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JustDial: Reducing the Digital Divide through an ICT-Enabled Application of Appropriate Technology and Fortune-Seeking Behavior at the Bottom of the Pyramid

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INTRODUCTION

This paper has two objectives. The first, and primary objective is to integrate and the concepts of “Appropriate technology” and “Fortune at the Bottom of the Pyramid”, and illustrate their applicability to the context of software and ICT enabled applications in reducing the digital divide. A secondary objective is to examine the feasibility and desirability of transferring appropriate technology applications developed and deployed in an emerging economy (India) to rich developed countries (USA, UK, Canada, Australia, and New Zealand). The paper does so through examining a case study of JustDial, a social networking/media information service application successfully developed and deployed in India.

The paper achieves these objectives by first, in the next section (section 2.0), describing and integrating the two complementary concepts of appropriate technology and fortune-seeking at the bottom of the pyramid. In doing so it also shows that most of the commonly reported applications of these concepts have been primarily in the context of physical hardware and physical services. By illustrating their use in the context of information services and ICT-enabled applications, the paper opens up a new avenue for invoking these concepts for global development and alleviation of knowledge poverty and digital divide. Next, in section 3.0, the paper describes an ICT-enabled social networking and information services application: JustDial, which has been developed and deployed in India. It shows how JustDial conforms to the underlying principles of appropriate technology and fortune-seeking at the bottom of the pyramid. In section 3.4 the paper examines JustDial’s plans for internationalization to developed countries and through those plans, it comments on the feasibility and desirability of exporting concepts of Appropriate Technology and Fortune at the Bottom of Pyramid, from their genesis in developing economies to resource rich developed economies. Finally, section 4.0 concludes with a summary of the paper and its contributions to appropriate technology practice.

1 The digital divide refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communications technologies (ICT’s) and to their use of the Internet for a wide variety of activities. It includes the imbalance both in physical access to technology and the resources and skills needed to effectively participate as a digital citizen. Knowledge divide reflects the access of various social groupings to information and knowledge, typically gender, income, race, and by location.
2.0 INTEGRATING TWO IDEAS: APPROPRIATE TECHNOLOGY SOLUTIONS AND DISCOVERING THE FORTUNE AT THE BOTTOM OF THE PYRAMID

2.1 Appropriate Technology Movement

The **Appropriate Technology** movement, initially proposed by Schumacher (1973), traces its roots to the philosophies of Gandhi and Henry David Thoreau (Akabue 2000). Appropriate to its origins in Gandhian philosophy, the this movement, from its very inception, has been an ideological movement, dedicated to noble causes such as design and deployment of technology to serve the needs of large impoverished sections of society, utilizing the resources and talents of those served, and frugality in use of scarce resources. Akabue [ibid], in a comprehensive review of literature on appropriate technologies, cites Morawetz (1974) to describe appropriate technology as a “set of techniques which makes [sic] optimum use of available resources in a given environment. For each process and project, it is the technology which maximizes social welfare if factors and products are shadow priced.” Similarly, Baetz, McGowan, and Wigand (1984), characterize appropriate technology as providing technical solutions that are appropriate to the economic structure of those influenced: to their ability to finance the activity, to their ability to operate and maintain the facility, to the environmental conditions involved, and to the management capabilities of the population (Akabue 2000).

The underlying motivation behind appropriate technologies is the observation that most modern technologies developed in the affluent world are resource and cost intensive, often wasteful in the use of scarce resources, and are typically designed to replace human labor by substituting technology and capital. When imported into the relatively poor countries, not only does the deployment of these “affluent” technologies deplete local resources, materials, and environment at fast rates, but also by replacing human labor with capital and machines these technologies contribute to large-scale transfers of wealth and well-being from the impoverished masses to a few capital and technology rich elites. This further exacerbates and

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2 We use the term **affluent technology** to differentiate between the concept of “appropriate technology” coined by Schumacher (1973) and most of the technologies developed and deployed in rich societies. Affluent technologies are designed in a context of rich factor-endowments, abundance of resources, and a general population which has a higher level of prosperity and technical sophistication, such that it can absorb and use these complex technologies. It may be argued that the “affluent technologies” are appropriate to the existing conditions in affluent societies. However such use of the term “appropriate” would not be consistent with Schumacher and other scholar’s use of the term appropriate.
perpetuates the already existing income and wealth inequalities and concentrations in the poor nations. Moreover, often the products and services developed and deployed in affluent societies are technologically complex and priced and marketed in a manner that puts them beyond the existing skill-sets and economic reach of the common man in developing countries. Thus the fruits of so-called technological progress are slow in trickling down to the people at the bottom-of-the pyramid. The appropriate technology movement was conceived as a counter approach to the notion of progress embodied in the development and deployment of affluent technologies (Lamba 2005).

Appropriate technology products and services, their design, production, and deployment rests on four key ideas: From a consumption and use perspective, appropriate technology products and services should be easily accessible, available, affordable, and useable by a large proportion of the poor populations of developing nations. Second, from a technology development and production perspective, appropriate technology products and services should, as far as possible, use existing resources, skills, infrastructure, and factor-endowments commonly available in the local environment of use of the adopting country. Third, the production and use of appropriate technology products and services should be sustainable, such that it does not harm the ecology of its production and use environment. Finally, the benefits of technology should not only trickle down to the masses; the technology and its deployment should be designed and implemented in such a manner that their benefits can be directly appropriated and used by large numbers of poor people.

Typical examples of appropriate technologies cited in literature are mainly in the context of physical products and services, such as agriculture, water and sanitation, health services, energy generation and use, transportation, and food preparation and storage. For example, when Wikipedia provides examples\(^3\) of appropriate technology use in Information and Communication Technologies, most examples cited are about hardware solutions such as low-cost computers, or hand-cranked or solar powered computers. More recent examples of appropriate technology deployment have begun to transition from hardware solutions to quasi-soft solutions such as Grameen Phone (an integration of mobile technology and micro-finance), information and libraries.

\(^3\)http://en.wikipedia.org/wiki/Appropriate_technology
provided on CDs and DVDs, free or inexpensive web and e-mail services using cooperative computer networks, and low-bandwidth web-based solutions such as LoBand⁴. However, at present there is a lack of examples of deploying appropriate technologies in the context of information services and social media. This paper attempts to extend the concept of appropriate technologies across contexts to alleviating the digital, information, and knowledge divides.

2.2 Fortune at the Bottom of the Pyramid

As mentioned above, the appropriate technology movement has, from its very beginning, been an ideological movement, with a strong sense of Gandhian values of serving the masses and frugal use of resources, and of technology that is appropriate to these values. Consequently, beyond the overall lofty pronouncements of frugal use of resources, the AT movement has not addressed the issue of economic incentives that can motivate inventors and entrepreneurs to develop and deploy appropriate technologies. However, while ideology, by itself, may be deployed either at a few localized sites, or over a short time, for it to be sustained, it requires incentivized economic agents with economic motives to develop and promote the use of appropriate technologies. The role of such agents is missing in the traditional appropriate technology movement.

As a response to this shortcoming, inspired by C.K. Prahalad’s (2004) seminal idea of “Fortune at the Bottom of the Pyramid”, recent appropriate technology initiatives have begun to include the idea that while the poor may not be able to afford to buy and benefit from the variety and complexity of costly products and services developed and deployed by the affluent society technologies; they can still aspire to, purchase, use, and benefit from these products and services. If these products and services are provided to them in smaller and simplified packages, the poor masses at the bottom of the pyramid⁵ are prepared to buy and adopt and use them in large numbers, and thus provide an economic opportunity to entrepreneurs and innovators. Prahalad’s key idea

⁴ LoBand, a website developed by Aptivate, strips all the photographic and other bandwidth-intensive content from Web pages and renders them as simple text, while otherwise allowing one to browse them normally. The site greatly increasing the speed of browsing, and is appropriate for use on low bandwidth connections as generally available in much of the developing world.

⁵ Prahalad (2004) defines the “Bottom of the Pyramid” as people subsisting on less than US$2.00 per day. According to estimates from Prahalad, currently there are at least 2.5 billion in the world at the Bottom of the Pyramid who do not have the economic where withal to partake of the benefits of modern technology and products.
is that developing and marketing inexpensive products for the large number of poor people in developing countries, is not only a “feel-good” proposition for social good, it can also be highly profitable business proposition. Examples of such innovations include cold-water shampoos (the poor usually do not have hot and cold running water) marketed in small sachets, or the use of micro-credit and micro-finance in villages in South Asia. Thus combining the ideological principles of the appropriate technology movement with the economic practicalities of Prahalad’s “fortune-at-the bottom of the pyramid” we create a more robust and practical model for longer-term, sustainable development and deployment of appropriate technologies.

2.3 Combining Appropriate Technology Solutions with Fortune at the Bottom of the Pyramid

As the above discussion shows, both the Appropriate Technology movement and the Fortune at the Bottom of the Pyramid concept are complementary, and have similar genesis and underlying motivations. Both ideas are designed to provide the fruits of technological progress to poor people in developing countries, who were formerly left out of the technological and economic progress of the last century. While appropriate technology describes the characteristics of the technology needed to make the fruits of technology and progress available to the bottom of the pyramid; ideas from The Fortune at the Bottom of the Pyramid provide economic incentives and justification for developing and deploying appropriate technology solutions. Therefore integrating the two concepts we come up with the following five principles:

- First, from a consumption and use perspective, appropriate technology products and services should be easily accessible, available, affordable, and useable by a large proportion of the poor bottom of the pyramid populations of developing nations.
- Second, from a technology development and production perspective, appropriate technology products and services should, as far as possible, use the existing resources, skills, infrastructure, and factor-endowments commonly available in the local environment of use of the adopting country.
- Third, the production and use of appropriate technology products and services should be sustainable, such that it does not harm the ecology of its production and use environment.
- Fourth, the benefits of technology should not only trickle down to the masses; the technology and its deployment should be designed and implemented in

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6 The combined concepts of appropriate technology and fortune-seeking at the bottom of the pyramid are also referred by Lacy (2011) as a “Micro-economy”. See also http://www.fastcompany.com/1725661/indias-mighty-microeconomy
such a manner that they can be directly appropriated and used by large numbers of poor people.

- Fifth, and finally not only is the development and deployment of appropriate technologies socially and morally desirable, it can and should also provide entrepreneurs and businessmen a strong profit motive.

As discussed above, most exemplars of these two concepts described in the literature have typically been physical products and services. This is understandable. The concepts of appropriate technology were motivated primarily by economic and health-related underdevelopment and thus early examples focused primarily on physical and health related technologies. Similarly, the concept of fortune-seeking at the bottom of the pyramid was originally developed to address the economic and product deprivation of the bottom-of-the-pyramid masses. Therefore most exemplars included mainly product or health-related applications.

However with the recent understanding of the implications of information and knowledge poverty, and the digital divide, attention is now beginning to shift to appropriate technologies for ameliorating the consequences of knowledge and digital divide. Only recently the literature has begun to cite information products and services as examples of appropriate technology and fortune-seeking at the bottom of the pyramid. However, the focus still seems to be on inexpensive hardware for reducing the effects of digital divide. Thus the examples often cited include mentions of low-cost computers such as the Simputer and the OLPC (“one-laptop-per-child”) project or providing access to low cost, low band-width internet.

The following case study of a Social Networking and information services application from India shows how these five principles can also be applied to providing information services for reducing the digital and knowledge divides.

3.0 JUSTDIAL: A WEBLESS SOCIAL MEDIA

(Note: The information for this section was compiled from a variety of secondary sources including Justdial’s website and a number of news reports in various online information sources, such as the Economist, Wall Street Journal, Economic Times,

7 A recent example of such information and communication intensive is the Grameen Phone, developed in Bangladesh that combines the functions of a mobile phone with rural micro-finance and micro-banking. Another example is Loband mentioned earlier that strips off bandwidth intensive information from web-pages, thereby making them available for low-bandwidth access.)
and Fast Company. A detailed list of the web-sources is available in the footnotes and from the authors).

Justdial ([www.justdial.com](http://www.justdial.com)) is an Indian information services and social networking company. A recent issue of Economist\(^8\) describes JustDial as a “web-less social network” (More on the “web-less” concept when we discuss JustDial as an appropriate technology below). With its origins in directory services, and subsequent metamorphosis into a Google style search engine, Justdial, with over 57m individual customers, and 5m corporate listings, bills itself as “India’s No.1 Local Search Engine\(^9\)”. However, as the following table of features compiled from various secondary sources and news-reports shows, like Google, JustDial has also grown into more than just a basic directory service and search-engine:

### 3.1 How does JustDial work?

Table 1 shows that JustDial includes a number of functionalities of traditional internet-based online directory assistance, search engines, and social-media services. Like its western counterparts, JustDial can also provide access to these services through a web-based internet interface—this is where the similarity ends.

#### Table 1. Popular Services and Features

<table>
<thead>
<tr>
<th>Description of JustDial Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Directory Assistance features</strong></td>
</tr>
<tr>
<td>Basic directory assistance like 411 and Yellow-Pages</td>
</tr>
<tr>
<td><strong>Advanced features</strong></td>
</tr>
<tr>
<td>Search engine capability; like Google, Bing, Baidu, etc.</td>
</tr>
<tr>
<td>GPS capability; senses user’s location and customizes search to user’s location; such as Places..</td>
</tr>
<tr>
<td>a mobile app for Android and iPhones</td>
</tr>
<tr>
<td><strong>Social media features</strong></td>
</tr>
<tr>
<td>User profile with search history; like Amazon.com</td>
</tr>
<tr>
<td>Product/Service rating and evaluation; Recommendation service; like tripadvisor, Amazon.com</td>
</tr>
<tr>
<td>Tag-friends: Tag upto 25 mobile users of JustDial as friends to share recommendations</td>
</tr>
<tr>
<td><strong>Preferred Vendor Suggestions</strong></td>
</tr>
<tr>
<td>Provide customers with preferred vendors suggestions; recommend “top deals” in the customer’s area; Justdial derives revenues from vendor subscriptions: like Google Sponsored Links, Groupon</td>
</tr>
</tbody>
</table>

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In line with its appropriate technology characteristics, *JustDial* also provides an interface appropriate to the special circumstances of use-conditions in India (i.e., India’s unique user-base and use infrastructure – see discussion in section 3.2 below).

When the users of *JustDial* need some information, whether a phone number, information about locally available medical services, market prices for agricultural and food commodities, or the address and rating of local restaurants, they just dial *JustDial* and pose their query as a text or a voice message, just as someone would enter a search query online in Google, tripadvisor or Amazon.com. *JustDial’s* call-center answering service provides an answer within 30 to 45 seconds, or if the user prefers connects him or her to a recommended vendor of requested services. Depending on the user’s preferences, the answer can either be texted, phoned, or e-mailed to the user. The user has either a high-tech option of browsing online, or receiving information through low-tech (or appropriate tech) means through phone, text messages, or e-mails.

Just like Google, Tripadvisor, or Amazon, the answers to these queries are generated through a combination, of software applications and databases. Moreover, similar to its online counterparts, *JustDial* also collects users’ ratings and harvests information about user’s use-profile from her/his search history. A combination of service-provider subscription information, user-profile information, his/her location tracked through location-tracking technologies such as GPS, and service-product providers ratings collected from users over a period of use, are used as the data-base for answering queries. Finally, information about the user’s “Tagged Friends” is used to further support the social recommendation features of the service. Finally like Google’s sponsored links, and Groupon’s sponsor recommendations, *JustDial* also generates revenues from commercial subscribers.

3.2 *JustDial* as an Appropriate Technology:

In section 2.3 we identified five principles combining appropriate technology and fortune-seeking at the bottom of the pyramid. In this section we explain as to how *JustDial* meets the criteria embodied in these principles:
**Principle 1:** From a customer and use perspective, products and services should be easily accessible, available, affordable, and useable by a large proportion of the poor bottom of the pyramid populations of developing nations.

India is a relatively poor, but fast growing emerging economy. A substantial majority of Indian citizens live below the poverty line. Except for a substantial and rapidly growing urban middle-class, a vast majority of Indians cannot afford to buy access devices (computers, smartphones, tablets, etc.) and connections to the internet.

This economic poverty is also reflected in the digital and knowledge divides, both within India, as well as compared with developed economies. In March 2011 The Telecom Regulatory Authority of India reported that the country of 1.2 billion people just had 8.8 million broadband connections. Moreover, the access to broadband and internet is heavily skewed in the favor of major cities in India. There is very little to almost non-existent access in smaller cities and villages. Furthermore, a large percentage of the poor citizens are either semi-literate or illiterate. Thus directly browsing internet is not an option. Additionally, most of the content available on the world-wide web is in languages other than Indian national and regional languages. Consequently, a vast proportion of Indian masses does not have access to or can directly avail of the information available on the world-wide web.

On the other hand, in March 2011, India already had 812m mobile phone users. Moreover, their numbers are growing at a rapid pace. Furthermore, most Indians have access to low-cost SMS (texting) services at a very affordable cost of paise 50 to Rs. 1 (US 1.1 to 2.2 cents) a message, and phone services at the rate of Rs. 1 a minute. Indians at all socio-economic and levels are accustomed to and prefer texting. Gartner estimates that in 2013 Indians will send out 192 billion text messages.

Taken together these statistics suggest that while web-browsing and internet access currently may not be an appropriate mode of access to information for Indian users; mobile telephony and text messaging has a high level of potential for most Indian users. With the growth of infrastructure and user sophistication this situation is likely to change. But for now, voice and text-based mobile telephony seems like the most feasible alternative.
**Principle 2:** From a technology development and production perspective, appropriate technology products and services should, as far as possible, use the existing resources, skills, infrastructure, and factor-endowments commonly available in the local environment of use of the adopting country.

From the development and production (deployment) perspective four conditions in the current situation provide another clue to the development of appropriate information services in India. First, India’s mobile telephony infrastructure is growing at a rapid rate, and now covers even remote towns and villages. Thus mobile telephone services are becoming ubiquitous. Second, given the low affordability by general populace, both Indian companies and multi-nationals like Nokia are investing large amounts of R&D and money developing and marketing simple, low-cost phones. Consequently low cost and simple mobile hand-phones are commonly available even in remote corners of India. Third, over the last decade, Indian IT-enabled services industry has developed a strong record of success and expertise in providing outsourced voice-based call center services. Finally, Indian IT industry has developed a stock of experience in IT-skills and developing IT software. A confluence of these strengths points towards using some sort of a combination of text or voice-based mobile telephony, call-centers, and IT-based application development as a way of providing information services to large number of Indians.

**Principle 3:** The production and use of appropriate technology products and services should be sustainable, such that it does not harm the ecology of its production and use environment.

Typically information and communication technologies are considered to be environment friendly. However, given the large-scale deployment of cell-phones, and the rapid turnover and obsolescence in cell-phone technology, new problems of dealing with electronic waste are likely to appear. However the re-cycling culture in India is likely to mitigate some of these fears.

**Principle 4:** the benefits of technology should not only trickle down to the masses; the technology and its deployment should be designed and implemented in such a manner that they can be directly appropriated and used by large numbers of poor people.
The access to information services is beginning to provide the information and knowledge-poor Indian masses access to information and knowledge. As the access to communication technology and information sources increases, and as citizens develop experience and sophistication in the use of information resources, the benefits of increased access to information are likely to accrue directly to the users of these services.

**Principle 5**: And finally, not only is the development and deployment of appropriate technologies socially and morally desirable, it should also provide entrepreneurs and businessmen a strong profit motive for developing and deploying the technology.

Started in 1996 in a 300 sq.ft. garage office with only three people, *JustDial* has grown to a 4500-member corporation with revenues reached Rs. 142 crore (US$32 m) by March 2011. In the year ending March 2011, *JustDial* fielded 72 million calls. The call volume is growing by 40% annually, and the company expects to break the 100m mark sometime next year\(^\text{10}\). Its service now covers almost every city and town in India. The challenge now is scaling up. According a recent issue of Economist\(^\text{11}\), in May-June 2011 *JustDial* attracted $10m from private-equity firms SAP Ventures and Sequoia Capital. Vibhor Mehra, a partner at SAIF Capital, another private-equity company which has a minority stake in *JustDial* since 2006, says that the company may file for an initial public offering later this year.

### 3.3 Global Expansion Plans for *JustDial*

In March 2010, *JustDial* officially launched its service in the US through Facebook\(^\text{12}\) using the number 1-800-JUSTDIAL. According to Wall Street Journal, *JustDial*’s CEO, VSS Mani believes that logistically it will be easier for *JustDial* to start operations in developed countries\(^\text{13}\). He believes that unlike India, where *JustDial* needed a large sales force to sell its business model to commercial subscribers and sign-up vendors, in developed economies, such as the USA, the existence of middlemen who act as aggregators of services, will make his task easier.

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\(^{10}\) [http://techcrunch.com/2010/03/22/can-india%E2%80%99s-justdial-make-it-in-the-us/](http://techcrunch.com/2010/03/22/can-india%E2%80%99s-justdial-make-it-in-the-us/)


In the US JustDial’s move competes directly with Google’s similar service GOOG-411. However there are two key differences between Google’s service and JustDial. First, Google’s service uses voice recognition software, whereas JustDial uses human operators. Second, the 411 service intends to charge users, whereas the JustDial services are free to the user\textsuperscript{14}. For now, JustDial intends to service its operations in the US from its Indian call-centers. However, over time it plans to establish call-centers in low cost areas of USA. The jury is still out if JustDial and its appropriate to India technology model can succeed in a developed economy such as USA. Some of the issues to look out for include:

(1) The penetration of broadband and internet services is considerably higher in the US than India. Moreover, the US users are much more sophisticated than the Indian users in the use of online technologies. Therefore, the customer-centric (Principle 1) and production-centric (Principle 2) reasons for JustDial in the Indian context no longer apply in the US.

(2) For historical and cultural reasons the acceptability and penetration of texting and SMS technologies is higher among countries in Asia than in the USA. However, texting seems to be becoming popular among the younger generation of mobile phone users in the US. More research needs to be conducted on the acceptability and preference for texting over voice services before some conclusions about the texting features of JustDial can be derived.

(3) The voice-based call-center response could have multiple disadvantages over automated assistants:

- Automated assistants information search are perceived to provide a higher level of privacy assurance to the user than a human assistant. Unless specifically programmed to do so, the automated assistant will not tell; the human assistant can do so on his or her own.
- The costs of voice/call-center human-based operations, is likely to be higher than those of computer-based assistants.
- As long as the voice-based operations are serviced from India, questions of misunderstood accents and American user’s resistance to foreign call center personnel can be an issue. On the other hand if the call-center operations are moved to the US, this is likely to increase the costs.

\textsuperscript{14} ibid.
(4) The success of *JustDial’s* appropriate technology is based upon the current state of consumer-readiness and infrastructure in India. However, with the projected growth in the Indian economy, as the internet infrastructure in India develops, and as the users become more experienced and sophisticated, we still need to monitor if they migrate to smartphones and online technologies or they stay with the appropriate technologies.

(5) *JustDial* as an Indian firm that is successful in India because of its deep understanding of Indian context, business practices, and management. While its CEO VSS Mani does have some early experience working in the US, most of his and his management team’s recent management experience comes from India. The question still remains if this experience can be translated to developed economies.

### 4.0 SUMMARY AND CONCLUSIONS

The above article presented and integrated the concepts of Appropriate Technology and Fortune-Seeking from the Bottom of the Pyramid. It extended these concepts from solutions for economic divide between haves and have-nots, to digital and knowledge divide between haves and have-nots. It then illustrated the application of these concepts to an Information Service firm, *JustDial* established and operating in India. Based upon this case study, it established five principles or guidelines for developing and deploying appropriate technology solutions consistent with the fortune-seeking behavior at the Bottom of the Pyramid. These principles can be useful for other information services firms planning to develop and deploy such solutions in other emerging economies.

Finally, the article presented and discussed plans for *JustDial’s* expansion from an emerging economy market (India) to a developed economy (USA). Additional data needs to be collected and more future research has to be conducted, before we can develop some ideas about the transfer of appropriate technologies from developing to developed countries.
References


