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Understanding Disruptive Innovation at the Bottom of the Pyramid

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Abstract:

Disruptive innovations by their nature, induces a reshuffling of the position of companies within their industry while the bottom of the pyramid typifies the emerging and developing economies of the world. An observable similarity between the characteristics of disruptive innovation and the attributes of the bottom of the pyramid (BOP) prompts a logical question - can disruptive innovations occurring at the BOP impact the esteemed position of today's top companies? With the aid of an agent-based model (ABM) simulation, this paper examines different scenarios of the occurrence of disruptive innovations at the top of the pyramid (TOP) and the BOP. The paper further, examines the associated impact and effect of such occurrence on the future sustainability of today's companies and highlights some vulnerability that managers need pay attention too.

Keywords: Disruptive Innovation; Emerging Economies; Bottom of the Pyramid; BOP; Sustainability; Competitive Advantage.

1 Introduction

Enterprises leading in their industry in terms of market share, profits share and many other indicators of a successful business have found themselves dramatically losing that position and in many extreme cases, these companies have ceased to exist – this scenario typifies the concept of disruptive innovations (Christensen and Overdorf 2010). This companies are usually not being disrupted because they lack good management practice or because they are deficient technically. On the contrary most of the leading companies that have falling foul of disruptive innovation usually possess both the technological know-how and good management qualifications - but yet they still get disrupted (Christensen 1997). This leads logically to the question – why?

According to Christensen (1997) it is easy to ignore innovations with disruptive tendencies with seemingly valid reasons. This is particularly so when a budding disruptive innovation is evaluated through the lens of traditional management decision models. These models are in themselves valuable business tools, however these same tools and approaches may be the veil that informs the decision to ignore disruptive innovations until it is oftentimes too late. Secondly, from the initial conceptualization of

disruptive innovation, these innovations are usually simple, cheaper and encroach the market of a leading company from the low end (Baiyere 2013, Christensen 2006).

In a parallel view, a close observation of the concept of the Bottom of the Pyramid (BOP) show similar attributes as ascribed to the concept of disruptive innovation. Firstly, the BOP market is generally not considered by many organizations as a profitable market sector – hence it is usually ignored by many (Prahalad & Hart 2002) for reasons that could make logical financial sense. Similarly, BOP when viewed in terms of the income versus population pyramid as illustrated by Prahalad (2005) as been characterized by certain misconceptions. The BOP in that sense is seen to typically describe a group with lesser resources and who are mostly interested in or mainly in need of basic and simple innovations without the bells and whistles.

When positioned side by side these vivid similarities between both concepts leaves room to ponder on what relationship there may be between these two theories. This paper is thus positioned to investigate the following questions: With these similarities can the BOP indeed stimulate disruptive innovations? Secondly, should a disruptive Innovation spring from the BOP, what is the perception of the managers of todays' leading companies - would they ignore it or be prepared to respond? And why really are disruptive innovations ignored?

2 Methodology

This paper is a result of a three stage research process. Firstly the study required a prior analysis and review of existing literatures on these two disparate domains. In addition to reviewing materials from the academic domain, publicly available literature where sought to get a richer perspective and depth into the practical and historical positioning of the two concepts being studied (Okoli & Schabram 2010). Secondly, a semi–structured research interview was conducted to investigate the views and perspectives of managers on this issue. Lastly for validation of the emerging information and results from both the review and interview, an agent based model simulation was created.

Interviews

The sample for the interview was drawn from companies that were among the leaders in their respective industries. These are mostly multinational companies with presence in several parts of the world. Thirteen Research and Innovation Managers/Management executives were interviewed for this research from all the organizations researched. All the respondents are in a position of authority mostly in the European division (or larger) regardless of the home country of the company. This group of people were selected because of their role in the decision making of the innovation process and/or their role in strategically deciding on the response option to a competitive threatening innovation. Table 1 summarises the distribution of the participants by industry.

The interview question where grouped into four themes with each theme aimed at elucidating a specific points through a number of preselected questions and based on the response received from the participants. The themes and their specific purpose are highlighted below:

Theme 1: Background & General innovation concept: The aim of theme was to know what perspective the interviewee had with regards to innovation and his/her

connection to BOP. For example, is the interviewee a manager making innovation decision or is he/she involved in the actual innovation process? This helps in the channelling of the appropriate semi-structured questions to the interviews. *How would you describe innovation & innovation drivers?* The set of questions under this subcategory, helped to understand the perspective of the interviewee with regards to goal, vision, his organization's strategy towards innovation and his/her own background.

Theme 2: Market Focus - Market Classification: This theme was structured to understand what market sector they presently serve – either BOP or TOP (top of the pyramid) or others. *Bottom of the Pyramid* - The knowledge of the interviewee is sampled with respect to the concept of BOP. *BOP Potentials.* From the perspective of the individual respondent, the weight of value he/she places on the potentials of BOP for the organization is observed here. Subsequent questions prod further to clarify the interviewees' position on this. *BOP Innovations.* To build up on the previous subcategory, the opinion of the interviewee as to the possibility of BOP innovations moving up to the TOP is examined.

Theme 3: Disruptive Innovations (DI): At this point the aim is to evaluate the respondent's knowledge of the DI concept. Additionally Christensen's (2001) theory of DI is tested to see there stand on this. Their opinions on why a DI maybe ignored is also sampled. *DI from BOP (DIBOP)* - The question here is directly tested on the respondents to figure out their views about DIBOP. *Remedies* - Suggestions and recommendations to deal with the occurrence of DI were gathered with the questions in this subsection.

Theme 4: Trends and DI Scenario tests: Interviewees were presented with different scenarios and trends and where asked to provide their opinion about them. The scenarios given include:

- VOIP in the telecommunications industry (e.g. T-Mobile)
- Alternative energy to the oil & gas industry (e.g. Shell)
- Mobile payments for the card payment industry (e.g. MasterCard)
- Remote Digital Banking for the brick and mortar banking (e.g. ABN AMRO)
- Internet of things for the mobile device industry (e.g. Nokia)
- Cloud computing for the software industry (e.g. SAP)

Table 1 Interview Participants by Industry

Industry	*Number of respondents*
Telecommunications	1
Mobile Devices	1
ERP	1
Oil & Gas	1
Banking and Finance	2
Consultancy & Services	4
Innovation, Designs & Products	3
Total	**13**

Agent Based Model (ABM) Simulation

A simulation model was designed using the agent based modelling approach. Doing an ABM simulation enables us to test the outcome of the research interviews based on the supporting theories and principles found from literature review.

The concept of agents corresponds properly with other modeling options because each discrete organization in the simulation can be directly represented as an agent. Behaviors can be coded into agents such that each acts in the expected way as the entity they are representing. The interesting result is that when a number of agents are simulated as a group, behaviors often appear that were never explicitly programmed into the agents; these interesting occurrences are known as emergent phenomenon. (Lansdowne, 2006, Macal & North 2006). ABM is a modeling method which enables representation of individual attributes and cognitive process, which through mathematical or statistical methods cannot typically be entirely attained (Andrade 2010). ABM enhances our understanding of human behavior and other social parameters (Bousquet & Le Page, 2004 and Arthur, 2006).

NetLogo an ABM modeling software by Northwestern University (Wilensky, 1999) was used for designing and developing the simulation. NetLogo is appropriate for the simulation of complex systems which are evolving over time. In Netlogo instructions can be given to hundreds or thousands of agents and yet they still possess the functionality to operate independently. This makes it possible to explore the connection between the micro-level behavior of individuals and the macro-level patterns that emerge from the interaction of many individuals. (Wilensky, 1999).

In the DIBOP[1] simulation designed for this research, there are three agents as shown in figure 1. The New Entrant represents a company that just enters a market with an innovation in contrast to an existing company which has been present in a market prior to the new entrant. The disrupter is a possible status that either the new company or the existing company can achieve.

Figure 1 Agents in the simulation

Based on the entrepreneurial survival theory (Frankish et al. 2007, Foss et al. 1998 and Reynolds 1997), there are three possible paths for any new entrant (Utterback 1993). These are i) it dies. ii) it survives and grows traditionally into another regular existing company or iii) it become a disrupter and then becomes an existing company itself. These agents are distributed between two environemnts – TOP and BOP. The TOP corresponds to the smaller portion of the total environment while the BOP occupies a larger area in accordance with Prahalad and Lieberthal's (2008) estimation of the relative size of the BOP (Hart and Christensen 2002). The simulation is controlled by parameters using a sliding interphase (see figure 2) with which a user can experiment with different

[1]Due to limitations of allowed space, further details about the DIBOP simulation can be provided on request.

scenarios. Energy as depicted in figure one is a measure of the capacity of a company to withstand disruption. This builds on the concept of Disruptive Innovation and the Innovation Diffusion Theory (Rogers 1962, 1983, Tidd & Bessant 2009). This is visually illustrated in the simulation by a decrease or increase in size of the existing company or entrant. The higher the energy level of a company, the bigger the visualization of the company size and vice versa (see figure 3). The Individual energy levels of each company or agent is randomly affected by the whole system status in addition to the constraints of the environment TOP/BOP.

Figure 2 Control Parameters for DIBOP Simulation.

The key scenarios that were simulated for this research are highlighted below:

Case 1 - Control Environment Simulation: This depicts an initial control simulation where it is assumed that there are no new entrants in the system and no disruptive innovation occurs. This gives a reference to the performance of the system with all things remaining same.

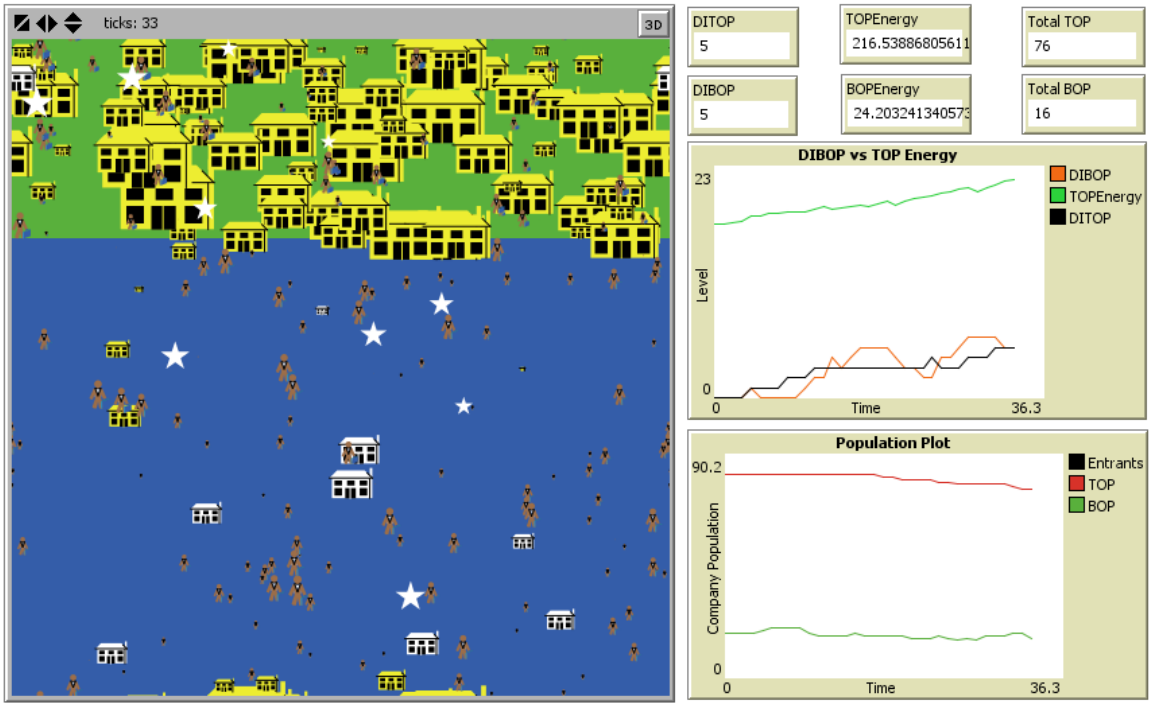

Figure 3 DIBOP simulation showing agents in the environment and the graph views.

Case 2 - New Entrants Simulation: In this simulation, new entrants are introduced to the system but no disruptive innovation takes place which implies no disruption takes place in the system. This gives an indication of how a system would likely operate when there is an influx of new entrants but no disruption exists in the system.

Case 3 - Simulating with Disrupters: This is the next simulation scenario where disruption is allowed to take place in the system (see figure 3). In this simulation, the effect of disruption on a system can be identified and the intensity can be controlled to see different effects on the system.

Case 4 - Simulating with a Double Disruption Rate: This simulation case is aimed at demonstrating the effect of an increase in the rate of disruption in a system. This demonstrates the power and danger of a high level of disruption in a system.

Each simulation case had specific objectives it is aimed at evaluating. Each simulation case was conducted at a tick of 500 and the simulation run was executed for a 100 times. Observations of each case are documented and the dominant occurring pattern are identified and analyzed for both practical and theoretical relevance.

3. Results and Discussions

Practitioners View

One apparent observation that was clear from the interviews, is that most of the managers acknowledge the possibility (albeit remote possibility) that disruptive innovation can indeed occur from the bottom of the pyramid. To use the words of one of the respondents – he considered the occurrence of true and tangible disruptive innovation occurring at BOP to be a *theoretical possibility at present*. Particularly giving the enormous constraints there are to a BOP innovation breaking into the global market among many other limiting factors. In essence the occurrence of DIBOP as seen by most managers is a very distant event. It is perceived as a detached event, more like an event that you read of in the newspapers and certainly not something that happens to you.

Another respondent puts view it in this way –

> "Our business model is business to business (B2B), so the threat of a disruptive innovation challenging our business is not likely to be from the BOP".

This suggests that there are specific types of innovation or market segments that innovations from the BOP can target. Similarly, another respondents opinion to why DIBOP is not an imminent threat was because they operate in the service sector and not in the products industry. Again, this suggests that disruptive innovation is generally limited to products innovation and service innovation is not a core area of strength attributed to BOP. Arguably these are tenable and credible justifications. However could these mind-sets also be a blind spot? Could these reasons prevent the foresight/activity required to spot a potential disruption before it disrupts?

Another striking dimension that was observed from the interview is the difference in the perspective of the respondents depending on their level of exposure to the BOP regions. Respondents that have lived or worked in areas considered to be developing

countries tend to more strongly convey the possibility of a DIBOP occurring while respondents that have mostly lived in regions that could be tagged TOP are less emphatic about the possibility of a DIBOP occurring or being a tangible threat. To quote one of the respondents who admits not to be very familiar with the BOP –

> "I believe innovation can occur from very unlikely places, so yes innovations can come from BOP but the needs are different and innovations for BOP market is more about survival."

From the company perspective, a respondent puts it this way:

> "It does not make sense for [XYZ Company] to invest in a product that returns millions in revenue… that is insignificant [to the company] because the growth projection is in hundreds of millions".

Herein lays a classic reason why many companies would ignore a potential disruptive innovation and lose the chance, positioning and timing to respond appropriately.

Pointers from DIBOP Simulation

Building on the inputs, suggestions and insights gathered from the interview and from extant literature, the simulation is aimed at enhancing and validating the knowledge acquired in this research. All the four simulation cases provide very unique insights to the possible interactions between BOP and disruptive innovations. The first two cases are more of a reliability tests.

Case 1 which is a case without disruption or influx of new entrants models reality very closely. In this case the simulation demonstrated that even in the absence of disruption plus absence of new entrants, *companies at the early stage usually do not have enough energy to sustain themselves and survive*. On the other hand companies that survive this early stage, have a higher chance of growing to a significant size, such that regardless of occasional decrease in size which may occur, they always have enough energy to sustain themselves and recover. A phenomenon that is analogous to the concept of crossing the chasm (Moore 2002).

Of worthy note is the case 3 where disrupters and new entrants have been introduced into the system. The observation from closely monitoring the energy plot (see figure 3 & 4) revealed a change in direction of the energy plot with a sharp change in the position of either the DIBOP/DITOP values. For instance, when the DIBOP/DITOP shoots up, a downward tilt will be noticed in the flow of the energy plot. Also, whenever both the DIBOP & DITOP plots are both low the energy plot indicates an upward spike. This behavior can also be studied with the DIBOP, DITOP and TOP Energy monitor (see figure 4) which displays this pattern in numbers. *In essence it did not matter which of the regions had a higher number of disruptions.*

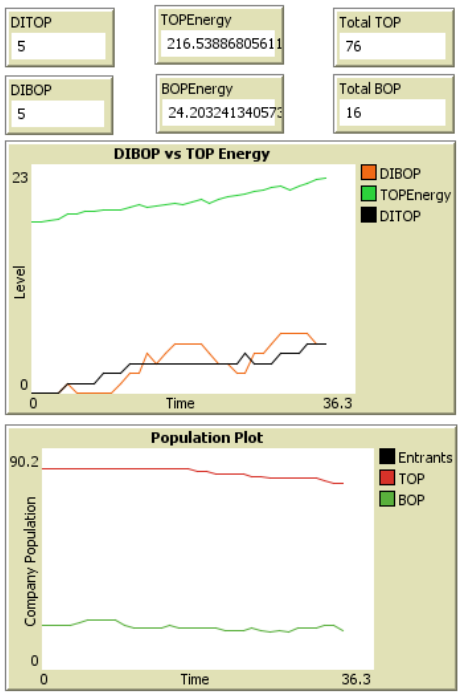

Figure 4 Relationship between DIBOP-DITOP and the Energy level (scaled by 10%)

This demonstrates that the impact of the occurrence of a disrupter can be felt by companies at the TOP and BOP regardless of which region the disruption occurs. Whether the disrupter occurs at TOP or BOP is irrelevant in terms of where it will have an impact. It can therefore be logically deduced that the limit to the extent of the reach of a disruptive innovation is not its geography but it can be limited by the extent of the industry(ies) that it actually disrupts. This observation leads us to a proposition.

Proposition 1: The impact of a Disruptive Innovation is independent of its region of occurrence, but is limited by the spread of the industry it disrupts.

Why are Disruptive Innovations ignored?

Considering the profound and extreme impact that a company may be challenged with in the face of disruptive innovation, why then is there the tendency for leading and even well managed companies to ignore such innovations when it is in its early stage? In fact the key component that enables some innovations to grow enough to unleash their disruptive potential is because they were not considered worthy of the attention and resources of the incumbent company. From the literature review and response of the interviewees, the following four points have been identified as some of the reasons why these companies did not consider the innovation as a threat from the beginning. These points are tagged with the acronym CLIF - *Customers, Leadership, Innovators and Finance.*

The mystery of listening to *Customers*: This statement attributed to Henry Ford - "*If I had asked what people wanted, they would have asked for faster horses – not cars"* is a

typical illustration of this point. Firstly, it is important to note that *listening to customers is an important strategy* (Christensen 2006) that will among many other positive things also enable companies to come up with sustaining innovations and survive daily competition. On the other hand, this same strategy could blind them from appreciating innovations with disruptive tendencies (Christensen 1997). For instance, customers of the mainframe companies will logically ask for faster computers with greater storage capacities. Minicomputers/PCs that disrupted the mainframes on the other hand, could only offer lesser speed, lesser memory and lesser reliability. It thus makes no logical sense for mainframe companies to consider minicomputers/PCs as a threat because it does not satisfy the needs of their mainstream customers.

Short term *Leadership* goals: The leadership and management of a company plays a key role in charting its future. Concurrently, they are responsible for maintaining continuous growth and remaining profitable. Next to these, on an individual level, the top executives are also interested in keeping their jobs. This therefore implies that they have a strong driving motivation to satisfy shareholders with impressive status reports from year to year. According to one of the interview respondent, being in this position logically leads the company leadership to focus more on short term wins. In the advent of a disruptive innovation, even if such innovations are spotted well in advance, if there contribution to the current growth trajectory of the company is insignificant, the tendency that they would be discarded in favour of faster or higher return sustaining innovations, is high. These have led to many organizations ignoring early signals of potentially disruptive innovations at their detriment.

Emotional attachment of *Innovators:* When disruptive innovations occur, they usually require a change in thinking. This is because when an innovation becomes disruptive, it can render obsolete all the once critical and valuable knowledge accumulated by a company over years. Such sudden and severe overhaul of existing mind-sets is usually a challenge for innovators in some industries. Innovators/researchers that have immersed themselves in particular research path, in which they have accumulated a wealth of experience, usually get emotionally attached with their previous creations that they are not eager to embrace such ground changing innovations. These could lead to the tendency for disruptive innovations to thrive without any targeted response from the company being disrupted. Although the company may have all the resources and technical knowledge to respond appropriately and on time, this internal dynamics within the organisations research group could be the hindrance that eventually leads to the threat being ignored. For example, Kodak had extensive knowledge about the film photography and at same time, Kodak championed the development of digital imaging (Lucas & Goh 2009). However, they still missed the opportunity to position themselves in the forefront of the digital camera business that eventually disrupted them and rendered the wealth of knowledge they have painstakingly gathered to become practically redundant in the new market that emerged.

The pit of *Financial* Projections: Lastly, but by no means the least potent – financial projections could probably be one that underscores many of the decisions to ignore a potential disruptive innovation. The basic principle of finance teaches us to invest in projects that have measurable and positive payback. Looking at the example of the mainframe vs. PC given above, it apparently makes no financial sense to invest in PCs over mainframe since the profit margin on a single mainframe surpasses the profit of several PCs combined together. Another classic example is the case of Skype and the

telecom giants (Thomann 2006). It makes no logical or financial sense for AT&T, KPN or Vodafone to invest in a Skype like innovation. Why? Because Skype was free!

It thus becomes apparent that organizations can very easily always find valid reasons to ignore disruptive innovations. This extends back to the discussion of the observable similarities between the disruptive innovation concept and the bottom of the pyramid.

Reconceptualising BOP

BOP can imply different things to different audiences, depending on the context in which the term is used. In this section and for the purpose of consistency, the term BOP will be further clarified. Considering BOP on a *global scale*, the traditional definition of Prahalad & Hart (2002) that is typically used to describe BOP falls under this category.

If we however look at a particular *region or country context*, we would identify the possibility to view the whole region as a pyramid with a group logically becoming the BOP and another the TOP of that pyramid. For example if we consider Europe as a pyramid, we would then include the students, unemployed folks and others as the low income earners in that pyramid, while the CEOs are the TOP of that pyramid.

On the other hand, as observed from the interview discussions, a company's activities may not connect directly with individuals but rather via organisations through the B2B arrangements. This suggests that there can be a pyramidal perspective on this arrangement. This is such that in the *business to business context*, the top companies like the fortune 500 could be the TOP while the numerous SMEs can be the BOP.

The importance of this conceptualization helps organizations rethink the positioning of the BOP construct such that it is not seen primarily as a construct for charity (Prahalad & Hamond 2002) but as a construct that could potential shape business decisions. For instance, a company like Ryanair is making impressive progress and competing successfully against well-established airlines in Europe as a low cost airline (O'Leary 2010). It is achieving this by positioning its offerings primarily at what could be considered as the BOP of the European market – students and low income earners. If evaluated from this perspective, organisations can more readily see other BOP's in their context that they may have been ignoring. Similarly, fast growing emerging economies like BRICS would then be more readily put into an appropriate BOP context and not lumped together under the global context of BOP (Johnson & Hart 2004). These should enable practitioners to position and identify a potential disruptive BOP threats to their specific industry through their own lens.

4. In Conclusion

This paper presents a research work studying the inter-relationship between disruptive innovation and the bottom of the pyramid. With the aid of interviews and an agent based modelling simulation, the paper pointed out vulnerabilities that managers in the TOP may overlook potentially disruptive innovations that emerge from the BOP. In addition it was also demonstrated that should a disruptive innovation occur from the BOP, the impact can be intense however, the extent of the impact is not necessarily dependent on the region of occurrence of the disruption, if it is truly a disruptive innovation.

Furthermore, an analysis of why disruptive innovations are ignored is built up from the research interview and findings from literature. From this analysis the acronym CLIF – *Customer, Leadership, Innovators and Finance*, was advance to advance some key reasons why disruptive innovations are ignored despite their extreme consequence. Lastly, the paper reconceptualise the term BOP. The term BOP can be viewed from different perspectives – the global context, the regional context and the business-to-business context.

In summary this paper provided answers to the questions - With the similarities observed between disruptive innovation and BOP, can the BOP indeed stimulate disruptive innovations? Secondly, should a disruptive Innovation emerge from the BOP, what is the perception of the managers of todays' leading companies - would they ignore it or be prepared to respond? And why really are disruptive innovations ignored?

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