, it posed a challenge: what lenses should be taken to the camp? Also, patients tended to prefer specific frames which suited their own sense of style. Even a monk takes time, browsing and trying out 10 pairs of frames to find the right style!

The first attempt we made was to take a selection of frames to the camp site and take orders from those who were willing to purchase them. We would then come back to the same site, on a pre-appointed day, to deliver the completed prescription lenses fitted to the selected frames. This worked to some extent but not many people placed orders because it meant making another time-

consuming and expensive trip to the camp site in order to collect the glasses.

The second attempt involved taking a selection of readymade glasses, pre-fitted with various powered lenses, so that we could give the glasses out on the spot. This, again, didn't make much of a difference since each patient had a specific preference for suitable frames. This preference, all too frequently, differed from the available readymade glasses. We had to look more deeply at the situation.

Innovation # 5: Prescribing and fitting glasses on site

In the next attempt we studied, in detail, the distribution of refractive errors across all patients. We then used some statistical methods and our judgment to create an inventory of lenses of various powers, along with a wide selection of frames. We also brought along a simple machine that allowed us to cut the lenses, polish the edges and fit them into the frame of choice. This intervention of making prescription glasses, fitted to the desired style of frame, available immediately at the camp site, removed a lot of barriers and the prescription to order conversion rate immediately rose to over 80%.

That experience gave us tremendous insight into the real cost for a person to get appropriate glasses, as per the prescription. The key realisation being that he or she would have to make two or three trips to the nearest town to visit an optical shop. Each of those trips cost money, not only for the transportation but for the wages forgone by the patient missing work, as well as any other incidental expenses. This was adding up to a significant amount - often more than the glasses themselves. We realized that this innovation was about seeing cost from the customer perspective and completely eliminating the 'non-value added' costs.

This understanding of viewing cost from the customer perspective became, over time, central to the Aravind's DNA. It has often come into play for a number of other innovations and patient-centred service designs.

Equity at All Costs: The Aurolab Story

At Aravind, equity means: *the desire to provide the same level of quality to all patients*. This is one of the unstated but non-negotiable values on which the organisation was built. We translated this by ensuring that the core service-

diagnosis, treatment, surgery and the outcome should be the same for everyone regardless of how much they pay or even pay nothing. This value was never challenged until the mid-1980s when a new technology was emerging in the treatment of cataract. Since its origin was in the western world, the technology was only available at a cost much too high to be accessible to the average patient in India.

At that time, when a person developed cataract and lost his/her sight, the treatment was to surgically remove the cataractous human lens, which had turned opaque and was obstructing light from entering. Once the human lens was removed, a pair of eyeglasses with high powered lenses - 11 dioptre - was provided so that the person could focus on objects. The high power made them very heavy. Without these glasses, the cataract patient would literally be blind. These cumbersome spectacles were commonly referred to as 'coke bottle glasses,' much to the dismay of the patient having to wear them. In addition to being heavy, these 'coke bottle glasses' also had some inherent limitations and created disruptions affecting functionality for some individuals. Enter the new technology.

The intraocular lens (IOL) was developed using an inert biocompatible material which could be implanted in the eye at the exact same location as the natural lens. It was available in a range of powers. This medical breakthrough completely revolutionized cataract surgery, allowing patients to regain normal vision, often without the need for any glasses. But there was one setback: the IOL came with a high price point, at around \$200 per lens. As this technology trickled into India, it was only accessible to those people who could afford the high cost. At Aravind, it was only the paying clientele who could afford such a luxury. The numbers of such patients was a trickle, if at all. We simply didn't have the financial strength to provide



these lenses for the free patients, who then accounted for two thirds of our volume.

Addressing this inequity in care became a challenge and almost an obsession towards the end of the 1980s. Eventually, negotiations with suppliers to get IOLs for Aravind, at a cost of \$10-\$15, led to failure and frustration, and a decision was made. It was decided that Aravind Eye Care would take on the manufacturing of the intraocular lens in-house and make them affordable.

Innovation #6: Aurolab

By studying the manufacturing process, we recognized that a small piece of plastic, though very precisely shaped, did not need to cost in the realm of hundreds of dollars. This gave us a boost in confidence - however unfounded it may have been - and we gave ourselves the green light to set up our own facility for manufacturing IOLs. It was named *Aurolab*.

We purchased the technology from a small group in the US and set up a unit to produce the intraocular lenses. Initially, we had to be prepared for the worst case scenario. This was because we were early adopters in the use of this implant technology and not many people in India used IOLs, or even believed in the merit of using them. Just in case not a single lens could be sold, we wanted to be sure that whatever was produced would get used. We were then doing 50,000 cataract surgeries and the investment made was to set up a production facility of this annual capacity to 'de-risk' the investment. This unit was also set up as not-for-profit. This allowed Aurolab freedom from the pressures of making the bottom line, which could potentially move us away from our goal of providing affordable technology.

As affordable IOLs became available it was recognized that there was a shortage of eye surgeons trained in the new lens implantation technique. It was vastly different from the older technology and required the use of a surgical microscope, learning to make very precise incisions and then implanting the lens. There were also additional technologies which enabled the right powered lens to be inserted into a patient's eye.

Innovation #7: IOL Microsurgery Training Course

The recognition, that for use of the IOL to become more widespread, more surgeons would need to become

competent in the necessary procedure, gave birth to Aravind's *IOL Microsurgery Training Course*. We designed an eight week program for the ophthalmologist to learn the new skillset. We truly had no idea if there would be any demand at all.

As things unfolded, we were pleasantly surprised; both the IOLs and the training program were in high demand. In fact, the demand for the training program was so great that we had a three year waiting list. This, despite the fact that we were taking six candidates a month. In parallel, the sale of the lenses was contrary to our fears. The market welcomed a high quality lens at a lower price and within the first year we had to triple our manufacturing capacity to 150,000 lenses a year. A further surprise occurred when the lenses were independently, and somewhat unknown to us, evaluated by the United States Food & Drug Administration (FDA) labs. Their results were very encouraging and indicated that the lenses produced in Aurolab were comparable to or better than commercially made lenses in the US.

Taking another step in the progression of the IOL, adoption still had not become universal and governments along with the World Health Organisation were very reluctant to embrace the technology. They continued to believe that it was too expensive. Around that time we engaged a large field survey. Its purpose was to establish the prevalence of blindness and its causes. As part of the study, information was also collected on those operated for cataract and the visual outcome in the operated eyes. What the studies showed, in addition to estimating the prevalence of blindness, was a vast difference in post-operative vision between those who got the intraocular lens and those who had the conventional surgery without it. Because many in the group receiving the conventional surgery did not have the corrective glasses, their rate of blindness was at about 40% compared to 5% in those who had the IOL.

The study data was presented to the Indian government that eventually led to a major policy being implemented, which aggressively promoted the use of the intraocular lens. This was also made possible by funding that had just been awarded to the government by the World Bank. A major shift took place in how eye care in India was delivered as well as the number of people who received the modern surgery - largely free of cost through government subsidy. This particular innovation reshaped how cataract surgery was done, not only in India but in many developing countries. Today Aurolab holds a

global market share of between 8-10%, by volume, for the intraocular lens. Our training program continues even today and has spread to many other institutions through a trainers' training programme and by the establishment of IOL training centres. This is a very good example of how non-negotiable values - in this case, equity - can drive a phenomenally powerful innovation.

Harnessing Technology

Proven means of treating patients, who were visually impaired or blind, exist and we were willing to provide the service at low or no cost. However, the major challenge continued to be reaching out to those who would benefit from such interventions. Most developing countries such as India, are characterized by populations that are scattered and facing logistical challenges. As mentioned previously, these populations are largely underserved for multiple reasons, including economic and access issues.

Up until the late 1980s and mid 1990s India had an extremely low telephone density - something like two or three percent of the population had access to telephone - and the reasons were around viability of connectivity of rural areas. It wasn't financially viable for telephone companies to lay a telephone line to a remote village for just one connection, which often was the case then. But technology was evolving rapidly in the field of communication and lot of experimentation was going on.

One group, out of the Indian Institute of Technology, Madras (Chennai), had developed a Wireless Local Loop (WLL) technology which allowed for coverage of about 20-30 kilometres around a transmitting tower. This was designed for the purpose of providing telecommunication as well as data communication. This technology was being rolled out in a few locations and Dr. V stumbled upon it when he was visiting some of the field activities of the renowned *M.S. Swaminathan Foundation*. In a coastal village, he found a centre able to utilize the Internet to get weather information and current market prices for the fishermen's daily catch. As there was no provision of physical landlines, their connectivity was established through this WLL technology. Immediately, a thought process was opened up around how we could harmonize wireless technology for the provision of eye care.

We connected with the fact that a company called *n-logue* that had set up a number of Internet kiosks in villages around

Madurai. As part of our experimentation, in collaboration with them, we trained the Internet kiosk operators to provide eye care service. For a small fee of five rupees, they would elicit the complaint of a patient and record it as a voice file. This voice file was then emailed to the Aravind Hospital as an attachment. As the emails came in, there was someone in the hospital who would listen to the complaint. They would then send back a voice reply. Back at the rural Internet kiosk, the operator would then send for the patient, who lived in the village, and let him or her listen to the reply. In order to make this efficient, the kiosk operators underwent one day's training at Aravind where they were also given a standard template to elicit the complaints; details such as age, occupation and the complaint - what caused it and how long it had been occurring.

This was very cumbersome but the very limited bandwidth of 40-60 KBPS allowed just such email messaging. It was too slow for any other means of real-time collaboration. This was far from satisfactory, yet it did establish a very rudimentary proof of concept for providing telemedicine.

As we struggled with inadequate technology, a group of students from the University of California, Berkeley were in contact with us. Their work was in developing a technology which would allow a much higher bandwidth for data and Internet communication. They were experimenting in making regular Wi-Fi to go long distances - as much as 40-50 kilometres. This did, however, require a line of sight between locations for it to work. So we went about setting up tall towers, with antennas, that could literally 'see' each other.

Innovation #8: Vision Centres

In collaboration with the UC Berkeley group, we did a proof of concept at one of the locations, about 12 kilometres away from our base hospital at Theni. We were pleasantly surprised at the bandwidth, in-terms of connectivity, which allowed for smooth video transmission. We could talk in real time between both ends! This was extremely exciting for us. Once the proof of concept was established, we decided to provide eye care service in remote locations by using this low cost telemedicine. We built an electronic medical record in the cloud and, in 2004, established the first of, what we now call, real time tele-medicine enabled *Vision Centres**.

These centres had basic diagnostic equipment staffed by

well-trained ophthalmic technicians. Each centre had two computers - one for patient registration and administrative functions like the sale of medicines and glasses, and the other to provide a telemedicine linkage as well as facilities for uploading all the clinical information. The centres had sophisticated IT technology at the backend while remaining simple and easy to the users – Vision Technicians and rural patients. The Vision Centre was completely paperless, which made many real time interventions possible.

Currently we have 51 Vision Centres, covering a population of about 3.5 million and handling about 1,000-1,500 consultations each day. This makes it one of the largest telemedicine applications in the world. For the first time in Aravind's history, and possibly even in the broader healthcare scenario, we are confident in saying that we are providing eye care to everyone who needs it in the community. In this particular case, it is important to recognize that the innovation was possible because of the strong commitment to a purpose: making sure that everyone who is in need of eye care gets it.

The Story of Financing Innovation

In 1976, Aravind started out with almost no capital. We believed that certain industrialists may be interested in participating to meet the cost requirements of restoring sight to people so desperately in need. So Dr. V went on a fund raising tour to the nearby city of Coimbatore, known for its textile industries. Many of the business owners were known to Dr. V and some of them were his patients. Aravind's founder set out, confident he would be able to raise all the money required to build the hospital and provide free care. He spent over a week trying to raise funds for this - as he thought - noble cause. Apparently others did not see things the same way. He raised a meagre 5,000 rupees, often given out of sympathy rather than a belief in the cause.

Innovation #9: Self-sustaining service model

This reality check for Dr. V quickly led to the realisation that the fundraising or donor approach was not tenable. There was a basic recognition that if he had stayed back in

Madurai for that one week, treating the paying patients, he would have earned a lot more money. He discovered that treating the patients who could afford eye care services would be a much more cost effective method of fundraising. And so it became an unwritten condition that we had to make it all work through earned income from services provided to patients who could afford to pay. This was the beginning of the much celebrated Aravind model which allows us to provide a significant amount of free care without needing to depend on outside donor funding.

Based on this condition, it was clear that we had to live within the means of the revenues earned at that point of time. This meant very low salaries and living very frugally. The model continued to evolve organically under this self-imposed constraint and this triggered a couple of related innovations.

Innovation #10: Distinct facilities & Innovation #11: Differential pricing

Things naturally unfolded so that the paying patients were given accommodations in one of the four bedrooms of the rented house. They were given a reasonable level of comfort and luxury, reflecting the standard of living at that time. In contrast, the free patients, who came from rural areas and had a poor economic background, were housed in a different building where the accommodations were similar to what they were used to at home. For them, this meant sleeping on a clean floor on a mat. They were quite happy to get the free surgery and then spend the required week (which was the necessary length of stay at the time) in order to get their eye sight back. The same surgeons performed the surgery for both types of patients, using the same techniques and the same instruments. The only differentiation came in the accommodations, the ambience and the frills like air-conditioning. This was the best that we could possibly provide given our circumstances.

And then, another insight emerged. To the patients, there was no separation between the medical component and the hotel component. This realization came from looking at our services from the patient's perspective. Going forward, this got systematized and scaled into separate facilities - one distinct facility for the paying patients and one for the free patients. Several of the common services, like the operating room, were the same while the living quarters

* Note: While we were the first to introduce low-cost telemedicine enabled Vision Centres, while primary eye care in various forms were available for a while.

and the examination areas were separate. This allowed the patients to self-select from which facility they wanted to receive care, based on whether or not they had the money to pay. In hindsight, we have seen that this self-determination also preserved the dignity of the patient. A poor patient did not have to plead that they were poor. They could just choose to go and receive the free services.

Distinct facilities and differential pricing had an enormous impact on multiple fronts. Patient volumes increased because people from all economic strata felt comfortable coming to the hospital. The community developed an enormous trust in Aravind Eye Hospital, both in terms of the care being given and the fee being charged. They fully trusted that tests, medications or surgery prescribed were all essential to their care. This trust has had a significant impact on patient volumes, which steadily increased and this has been fundamental to Aravind's growth and development. Care provision became very simple and transparent with zero as a legitimate price point. Being able to create the product differentiation on the frills and not in the core service ensured that equity and ethics were not violated.

Innovation #12: Single visit cycle of care

The perspective of viewing costs from the patients' perspective and trying to keep it to the minimum resulted in a number of process innovations. We tweaked our systems in order to provide the complete cycle of care on a single visit - from patient registration, to consultation, to investigations, to surgery. All of this was possible in the same visit, as long as the patient was willing to undergo surgery and had the time to do it. Any scheduling was done at the patient's request since the hospital did not have any appointment system. By working on appropriate prediction models, micro-level planning and workflow tweaking, we were able to achieve this.

The outcome was a significant reduction in the cost of overall care, both to the institution and to the patient. As an example, the cost of providing care at Aravind is currently about one percent or one hundredth the cost in the UK. This model of high efficiency leading to low cost, allowed us to more than break even, even though only 40% of the patients pay market rates while the rest paid nothing or a steeply reduced price.

In the initial stages of Aravind's development, capital came through borrowing from the bank. But for the

subsequent expansion and building of new hospitals, all of the funds came from accrued savings. Today Aravind's financial model generates over 30% plus operating surplus. As a non-profit, that entire surplus stays within the organisation for its development and growth. This innovation was born through a value framework and self-imposed restrictions as to how we would operate, along with viewing cost from the patient's perspective, which in turn led to a greater impact in reducing our own cost.

It Is Not Only About Innovation

A lot of what has been described, on the surface would seem like a series of innovations that worked well. However, the details of what happened are incomplete without understanding what drives such changes in the first place. This reflection about innovations at Aravind led to a number of realisations in hindsight.

The most important one seems to be the strong and continued focus on purpose. This in Aravind's case was to "eliminate needless blindness." This meant that we had to reach everyone in the areas that we served, and beyond. This is not an externally imposed mandate. We have had to hold ourselves accountable for this purpose. This fundamental focus on purpose, which became non-negotiable, brought forth a lot of these innovations, including:

- the initial outreach for accessing the non-customer (*Innovation #1: Outreach to the non-customer*),
- the provision of transportation because without follow-through the vision would not get restored (*Innovation #2: Free food and return transportation*), and
- much later, setting up Vision Centres when survey evidence showed the eye camps were only reaching a very small fraction of the those in need (*Innovation #8: Vision Centres*).

Similarly, another driver of innovation has been how one goes about achieving the purpose. Clearly it was not about achieving the purpose through any means. Instead, we went about achieving our purpose by specific means governed by a value framework or self-imposed set of non-negotiables. For instance, one of the non-negotiables was that Aravind's services had to be provided without dependence on external funding

(*Innovation #9: Self-sustaining service model*). If service to our population was driven by external donors, it would mean that the provision of eye care was at the mercy of external conditions. Our self-imposed constraint continues to be that we must find the means by which to guarantee continued and sustainable service. This is what led to the inclusive pricing model (*Innovation #11: Differential pricing*), which gave Aravind financial self-reliance.

Another self-imposed, non-negotiable value was equity. At Aravind, equity means that everyone must get similar quality of care and that we must preserve the dignity of each patient, regardless of whether they are paying for the services or getting them for free. Without this self-imposed constraint Aurolab would never have been created (*Innovation #6: Aurolab*). It also brought us the delivery model wherein any patient can self-select their facility and price - either for free or paying rates, with absolutely no mechanism to test the economic means of the patients (*Innovations #10 & 11: Distinct facilities & Differential pricing*).

There are many ways that innovation can come about on a problem solving platform. But a lot more gets driven when there is a very strong and undiluted focus on purpose as well as a non-negotiable, exalted value framework within which it must be addressed. Having said this, it is equally important for organisations to continually check whether they are on track, both in terms of the direction of the organisation as well as the non-negotiables within which they must operate. These factors have been the foundation in Aravind's on-going story of innovation.

Takeaways...

While this is all about Aravind, a lot of what has spurred and enabled innovation at Aravind is very relevant to other eye hospitals, healthcare providers and other organizations. Aravind, through its replication arm LAICO (Lions Aravind Institute of Community Ophthalmology), has raised resources to mentor over 300 eye hospitals from across the world, in more effective ways of eye care delivery. This has resulted in doubling these hospitals' output with enhanced quality within two years. A steady stream of senior government bureaucrats now come in batches to spend several days at Aravind to study generic processes such as customer (patient) centric approach, to

help transform their own services to the country. Several corporate organizations such as SAP, Mindtree and GE send their senior leadership teams and this has helped mutual learning and development. Innovations seem to stem out of seemingly **contradictory goals** – must serve (all) the poor and yet must be financially self-reliant; there must be equity in care and yet there must patient perceivable differences to encourage some of them to pay for the services; can't charge more than market rates nor depend on donations and yet be able to provide free or subsidized care to all those who seek it. Where does the organization draw the boundaries is also an influencer of innovations – if a patient doesn't comply with seemingly clear instructions, who is responsible? if people continue to remain blind in the community in spite of offer of free care, who is responsible? **Extending the boundaries** to take on more responsibilities tends spur more innovations and the pay back is a much larger and a growing market. Such more generic abstraction of what drove innovation at Aravind would help understand the relevance to other sectors.

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He has been an Advisor to India's National Programme for the Control of Blindness and WHO; served as the Southeast Asia Chair of International Agency for the Prevention of Blindness and was the founder President of Vision 2020 India.

Thulasiraj was named as a Social Entrepreneur in 2005 by the Schwab Foundation; adjudged the "Hospital Administrator of the Year in 2008" in India by Modern Medicare and GE Health; speaker at the TED Conference, India in 2009; listed among the 30 Most Influential People in Public Health globally by a portal on Masters in Public Health Management; in 2014, honoured as the "Most inspiring Healthcare Leader of the year" by Times of India.



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