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TOWARDS LINKING DISRUPTIVE INNOVATIONS AND BOP MARKETS

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ABSTRACT

The base of the world economic pyramid consists of 4 billion people typically earning less than 4 USD per day. This population is generally called the base of the pyramid (BoP). Much research on BoP markets focuses on motivating companies to enter these markets to create a win-win situation such that companies can gain benefits and BoP customers can satisfy their unmet or under-served needs. The reviewed literature suggests the need of innovations to successfully deploy products and services in these BoP markets. The reviewed research on disruptive innovations suggests that these innovations provide a good opportunity in new markets in contrast to companies' mainstream markets. This paper presents the findings of the initial phase of our research, and attempts to demonstrate that BoP can present a potential new market for companies to successfully employ disruptive innovations. This is shown by synthesizing the reviewed literature on: (1) design, development, marketing, and distribution of products and services in BoP markets; and (2) disruptive innovations.

Keywords: Base of the pyramid (BoP), innovations, disruptive innovations

1 Introduction

Figure 1 shows the world economic pyramid. The base of this pyramid consists of 4 billion people with per day income of 4 USD. Over a billion people of the BoP earn less than 1 USD per day. Most of these 4 billion people live in rural villages, urban slums, or shantytowns. Usually these people have little or no formal education. These people are hard to reach via the conventional means of communication and distribution channels. The quality and quantity of products and services available to these people is usually inferior [1]. Prahalad and Hart [1] state, "Low-income markets present a prodigious opportunity for the world's wealthiest companies – to seek their fortunes and bring prosperity to the aspiring poor". Companies need to be radically innovative to successfully deploy products and services in BoP markets.

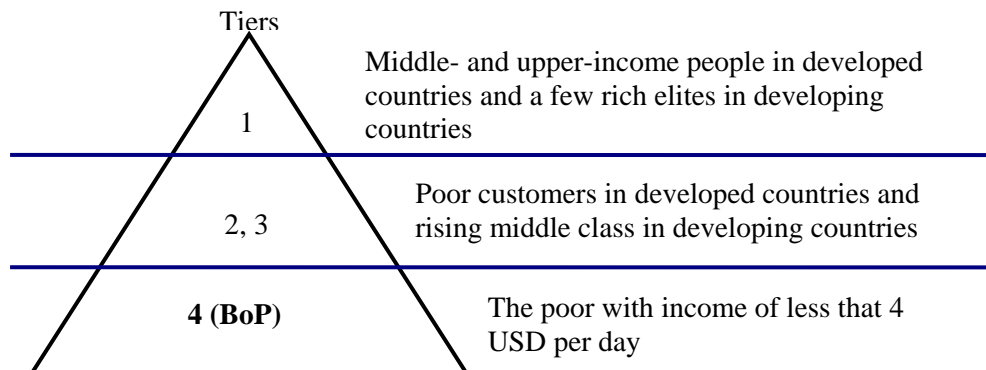


Figure 1 The world economic pyramid

Usually, companies focusing on their mainstream markets (e.g. tier 1, 2, and 3 of the world economic pyramid) employ sustaining innovations, which maintain the performance of a product by incremental innovations. Disruptive innovations introduce products and services with attributes that are not valued in

the mainstream markets of a company. Disruptive innovations tend to be valued or used in new markets or in new applications. The work presented in this paper attempts to demonstrate that BoP can present a potential new market for companies to successfully employ disruptive innovations.

This paper is structured as follows. Section 2 presents the research methodology employed. Section 3 presents the benefits companies can obtain by tapping BoP markets. In addition, this section describes the different issues in the design, marketing, and distribution of products and services in BoP markets, and highlights the need of innovations to address these issues. Section 4 explains what disruptive innovations are and how companies can use these innovations by overcoming the barriers in pursuing these innovations. The links between disruptive innovations and BoP markets are explained in Section 5. Finally, Section 6 sets out the conclusions and briefly presents the plan for further work.

2 RESEARCH METHODOLOGY

There are two major steps in the research methodology:

Step (1): Carry out literature survey: (i) to identify the different issues in designing, marketing, and distributing products and services in BoP markets, and to identify the need of innovations to address these issues; and (ii) to understand disruptive innovations and how these innovations can be employed successfully.

Step (2): Synthesize the reviewed literature in these two areas in order to identify links, if any, between them.

3 BOP MARKETS

3.1 Motivation for companies to tap BoP markets

Companies can seek opportunities in BoP markets to fulfill their aims of corporate social responsibility (CSR) and/or to gain benefits such as increased profits, using BoP markets to test products and services developed through new technologies, etc. In general, motivational level for companies to enter BoP markets can be high if they gain benefits in contrast to fulfilling their goals of CSR. The reviewed literature shows that companies can achieve several types of benefits by entering BoP markets.

The potential purchasing power of BoP markets is significant, and companies can earn profits by selling products and/or services in these markets. The International Finance Corporation together with the World Resources Institute measured the size of BoP markets [2]. Their findings are shown in Table 1. For their study they used income and expenditure data from household surveys.

Table 1 Potential purchasing power of BoP markets for different regions – summarized from [2]

World region	Potential purchasing power (USD)
Asia plus Middle-east	3.5 trillion
Latin America	509 billion
Eastern Europe	458 billion
Africa	429 billion

Prahalad and Hart [1] have listed the drivers of innovation required in BoP markets as follows.

- People in BoP markets now have increased access to TV and information. This can help multinational corporations (MNCs) to make BoP markets aware of their different products and services.
- Deregulation and gradual withdrawal of government and international aid makes BoP markets more hospitable for MNCs by taking support from NGOs.
- The intense competition at the top of the world economic pyramid can motivate MNCs to explore BoP markets.
- By creating products and services for BoP markets, MNCs can avoid the migration of people from BoP markets to overcrowded urban areas.

Based on the reviewed literature on international business, innovation and stakeholder management, Sharma and Hart [3] identify that this literature does not adequately address the question - how and why companies would explore opportunities in BoP markets. They have proposed the factors that will motivate companies to enter BoP markets, and these factors are: saturated and slow-growth in developed markets, maturity of the dominant technology in the present industry, and ‘loss of societal legitimacy’ (e.g. spread of information on negative effects of tobacco on health can cut profits of the companies manufacturing tobacco products).

Keating and Schmidt [4] explored opportunities and challenges for MNCs in BoP markets. They gathered data through interviews with managers from 22 MNCs in different industries such as consumer goods, energy/utilities, healthcare, technology, finance, and consultancy/advisory. Financial, strategic (e.g. advantages gained through partnerships), and philanthropic gains motivate MNCs to tap BoP markets. In general, the benefits achieved are: increased profits, and socioeconomic and environmental impacts. The authors found that the spread of innovation to other parts of a company is seen as an additional benefit.

3.2 Success in BoP markets: issues and need of innovations

There are specific issues (e.g. affordability, availability, economic self-sustainability, etc.) that need to be considered in designing and developing products and services for BoP markets. These issues are significantly different from those in established markets such as tiers 1, 2, and 3 of the world economic pyramid. These differences can be attributed to the characteristics of BoP markets, for example, literacy level, income, etc. of BoP customers, available infrastructure in these markets, etc. These issues can be challenging to address for the companies having expertise in designing, developing, marketing, and distributing products and services in their mainstream markets, for example, tiers 1, 2, and 3 of the world economic pyramid. Therefore, it is important to understand the issues in designing and developing products and services for BoP markets. Based on the reviewed literature, Table 2 summarizes the main issues in design, development, marketing, sales, and distribution of products and services in BoP markets. This table also provides the information on the data collection methods used by the authors listed in this table. In order to successfully address these issues companies need to be radically innovative in technology and business models.

Table 2 Main issues in BoP markets

	Author	Data collection method	Main issues considered or identified
1	Anderson and Markides [5]	Field visits, observations, and in-depth interviews	Affordability, availability, acceptability, awareness
2	Keating and Schmidt [4]	Interviews with managers from MNCs	Affordability; high durability of products and services, stakeholder engagement; marketing, sales, and distribution
3	Reza [6]	Experience from successful implementation of a project in BoP market	Affordability, availability, awareness, stakeholder engagement, economic self-sustainability
4	Richardson and Callegary [7]	Experience from successful implementation of a project in BoP market	Affordability, availability, accessibility
5	Skarp et al [8]	Experience from successful implementation of a project in BoP market	Affordability, availability, usability, economic self-sustainability, stakeholder engagement
6	Sharma and Hart [3]	Literature review	Affordability, stakeholder engagement
7	Prahalad and Hart [1]	Literature review	Affordability, stakeholder engagement, creating employment opportunities

The work carried out by Anderson and Markides [5] aims at identifying the reasons behind the success of strategic innovators who targeted their products and/or services for the customers in BoP markets. Their research findings are derived from the results of the analysis of the data gained through field visits to different countries in Africa, South Asia, East and South East Asia. The data was collected through observations and in-depth interviews with the companies (e.g. Smart Communications Inc., HLL, Indian conglomerate TATA, CavinKare, Haier Group) producing and distributing products/services for BoP markets. The successful companies in BoP markets focus their attention on the '4As', namely, affordability, acceptability, availability, and awareness. These four 'A's are explained as follows.

- “*Affordability* relates to the degree to which a firm’s goods or services are affordable to BoP consumers.” The low-income of BoP consumers (e.g. more than two-thirds of the income of Indian villagers’ is spent on food) creates a significant problem in designing and distributing products/services to these customers.
- “The extent to which consumers and others in the value chain are willing to consume, distribute or sell a product or service relates to *acceptability*.” The particular requirements (e.g. cultural, socio-economic characteristics) of BoP customers and distributors are important to successfully tap BoP markets.
- “*Availability* is the extent to which customers are able to readily acquire and use a product or service.” Usually, the infrastructure in BoP markets is poor (e.g. lack of or inadequate distribution channels). Companies need to devise methods of distributing or delivering their products/services to BoP customers.
- *Awareness* relates to “the degree to which customers are knowledgeable about product or services.” Many BoP customers do not have access to the conventional advertising media (e.g. only 41 per cent of poor rural households in India have access to TV). Companies, aiming to enter BoP markets, require devising alternatives to make BoP customers aware of their products/services.

Keating and Schmidt [4] collected data through interviews with managers from MNCs. The factors contributing to MNCs’ success in BoP markets by overcoming the challenges are: “offering products/services that leverage their core capabilities; strengthening value chain activities with key partnerships; and making innovative changes to the business operating model where required”. In the case of BoP markets, market analysis, marketing, sales, and distribution pose a considerable challenge for MNCs. In order to overcome these challenges, MNCs must be radically innovative in relation to design of products/services, and issues regarding marketing, sales, and distribution.

Reza [6] describes the success of ‘Grameenphone’ (GP) in the rural areas of Bangladesh. The Community Information Centers (CICs) established by GP provide different services such as access to internet, government information, telemedicine, information on rural trade and business, etc. Their project aimed at supporting local communities in accessing information and communication technologies (ICT), creating entrepreneur-centered local ownership, and establishing economically self-sustaining business model. Regarding the sustainability of the telecentres, the author states, “In order to achieve the goals of community development and financial sustainability, telecentres have to integrate social, political, cultural and technical sustainability as vital elements into their planning and operation.” The author highlights the challenges and threats to the successful operation of telecentres. Lack of computer awareness in rural communities pose a significant challenge, and the likelihood of transformation of telecentres for human development and democratization of technologies into ‘cyber-cafes’ for entertainment is a threat.

Richardson and Callegary [7] describe the development of a system aimed at serving the un- or under-banked population of South Africa. Around 50% of the adult population in South Africa is unbanked. This has given rise to crimes such as cash-in-transit thefts, armed robbery, etc. The authors’ system, called WIZZIT, provides a mobile-phone-based banking facility, and is independent of network, SIM card, and the age of a mobile phone. In the development of the WIZZIT, the authors addressed the issues, namely, affordability, accessibility, and availability, through:

- technology (e.g. use of mobile phones tackles the need of brick and mortar banks and helps to achieve affordability);
- engaging and training stakeholders (e.g. trained agents help the clients to open their bank accounts, 18-hour call centre answers the queries of clients in 11 different official languages);

- appropriate use of regulations (e.g. low-income clients can open their bank account by providing only their identification document – salary slips, residence proof are not required); and
- collaborating with other partners (e.g. WIZZIT has collaborated with four major banks of South Africa - this helps to improve accessibility for clients).

The authors state ‘a legacy of neglect and exclusion’ among the poor in South Africa as a challenge in the diffusion of the WIZZIT to the lower end of the market.

Designing and developing a system for BoP markets requires considering a variety of issues in parallel. Regarding the design, development, and implementation of a project aimed at providing affordable mobile connectivity to the inhabitants of rural areas, Skarp et al [8] state, “The project team focused simultaneously on three dimensions that it believes must proceed in parallel:

- Technological innovation for low-cost communication solutions
- Business management innovation for the emerging markets
- Synthesis of the value network to make the solution feasible.”

BoP markets pose a new challenge to MNCs regarding how they can produce products and services for this market by combining low cost, good quality, sustainability, and profitability [1]. BoP markets are unorganized. Prahalad and Hart [1] state, “It takes tremendous imagination and creativity to engineer a market infrastructure out of a completely unorganized sector”. The authors describe four elements, namely, crating buying power, shaping aspirations, improving access, and tailoring local solutions to harness BoP markets. These elements require innovations in technology, business models, and management processes, and businesses need to experiment, collaborate, and empower locals.

Sharma and Hart [3] proposed factors that can influence the success of a firm in BoP markets. These factors are: understanding the socio-economic complexities of BoP markets by engaging different stakeholders from these markets, decentralized organizational structure that helps to develop innovation by stakeholders in BoP markets, ‘discretionary slack’ that allows managers to experiment, and appropriate controls to exploit this slack.

Kandachar and Halme [9] discuss different issues such as technology and innovation, collaboration of stakeholders (e.g. NGOs, local government, companies, etc.), etc. associated with a BoP strategy aimed at eradicating poverty. They discuss the importance of technological innovations for the BoP markets, which are subjected to scarcity conditions. These scarcity conditions include lack of appropriate infrastructure, shortage of skilled personnel to undertake projects, inadequate institutional (e.g. educational, financial, judicial) support, etc.

From the analysis of the abovementioned literature, the following points can be noted.

- The issues, which play an important role to successfully design, develop, market, sell, and distribute products and services in BoP markets are: affordability, acceptability, availability, awareness, creating employment opportunities, economic self-sustainability, high durability of products and services, stakeholder engagement, and usability. These issues can be complexly intertwined with each other.
- The issue affordability is seen frequently, followed by the issues ‘stakeholder engagement’, ‘availability’, ‘awareness’, and ‘economic self-sustainability’.
- These issues can pose considerable challenges for companies having expertise in designing and developing products and services for the tiers 1, 2, and 3 of the world economic pyramid.
- In order to address these different issues in parallel, companies need to be innovative in different disciplines such as design, marketing, distribution, etc. These innovations can be in technology and business models.

Disruptive innovations can provide a good opportunity to successfully enter BoP markets to create a win-win situation where companies can gain profits and customers can satisfy their needs.

4 DISRUPTIVE INNOVATIONS

In general, companies focusing on their mainstream markets (e.g. tier 1 of the world economic pyramid) employ sustaining innovations in contrast to disruptive innovations. These innovations can be in technology or business models. Bower and Christensen [10] differentiate between sustaining technologies

and disruptive technologies. The improvement in the performance of a product is maintained in sustaining technologies. Disruptive technologies introduce products with attributes that are not valued by the mainstream customers of a company. Disruptive technologies tend to be valued or used in new markets. Christensen et al [11] explain the term ‘disruptive innovation’ (see Figure 2). The top line in this figure illustrates the performance growth of the technology that is developed by established companies. This performance growth is maintained by sustaining innovations. With time, the performance of these innovations exceeds that demanded by the mainstream market. “That creates the potential for upstart companies to introduce disruptive innovations – cheaper, simpler, more convenient products or services that start by meeting the needs of less-demanding customers”. The bottom line illustrates the growth of these disruptive innovations. Consider the following example explaining the vertical axis (i.e. performance) in Figure 2. In the case of healthcare industry, the vertical axis ‘Performance’ in Figure 2 can be the complexity of diagnosing and treating different disorders. The less-demanding customers in the healthcare industry are patients with simple disorders (e.g. infectious diseases), and the most-demanding customers can be patients with complex disorders (e.g. a patient suffering from multiple diseases, for example, diabetes and heart disease requiring open heart surgery).

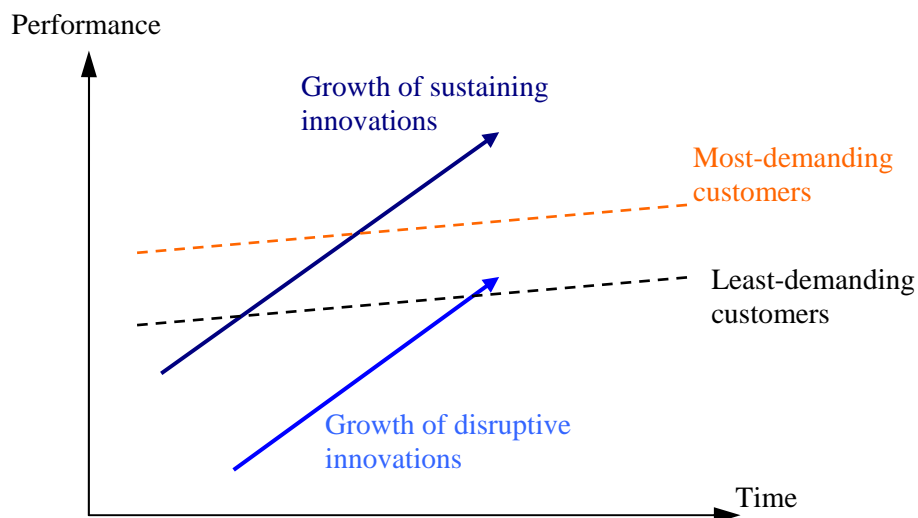


Figure 2 Disruptive innovation - adopted from [11]

There are several examples of disruptive innovation. Chan [12] provides some examples of disruptive innovations. The quartz-based watches, developed in Japan during the 1970s, could be produced more cheaply. This disruptive technology almost destroyed the previously established Swiss fine watch industry. The Internet is an example of disruptive technology. Microsoft nearly neglected the Internet until 1995 [13]. At that time, the highest levels of senior management at Microsoft realized the potential of the Internet for e-commerce. Until that time, Netscape’s Navigator was the leading Internet browser. Encyclopedia Britannica failed to identify the importance of the Internet for information distribution, and lost dominant position in the encyclopedia industry.

4.1 Overcoming the barriers to pursuing disruptive innovations

Established companies focusing on their mainstream markets overlook disruptive innovation for many reasons such as threat to their existing business models from pursuing disruptive innovations, less profit margins from new markets where disruptive innovations can be successful, etc. The performance level of products and services developed through disruptive innovations is generally inferior to that of products and services, developed through sustaining innovations targeted at mainstream markets [12]. Furthermore, mainstream customers often provide negative feedback to established companies regarding the usefulness of disruptive innovations. This discourages incumbent companies to pursue disruptive innovations.

McGahan [14] examined patterns of evolution in industry-change. These patterns are: progressive, creative, intermediating, and radical. In the case of radical pattern, which is attributed to disruptive technologies, both existing core assets and core activities of a company are threatened. Core activities are defined as “recurring actions that create value both by making the industry’s suppliers more willing to transact and by generating greater willingness to pay among the industry’s buyers”. Core assets are defined as “durable resources that make the firm more efficient or effective at performing core activities, including intangible assets such as brand name and knowledge capital”. A threat to core activities and assets from disruptive technologies is one of the barriers in pursuing disruptive innovations.

Christensen et al [15] provide the reasons why leading companies focusing on their mainstream customers neglect disruptive innovations. These reasons are as follows.

- In the initial phase, the performance of the products and services emerging from disruptive innovations does not match that expected by the sophisticated and profitable customers of leading companies.
- Predicting the market impact of disruptive technologies’ products and services is not easy.
- Leading companies mainly focus on markets where the returns are the highest. However, disruptive technologies satisfy the markets with lower profit margins.
- Leading companies tend to serve large markets, and their managers aim at increasing more revenue each year to maintain their growth rates. At the beginning, disruptive technologies’ markets are smaller and can not provide larger volumes of new business.

The aforementioned barriers can be classified into the following broad categories.

- Barriers arising from the reactive attitude of companies towards disruptive innovations (e.g. focusing on the threats of disruptive innovations to company’s different assets or resources). Companies need to proactively develop appropriate methods and tools to tackle these threats and to employ disruptive innovations.
- Barriers arising from the narrow focus on a particular market, for example, mainstream market (e.g. companies focus mainly on mainstream markets to keep their higher profit margins). Companies can obtain benefits through entering new markets by means of disruptive innovations.
- Barriers arising from the difficulties in using disruptive innovations (e.g. forecasting success of disruptive innovations in new markets is a challenging task).

Bower and Christensen [10] present a method to help companies in identifying and using disruptive technologies. The method involves the following steps: (1) identify if the technology is disruptive or sustaining; (2) assess the disruptive technology and estimate its strategic significance; (3) find market for disruptive technology; (4) establish independent business making use of disruptive technologies; and (5) keep this business autonomous.

Christensen [16] identified some principles which played a key role for the companies in successfully employing disruptive technologies to their advantage. These companies:

- developed and commercialized disruptive technologies in those companies whose customers’ needs could be satisfied with these technologies;
- developed disruptive technologies in small organizations which get satisfied with “small opportunities and small wins”;
- searched for the markets iteratively through trials such that the incurred costs were small in amount;
- used some resources of the mainstream organization without an intention to improve their processes and values;
- searched or developed new markets where the products or services developed through disruptive technologies were important.

Christensen [16] advocates the discovery and learning driven path to use disruptive technologies in new and emerging markets rather than ‘plan to execute’ approach.

5 LINKING DISRUPTIVE INNOVATIONS AND BOP MARKETS

Section 3.1 presented motivations for companies to enter BoP markets. Companies can gain financial, strategic, and philanthropic benefits by tapping BoP markets. In order to tap BoP markets, companies

require overcoming the challenges associated with BoP markets. Understanding and addressing different issues of BoP markets is crucial to successfully tap these markets. Section 3.2 presented these issues and emphasized the need of innovations in technology and business models to address these issues. Companies can obtain added benefits, associated with using disruptive innovations, if they enter BoP markets by employing these innovations.

BoP markets provide a good opportunity for companies to successfully sell products and services developed through disruptive innovations in these markets because of the following reasons.

- Disruptive innovations, generally, satisfy needs of customers from new markets in contrast to companies' mainstream markets.
- Simpler and less expensive products and services, emerging from these innovations, can be more appropriate in BoP markets.
- Established companies can eliminate threats coming from upstart companies which can employ these disruptive innovations in new markets and thereby enter established companies' mainstream markets by gradually developing these innovations.
- Focusing on BoP markets as new markets to employ disruptive innovation can save companies' time and effort required in searching for new markets for disruptive innovations.
- Disruptive innovation in one BoP market can be transferred to different BoP markets by adapting or adopting these innovations, for instance, low-cost medical scanners developed by GE for Asian markets are now being sold in other poor counties [17].

In addition, companies can gradually develop disruptive innovations targeted at BoP markets, and can use these developed innovations in their mainstream markets. This is illustrated in Figure 3. The gradual development of disruptive innovations in BoP markets to sustaining innovations in mainstream markets is represented by the dotted line. Consider the following examples: Honda's success in marketing motorcycles in U.S. market (in the early 1960), which were mainly developed for meeting the needs of less-demanding customers in Japan; a Chinese company Galanz designed and developed simple, energy-efficient, and low-cost microwaves to meet the needs of Chinese middle class, and slowly moved upmarket and in 2000 it captured 76% of market from 2% in 1993.

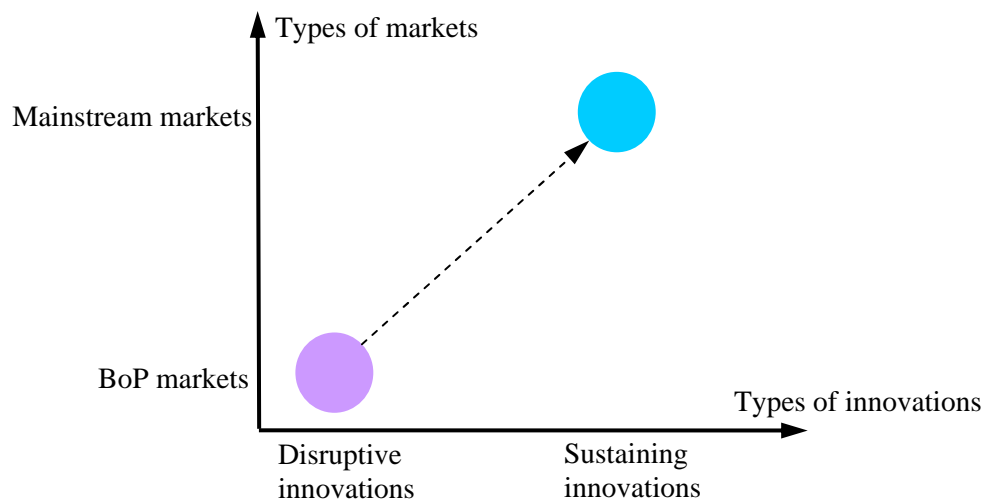


Figure 3 Types of innovations and markets

In order to successfully harness these abovementioned benefits of entering BoP markets with disruptive innovations, companies can follow the guidelines of Christensen [16] presented in Section 4.1.

In the deployment of disruptive innovations in BoP markets, companies can avoid the mistakes/failures (if any) in their mainstream markets, and companies' experience and knowledge regarding the design and development of products and services for their mainstream markets can play an important role in tackling those mistakes/failures. Companies can leapfrog to products and services that do not repeat the mistakes

(e.g. environmental mistakes) in their mainstream markets. Prahalad and Hart [1] state companies in developed countries excessively used natural resources and developed products that were extremely polluting. The USA, comprising 4% of the world's population, consumes about 25% of the planet's energy resources. It would be disastrous if similar consumption patterns are created in BoP markets [1]. Consider the following successful example of solar energy application in BoP markets which avoided the environmental mistakes in the developed countries. The Solar Electric Light Fund (SELF), a USA-based NGO, successfully adapted solar energy technology for BoP markets. The SELF used this technology and microcredit financing to supply electricity to the remote villages in Africa and Asia. This solar power helped the villagers to avoid the burning of hazardous materials such as kerosene, wood, dung, etc. The expenses associated with the transmission of electricity from central power stations to the places where it needs to be consumed are avoided by the SELF because it used on-site and small-scale power generation units. The villagers operate their solar power system crating jobs for themselves. The SELF has implemented projects in China, India, Sri Lanka, Nepal, Vietnam, Indonesia, etc.

Wu et al [18] explain a case study involving the use of disruptive technology in low-end markets. Personal Handyphone System (PHS) is an example of disruptive innovation successfully employed in the low-end markets of China. PHS combines the features of mobile phones and cordless phones, and it is a competency-destroyer for mobile operators. PHS has an operating-distance range of 1.5 km. In China, the first PHS service was introduced in 1998, and in 2008 the number of people using PHS reached 66.5 million. The success of PHS is attributed to the cheaper and simpler handsets and cheaper calls in contrast to mobile service (i.e. PHS has satisfied the important needs of the customers from low-end markets). The key issue, identified through this case study, is that the companies with disruptive innovations available with them need to identify or explore customers' needs that can be satisfied by adapting or adopting those innovations. This requires a proactive approach towards using disruptive innovation in contrast to reactive rejection of these innovations. In order to fulfill this approach, an experimental or exploratory strategy is useful.

In order to make profits in BoP markets, it is crucial to understand the needs of customers from these markets and issues specific to these markets. To address these needs and issues, there can be two broad approaches companies can follow, namely, market-pull and technology-push. In the case of market-pull approach, the first step is to understand BoP-customers' needs and issues in these markets. Companies then can select one of the following alternatives to address these needs and issues:

- searching for available innovations including disruptive innovations in technologies and business models, and appropriately adapting, adopting or integrating these innovations;
- devising new innovations; and
- combining the above two alternatives.

In the case of technology-push approach, companies' intention is to exploit innovations available with them. In this approach, companies ought to explore BoP customers' needs that can be satisfied with the available innovations (including disruptive innovations). This involves identifying the attributes of the products and services that can be developed using these available innovations; and then identifying the needs of customers that can be satisfied with those products and services. In essence, in the case of technology-push approach, the problem that companies need to solve is to identify appropriate markets. According to Danneels [19], companies fail to employ disruptive innovations when they lack the 'customer competence', which consists of resources necessary to serve certain customers. 'Customer competence' includes understanding of customers' needs, their buying process, communications and distribution channels to reach them, and so forth. The author refers to Christensen's [20] work. He states, "The failing incumbent described by Christensen lacked the market competence to establish the resources needed to address the market that initially was served by the disruptive technology. They lacked the skill to conduct research on a new market, to set up a new distribution and sales channel, to build a reputation in a different market, and so forth". Disruptive technologies require the development of a market or an expeditionary marketing approach [21]. Kassicieh et al [22] state "Disruptive technologies firms usually know that the markets have to be created from their work and that they do not exist prior to that work". In order to identify the factors differentiating the commercialization of disruptive and sustaining technologies,

Kassicieh et al [22] conducted a questionnaire-survey with two types of respondents working in areas, namely, disruptive technologies and sustaining technologies.

According to Danneels [19], disruptiveness of innovations depends on the perspective of a company. For example, an innovation, which has capability to pose a threat to the core activities and assets of a company focusing only on its mainstream markets, is disruptive for that company. In contrast, the same innovation can not be disruptive to that company or a different company if it employs that innovation in some markets to make profits. For instance, the Internet is a sustaining innovation for catalog retailers; whereas, it is disruptive for department stores. This shows that companies can nullify the disruptiveness of innovations if they use these innovations in appropriate markets, and BoP markets appear to be a potential subset of these markets.

Iyer et al [23] identify the risks involved in developing and commercializing disruptive innovations in emerging markets and particularly in India. For example, Pepsi's large distribution network turned into liabilities due to the lack of filtered water. This shows that to satisfy some need (e.g. a need of communication) in BoP markets using disruptive innovations, it is crucial to consider all the relevant issues (e.g. affordability, acceptability, availability, awareness, etc.) about that need. A company may not have all solutions required to address different issues regarding some need(s) in BoP markets. The available disruptive innovations in technology and/or business models can satisfy a subset of issues about some need(s) in BoP markets. Therefore, companies need to devise new solutions and/or need to search for appropriate existing solutions including sustaining innovations to address other relevant issues, which are not addressed by the available disruptive innovations. Varadarajan [24] presents some examples where companies have developed and commercialized products in developing country markets using sustaining innovations. For instance, single-use shampoo sachet for BoP market is derived from sustaining innovations. Different solutions can be generated for BoP markets by combining or integrating available disruptive innovations, newly devised solutions, and appropriate existing solutions including sustaining innovations. After selecting a final solution, its further development can be carried out.

6 SUMMARY, CONCLUSIONS AND FURTHER WORK

To summarise, based on the synthesis of the reviewed literature, we have shown that satisfying needs of customers from BoP markets requires companies to be radically innovative, and these markets appear to be suitable for disruptive innovations.

Designing, developing, marketing, and distributing products and service in BoP markets successfully demands addressing numerous issues specific to these markets. Some of the major issues identified are: 'affordability', 'stakeholder engagement', 'availability', 'awareness', and 'economic self-sustainability'. Innovations in design, marketing, distribution, etc. play an important role in addressing these different issues. Companies can gain several types of benefits by tapping into BoP markets; and employing disruptive innovations in these markets can provide additional benefits to these companies. Rather than reactively rejecting disruptive innovations, companies can harness these innovations in new markets, and BoP markets present a good opportunity as these 'new' markets.

Further work involves conducting in-depth analysis of case studies in different industries where companies have successfully employed disruptive innovations in BoP markets. This can help us to identify patterns (if any) in successful employment of disruptive innovations in BoP markets. It would also be worthwhile to study cases where companies have failed to deploy disruptive innovations in BoP markets.

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REFERENCES

1. Prahalad, C.K. and S.L. Hart, *The Fortune at the Bottom of the Pyramid*, in *strategy+business*. 2002.
2. BBC. *Firms 'ignore' \$5 trillion market*. 2007 [cited 2008 27 November]; Available from: <http://news.bbc.co.uk/2/hi/business/6467833.stm>.

3. Sharma, S. and S. Hart, *Base of the Pyramid: Predicting MNC entry and success*. Under review at the Journal of International Business Studies - retrieved from <http://pbotest9.kub.nl:7779/faculties/fsw/departments/os/research/colloquium/hart.pdf>.
4. Keating, C. and T. Schmidt, *Opportunities and challenges for multinational corporations at the base of the pyramid*, in *Sustainability Challenges and Solutions at the Base of the Pyramid*, P. Kandachar and M. Halme, Editors. 2008, Greenleaf Publishing Limited: Sheffield, UK.
5. Anderson, J. and C. Markides. *Strategic Innovation at the Base of the Economic Pyramid*. 2006 [cited 2008 21 November]; Available from: http://www.jamieandersononline.com/uploads/ANDERSON_MARKIDES_SI_at_Base_of_Economic_Pyramid_FINAL.pdf.
6. Reza, A.H.M.S., *The GP Community Information Centre: Helping the Poor through Technology*, in *Sustainability Challenges and Solutions at the Base of the Pyramid*, P. Kandachar and M. Halme, Editors. 2008, Greenleaf Publishing Limited: Sheffield, UK.
7. Richardson, B. and N. Callegary, WIZZIT: Mobile Banking for the Poor in South Africa, in *Sustainability Challenges and Solutions at the Base of the Pyramid*, P. Kandachar and M. Halme, Editors. 2008, Greenleaf Publishing Limited: Sheffield, UK.
8. Skarp, M., et al., Affordable Communication for Rural Communities, in *Sustainability Challenges and Solutions at the Base of the Pyramid*, P. Kandachar and M. Halme, Editors. 2008, Greenleaf Publishing Limited: Sheffield, UK.
9. Kandachar, P. and M. Halme, Farewell to pyramids: how can business and technology help to eradicate poverty?, in *Sustainability Challenges and Solutions at the Base of the Pyramid*, P. Kandachar and M. Halme, Editors. 2008, Greenleaf Publishing Limited: Sheffield, UK.
10. Bower, J.L. and C.M. Christensen, *Disruptive Technologies: Catching the Wave*, in *Harvard Business Review*. 1995.
11. Christensen, C.M., R. Bohmer, and J. Kenagy, Will disruptive innovations cure health care?, in *Harvard Business Review*. 2000.
12. Chan, S., Strategy Development for Anticipating and Handling a Disruptive Technology. *Journal of the American College of Radiology*, 2006. 3(10).
13. Yoffie, D.B. and M. Kwak, *The Browser Wars--1994-98*, in Boston Harvard Business School Press. 1998.
14. McGahan, A.M., *How industries evolve: principles for achieving and sustaining superior performance*. 2004, Boston: Harvard Business School Press.
15. Christensen, C., T. Craig, and S. Hart, *The Great Disruption*, in *FOREIGN AFFAIRS*. 2001.
16. Christensen, C.M., *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. 1997: Harvard Business School Press.
17. Economist, T. http://www.economist.com/business/PrinterFriendly.cfm?story_id=12637160. 2008 [cited 2008 25 November].
18. Wu, X.B., W. Zhang, and R.F. Ma, *Disruptive Innovation in Developing Countries: The Case of China*, in *IEEE International Engineering Management Conference (IEMC'05)*. 2005.
19. Danneels, E., *Disruptive technology reconsidered: a critique and research agenda*. *Journal of Product Innovation Management*, 2004. 21(4): p. 246-258.
20. Christensen, C.M., *The Innovator's Dilemma. When New Technologies Cause Great Firms to Fail*. 2000, Boston, MA: Harvard Business School Press.
21. Prahalad, C.K. and G. Hamel, *Competing for the Fortune*. 1994, Boston: MA: Harvard Business School Press.
22. Kassicieh, S.K., et al., Factors differentiating the commercialization of disruptive and sustaining technologies, in *IEEE Transactions on Engineering Management*. 2002.
23. Iyer, G.R., P.J. LaPlaca, and A. Sharma, Innovation and new product introductions in emerging markets: Strategic recommendations for the Indian market. *Industrial Marketing Management*, 2006. 35(3): p. 373-382.
24. Varadarajan, R., Fortune at the bottom of the innovation pyramid: The strategic logic of incremental innovations. *Business Horizons*, 2009. 52(1): p. 21-29.

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