A unified innovation approach to emerging markets: imperatives to play and win the game
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Abstract

Previous research shows a plethora of overlapping and interrelated innovation approaches to understand the bottom of the pyramid customer needs and markets specifications. This research attempts to (1) identify the key factors that make a product relevant to be considered as an innovation for emerging markets (2) and establish relative importance of key factors for product managers while conceptualizing a new product for emerging markets. In the first part, the study assembles the list of characteristics from the selected innovation theories revolving around emerging markets. Subsequently the identified characteristics are clustered into eight key factors using semantic similarities scores and Ward’s clustering method. An analytical hierarchy process method is employed to obtain the priorities of these eight key factors. The study concludes with a Unified Innovation Framework which presents the overarching innovation approach for emerging markets and provides a common definition for a product considered relevant for emerging market. The results show high prioritization given to cost effective, easy to use and problem centric as compared to the sustainability, no-frills, resourceful, breakthrough and fast-to-market factors by product managers. However, the paper acknowledges that the prioritization results are subject to change given different motivation behind the various theories. Finally the paper proposes that, the eight key factors required factors to “play in” emerging markets would not change, but factors to “win in” can change based on other aspects such as sector, motivation, innovation flows and government policies.

Key words:

Innovation, Bottom of the pyramid, Emerging markets, Frugal, Unified

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Introduction

Almost a decade ago Prahlad (2004) introduced the term “Bottom of the pyramid” (BOP) referring to 4 billion people who earn less than $2000 per year and suggested significant potential financial benefit of developing products and services for BOP.

Since then, multinational companies are increasingly focusing on emerging economies, allured by the promises of the large potential customer base in these countries. As a consequence there has been a plethora of academic research (Prahalad and Mashelkar, 2010; Zeschky, Widenmayer and Gassmann, 2011; Govindarajan and Trimble, 2012; Radjou, Prabhu and Ahuja, 2012; Agarwal and Brem, 2012; Brem and Wolfram, 2014; Rao, 2013; Corsi and Minin, 2014; von Zedtwitz et al., 2015) to understand the various product development and innovation initiatives adopted by these multinationals to play and subsequently win in these attractive markets.

Literature clearly shows that in the last few years there was a gradual shift in the strategy models (Govindarajan and Trimble, 2012; Prahalad and Mashelkar, 2010) from the “Globalization” or “One – size fit all” approach to “Glocalization” or adapting global product to local needs (for example by de-featuring and lowering price) (Corsi and Minin, 2014). However, when glocalization did not lead to the desired results, companies started “localizing” their complete value chain including R&D in these regions. This included setting research and development (R&D) centers in these emerging economies and hiring local talent (Agarwal and Brem, 2012). For this “localizing” strategy, several innovation theories have since been introduced to develop products that lure the BOP customers such as frugal innovation (Zeschky, Widenmayer and Gassmann, 2011), Jugaad (Radjou, Prabhu and Ahuja, 2012), Grassroot innovation (Gupta, 2013), Catalytic innovation (Munshi, 2010), Indigenous innovation (Lazonick, 2004) Gandhian innovation (Prahalad and Mashelkar, 2010). Apart from these approaches there are more that revolve around emerging markets and do explain the similar and overlapping characteristics (von Zedtwitz et al., 2015).

The similarity of these innovation approaches is evident due to the same target customer segment (Brem and Wolfram, 2014; Rao, 2013). All of these theories focus on the unique needs of the underserved customer segment which are often not fulfilled by the mature world products. Although, there are distinctions between these theories due to the different motivations (Rao, 2013), the resultant characteristics suggested to approach the underserved customers are comparable. For example Jugaad is a timely “workaround” which looks for a cheap, timely and creative solution and ends up in a radical/frugal innovation. Disruptive innovation starts with lowering the features, enhancing ease of use, and ends up in lower costs. Frugal innovation starts with a low-cost motivation and ends up with lesser features and ease of use (Rao, 2013; Govindarajan, 2012). Gandhian and catalytic innovations originate from a social motive to develop simple and sustainable products that are affordable by the local consumers. Hence, even though the motivations behind these innovation strategies are different, the resultant product characteristics are similar: affordable, timely, flexible, portable, sustainable, accessible, radical.
and customer-centric products. This paper investigates the most frequently used innovation approaches used in context of emerging markets and explain them individually in the following section.

**Terminologies for product innovation in emerging markets**

From the plethora of related terminologies, this paper selects and presents a brief description of the most frequently used innovation approaches for new product development in emerging markets. The selection is based on two recent articles which focus on the differentiation of emerging market terms (Brem and Wolfram, 2014, von Zedtwitz et al., 2015).

**Jugaad**

Jugaad is a fast, creative and improvised way of solving problems in a resource constrained environment at a lower cost. It is an Indian word which means “Workaround” or “innovative-fix”. It is frequently used to refer to the make shift solutions in Northern parts of India (Rao, 2013) such as using a water pump like an engine in a daily transport vehicle. But this resourceful and clever approach does have a connotation of compromising on quality (Prahalad and Mashelkar, 2010). Jugaad is an inherently imaginative and customer oriented approach which lacks a structured approach and is far from technology or product focused approach (Kingsnorth et al., 2011; Lacy 2011). It aims at overcoming harsh environment constraints by developing an effective solution using limited resources and by adopting a frugal and flexible approach (Radjou, Prabhu and Ahuja, 2012). This approach in itself is radical in nature (Prahalad and Mashelkar, 2010).

**Disruptive Innovation**

Hart and Christensen (2002) discussed disruptive innovations originating from emerging economies. These were simple, cheap, small and easy to use products or services that cater to the need of the unserved or underserved market (Christensen 1997; Christensen et al. 2006). These products have the potential to disrupt the existing markets with their good-enough offerings which may have lower performance but provide valuable features to attract bottom of the pyramid (Govindarajan and Kopalle, 2006b). With a high focus on affordability and acceptability, these innovations might have lower gross margins and smaller target segment but gradually has the potential to increase revenue by developing an altogether new market (Rao, 2013; Ray and Ray, 2011).

**Frugal Innovation**

Frugal innovation is an approach to develop “good-enough,” affordable products that suffice the needs of resource constrained consumers (Zeschky, Widenmayer and Gassmann, 2011). The Economist has defined frugal innovations as low cost, robust and resource constrained products/services with thin margins (Economist 2010a). Frugal innovation follows certain processes, product management methodologies and structures in the innovation approaches which Jugaad lacks (Lacy, 2011; Prahalad and Mashelkar, 2010). It is not just de-features the
existing expensive products nor is it arbitrage of the labour cost or using inferior material to lower costs but it is a clean slate approach of building an affordable solution from scratch. These products are cost effective, simple, basic, compact, easy to use and may use cutting edge technology if necessary to lower the price (Rao, 2013). It works with a bottom–up approach to innovation (Gupta; 2012) as opposed to the top-down, sophisticated, R&D led development process followed in the western world (Bhatti, 2012). Affordability, availability, accessibility, usability and creating customer awareness are critical characteristics of frugal innovations (Prahalad, 2012; Varadarajan, 2011) which are specifically designed for low income market segments (Nunes and Breens, 2011; Agarwal and Brem, 2012).

**Frugal Engineering or Constraint based innovations**

Carlos Goshn, the Chairman and CEO of Renault S.A., coined the term Frugal Engineering to describe the competency of Indian engineers in innovating cost effective products, quickly and in a resource constrained environment (Kumar and Puranam, 2012; Rajdou and Prabhu, 2013). Frugal engineering or constraint-based innovation focuses on awareness and a cognitive approach in developing new products, services, and businesses in constrictive conditions (Sharma and Gopalkrishnan, 2012). The six underlying principles of frugal engineering are robustness, portability, de-featuring, leapfrog technology, mega-scale production and service ecosystems (Kumar and Puranam, 2012). This approach targets growing middle class consumers in India, China, Brazil and other developing nations and hence focuses on understanding the unique needs of emerging market-customers which are not addressed by mature-market products.

**Reverse Innovation**

Reverse innovation is commercializing frugal innovations in the advanced countries (Govindarajan, 2012, Nunes and Breens, 2011, Agarwal and Brem, 2012). The target segment for this innovation is the low income consumer group of developed countries which are completely ignored by the multi nationals because of their small volume (Govindarajan, 2012). Reverse innovation is creating a new market for frugal product in developed economies by adapting or modifying the good-enough products originating from emerging economies (Nunes and Breens, 2011, Agarwal and Brem, 2012). Because of same product orientation but different target customer both reverse and frugal innovation share similar characteristics.

**Gandhian Innovation**

Gandhian innovation also addresses affordable product development for the bottom of the pyramid (Mashelkar and Sridhar, 2008). These innovations can be of three types. Firstly disrupting business models wherein developing market firms take advantage of Western technologies to adapt and create improved business quality process that can offer services at a lower cost. For example, the outsourcing model followed by the Indian IT businesses. Second is modifying organizational capabilities by creating or sourcing new capabilities; developing new technologies either on their own or by collaborating with Western partners such as Tata Motors cooperates with numerous technologically advanced companies (Bosch, Johnson Controls, Toyo, Behr, etc.) to develop the appropriate components for their Tata Nano product. And the third is
modifying organizational capabilities by altering internal capabilities. Fast deployment, design skills and large scale production to get advanced products using existing technologies. For example, in 2007, Computational Research Laboratories (CRL) developed the fourth-fastest computer in the world at a cost reduction of more than 20% compared to other supercomputers, by designing a holistic new design and using off-the-shelf technology (Prahalad and Mashelkar, 2010).

Grassroot Innovation
Grassroot innovations originate from the local low income community who are both the consumers and inventors (Heeks, 2012) of these innovations. The local inventors are connected through social or technical networks to develop ecologically and socially acceptable products and services. Grassroot initiatives focus on “green” and sustainable aspects. Seyfang and Smith (2007) explain that these innovations “operate in civil society arenas and involve committed activists experimenting with social innovations as well as using greener technologies”. The motivations behind this civil-society-based, value based, social and affordable innovation are community led initiatives (Seyfang and Haxeltine, 2012) to develop new and sustainable solutions (Smith et al., 2014).

Catalytic Innovation
Catalytic innovations are a subset of disruptive innovation with high emphasize on social change, scalability and sustainability (Christensen et al., 2006; Munshi, 2010). This innovation approach pushes social change by adapting to economies of scale. Catalytic innovations as discussed in literature are simple, good enough and affordable that targets either the over-served (because the existing solution is more complex than many people require) or under-served markets. They often work towards generating resources through grants, donations or intellectual capital which are ignored by existing players (Christensen et al., 2006).

Indigenous Innovation
Indigenous innovation is adoption of Western world know-how to improve and develop in house research and development capabilities in developing world (Brem, 2008; Chen et al., 2006). These innovations originated from the spillovers of increased technology transfer and diffusion happened due to localization efforts of multinational companies (Fu and Gong, 2011).

All the above terminologies describe innovation in –for –from emerging markets and their evident overlap often leads to terminology confusion (von Zedtwitz et al.,2015). As the emerging markets shift from being the consumption center to innovation hubs it is critical to conceptualize the product development value chain that can integrate these innovation theories (Sarkar, 2011). There is a lack of knowledge on how these overlapping theories together translate into the new product decision process. A logical need for consolidation of approaches into a unified framework is experienced. Consolidation that can bring clarity on the key characteristics to be followed while developing a product for BOP customers like Prahlad (2012) suggested the 4A’s model in a similar direction which claims four main aspects of awareness, access, affordability,
and availability that can be utilized to develop innovative products for BOP consumers. Moreover there is also a lack of empirical research done in this context; most of the researches till now have been exploratory and qualitative in nature. This paper is an attempt to consolidate the innovation approaches by adopting an innovative approach to empirically analyze the key characteristics and develop a unified framework. To complement the theoretical base to the practical world paper also uses GE Healthcare as a case study example to validate the findings. GE Healthcare is an appropriate and well-known case example of product innovation for emerging markets because of their strong focus and specific initiatives to tap Healthcare market in developing markets. One of such initiatives is “Healthymagination”, specifically targeted towards the BOP consumers and already has 68 special products under its portfolio.

In the next section the main two research questions that guided this research project are formalized and in the subsequent section the design and findings of each of the research question are explained. This paper follows the structure of Moenaert et al., 2010, who did similar research to identify the factors that influence strategic decision making and established their relative importance in the context of new product development. In the final section, the results are discussed with their implications and limitations.

**Research Questions**

As discussed, the various innovation strategies for emerging markets may have originated due to different motivating factors, but they are overlapping and quite similar in nature (Rao, 2013). The fact that they are targeting the same bottom-of-the-pyramid customer base implies similar characteristics of the resulting products and processes. However, as yet there is no framework which reflects the insights of all these individual theories and filters out the major attributes to be considered for new product development. This leads us to the first research question (RQ):

RQ1: What are the key factors that make a product relevant to be considered as an innovation for emerging markets?

In-spite of the growing popularity of this topic, the existing literature is limited to qualitative and exploratory studies based on company best practices and strategies (Cunha et al., 2013). These studies discuss the different features necessary for products developed in emerging markets and explain these features in detail. However, they miss on the question of hierarchy of these features in the product decision process. Manufacturing an easy-to-use or compact solution might require sophisticated technology which can be expensive; the likelihood for a “go” decision of such a product can thus be an interesting question for both academic and managerial purposes. The question of which factor prevails is critical and hence leads to the second research question:

RQ2: What is the relative importance of these key factors given by product managers when designing a product for BOP customers?
To answer these research questions, study used the methodology shown in Figure 1.

Figure 1: Methodology

In the subsequent sections methodology design and findings for each of the research questions are discussed individually.

**RQ1: Identification of key factors**

**Design**

The first research question involves identifying the key factors that make a product relevant for emerging markets. To answer this research question, a systematic scanning of current literature was carried out (Corsi and Minin, 2014). A computerized search was conducted on papers published in the scholarly journals contained in the ABI/Inform, Business Source Complete (BSC), Emerald, Elsevier, and ISI web of knowledge databases (Cunha et al., 2013;). Apart from these databases Google Scholar was also used and references from relevant publications were examined to find further papers. Books and articles from leading magazines were also examined to obtain a comprehensive literature review. As research on these issues is still in the early phases, it was necessary to include books and articles from leading magazines (Economist, Business Standard) as well. The following combinations of key words were used to find the relevant papers, based on prior research (Brem and Wolfram, 2014, von Zedtwitz et al., 2015): jugaad (5); frugal innovation (22); frugal engineering (8); reverse innovation (9); disruptive innovation (8); catalytic innovation (5); grassroot innovation (18); gandhian innovation (10); indigenous innovation (10). Shown in brackets after each search term is the number of papers selected for further analysis. Since 7 selected papers were relevant for more than one term, the number of unique articles selected amounts to 83. Subsequently, from the selected papers, the definitions and explanations were analyzed to come up with a list of characteristics identified for each of these theories. In Table 1, the characteristics and corresponding studies are listed and grouped based on the innovation theories they are dealing with.
Across the selected theories, certain characteristics appeared repeatedly; others (listed in italics in Table 1) were either exact synonyms of other words included or were English phrases explaining already included terms. Omitting these words/phrases led us to a collection of 81 unique characteristics that consolidate the attributes described by the leading innovation theories for emerging markets for new product development.

Table 1: Characteristics of various innovation theories according to relevant studies (in alphabetic order)

<table>
<thead>
<tr>
<th>Innovation Theory</th>
<th>Studies</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jugaad</td>
<td>(Birtchnell, 2013), (Brem and Wolfram, 2014), (Mitra, 1995), (Radjou, Prabhu and Ahuja, 2012), (Singh et al., 2012)</td>
<td>Agile, austerity, cheap, cost-effective, clever, creative, effective, fast, fix, flexible, frugality, improve, inclusive, ingenuity, innate, intrinsic, intuitive, local, low-cost, more-with-less, quick, resilience, resourceful, resource-constrained, robust, rough, simple, sustain, unique</td>
</tr>
<tr>
<td>Frugal Innovation</td>
<td>(Agarwal and Brem, 2012), (Basu, Banerjee, and Sweeney, 2013), (Bhandari, 2009), (Bhatti, 2012), (Bhattacharyay, 2012), (Bhatti and Ventresca, 2012), (Brem and Wolfram, 2014), (Cunha et al., 2013), (Eagar et al., 2011), (Gallis and Rall, 2012), (Horn and Brem, 2013), (Hossain, 2013), (Howard, 2011), (Kingsnorth, Tongaonkar and Awojobi, 2011), (Moore, 2011), (Mukerjee, 2012), (Radjou and Prabhu, 2013), (Schneider, 2010), (Soman et al., 2012), (Thornton, 2013), (Tiwari and Herstatt, 2012), (Zeschky, Widenmayer and Gassmann, 2011)</td>
<td>Accessible, adaptable, affordable, appropriate, available, basic, bottom-up, breakthrough, bricolage, cheap, clean-sheet, creative, easy to use, economical, eco-aware, efficient, environmental, energy-efficient, flexible, frugality, green, good-enough, human-centric, high quality, invent, ingenuity, intuitive, large-scale, lean, light, limited functionality, local, low-cost, modify, more-with-less, no-frills, portable, quality, radical, resource-constrained, robust, reliable, rugged, simple, smart, social, sophisticated, sustain, technical, timely, user-friendly, valuable</td>
</tr>
<tr>
<td>Frugal Engineering or Constraint based Innovation</td>
<td>(Aiyar, 2011), (Brem and Wolfram, 2014), (Kumar, 2008), (Kumar and Puranam, 2012), (Kumar and Puranam, 2013), (Radjou, Prabhu and Ahuja, 2012), (Reddy, 2011), (Sehgal et al., 2010)</td>
<td>Advanced, affordable, basic, cheap, cost-effective, clean sheet de-featureing, frugality, invent, large-scale, light, low-cost, minimal, no-frills, portable, quality, quick, radical, reliable,</td>
</tr>
<tr>
<td>Innovation Type</td>
<td>Characteristics</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Gandhian Innovation</td>
<td>Accessible, affordable, appropriate, cheap, creative, frugality, more-with-less, large-scale, local, low-cost, people-focused, radical, resourceful, robust, simple, sophisticated, sustain, user-friendly</td>
<td></td>
</tr>
<tr>
<td>Catalytic Innovation</td>
<td>Affordable, bricolage, ecological, effective, efficient, fast, good-enough, meet observed needs, new, novel, large-scale, low-cost, low-performance, radical, resource-constrain, simple, social, sustain</td>
<td></td>
</tr>
<tr>
<td>Grassroot Innovation</td>
<td>Adaptable, affordable, alternative, basic, bottom up, breakthrough, cost-effective, collective, creative, diverse, dynamic, easy to imitate, economic, frugality, green, improve, indigenous, informal, ingenuity, interactive, intrinsic, large-scale, local, low-cost, new, organized, practical, self/interest driven, small, social, spontaneous, sustain, folks wisdom, valuable, voluntary</td>
<td></td>
</tr>
<tr>
<td>Reverse Innovation</td>
<td>Adapting, cheap, clean slate, compact, decentralized, disruptive, ease of use, good enough, growth, high technology, local, low-cost, modular, new, radical, scaling, simpler, portable</td>
<td></td>
</tr>
<tr>
<td>Indigenous Innovation</td>
<td>Adaptable, adjustable, adopt economic, improvised, local,</td>
<td></td>
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</table>
To complement the existing research with the in-practice new product development efforts, GE Healthcare was taken as an example based on an extensive case study analysis (Yin, 1994). GE Healthcare has been taken as a case study for this paper because of their strong focus on emerging markets with initiatives like “Healthymagination” which focuses on three main factors of cost, quality and accessibility to attract BOP consumers. This initiative targets emerging markets and focuses on developing new products which are 15% lower in cost than the existing offering but simultaneously 15% better in quality and accessibility. This initiative already has 68 special products under its portfolio which makes GE Healthcare an appropriate case example to study innovation approaches for new product development in emerging markets. Qualitative information was collected through open ended interviews with 4 innovations experts in GE Healthcare. The key characteristics considered at GE Healthcare while product development were found to be in sync with the characteristics discussed in theory and hence the same 81 unique characteristics were considered for further analysis.

Semantic similarity measures the concept relatedness of two English words or phrases. It measure the synonymy, antonymy, hyponymy, hypernymy and meronymy between two words and generates a similarity score which has further applications in artificial intelligence for information retrieval and text mining (Han et al., 2013). For the scope of this study, semantic similarity method is used to generate numerical similarity scores between the identified 81 unique characteristics which are further used in cluster analysis to group similar characteristics. There are various web interfaces to calculate the similarity scores and one such interface used for this study is the open-source UMBC Ebiquity Core (Han et al., 2013). This service uses the Wordnet database (of 3 billion English words) and Web corpus from the Stanford WebBase project (contains 100 million web pages from more than 50,000 websites) to assign and analyze the word senses. The statistical method used to compute the similarity scores is based on distributional similarity and Latent Semantic Analysis (LSA) which works on the underlying hypothesis that words occurring in the same contexts tend to have similar meanings (Harris, 1968). Based on the statistical analysis the UMBC Semantic Similarity service calculates a
similarity score in a range of 0.0 and 1.0 where 1.0 score represents an exact synonym of the word.

This UMBC Ebiquity Core service was used in this research project to generate similarity score between each pair of the characteristics generating an 81 X 81 matrix. Figure 2 shows an excerpt of this similarity matrix.

Figure 2: Similarity matrix (excerpt)

Among the hierarchical agglomerative clustering algorithms, Ward’s method has shown the capability of adequately assigning objects to clusters (Backhaus et al., 2010). However, outliers in the data can distort the results obtained from this procedure (Hair et al., 2010, p. 532). Such outliers may be identified with the single-linkage method (Eckey et al., 2002, p. 234). Using the statistical software R (R Development Core Team, 2013), we therefore first applied the single-linkage algorithm to the similarity matrix of the 81 unique English words and identified five outliers (“green”, “large-scale”, “light”, “local” and “motivation”). After removing these words, we then performed a clustering analysis based on Ward’s method. We decided that eight clusters, each one representing a key factor discussed for the innovation methods, would be an appropriate number that could still be handled in the subsequent analysis trying to determine the priorities of these factors. Table 2 under findings shows how the 76 words remaining were grouped into eight clusters.

Findings
The table below shows the eight main factors that consolidate the characteristics explained by the leading emerging market based innovation theories. Using cluster analysis technique all the characteristics from existing literature has been grouped into one of the eight factors. Analyzing the majority of the words for each of the group, factor names are assigned and described which provides a unified framework of key factors that make a product relevant to be considered as an innovation for emerging markets.
Table 2: Key factors with description and clustered characteristics

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Characteristics</th>
</tr>
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<tbody>
<tr>
<td>Cost-effective</td>
<td>Value for money, providing quality (not luxury) at prices that are affordable to bottom-of-pyramid customers</td>
<td>Accessible, affordable, available, cheap, convenient, cost-effective, efficient, reliable, robust</td>
</tr>
<tr>
<td>Resourceful</td>
<td>Do more with less, using minimal/least possible resources in the product development efforts</td>
<td>Adaptable, agile, flexible, inclusive, lean, quality, resilient, resourceful</td>
</tr>
<tr>
<td>Easy-to-use</td>
<td>Human-centric, intuitive designs that require little to no prior knowledge or training to utilize</td>
<td>Advanced, clever, customize, interactive, intuitive, smart, sophisticated, user-friendly</td>
</tr>
<tr>
<td>Sustainable</td>
<td>Environment-friendly, considering both societal and environmental effects</td>
<td>Ecological, economic, economical, environmental, social</td>
</tr>
<tr>
<td>Problem-centric</td>
<td>Bottom-up approach, looking at the problem first and then developing a suitable solution, customer-centric rather than technology- or product-centric</td>
<td>Adequate, appropriate, better, effective, improve, sufficient</td>
</tr>
<tr>
<td>No-frills</td>
<td>Simplification, seeking minimalistic features and functional requirements which get the job done</td>
<td>Basic, innate, intrinsic, simple, traditional</td>
</tr>
<tr>
<td>Fast-to-market</td>
<td>Timely to market, faster to deploy and also considering all the aspects of business from manufacturing to logistics</td>
<td>Fast, informal, organized, quick, spontaneous, timely, voluntary</td>
</tr>
<tr>
<td>Breakthrough</td>
<td>Creating a novel creative solution which eventually disrupts the existing market and helps to shape an entirely new market</td>
<td>Alternative, austerity, breakthrough, collective, creative, diverse, dynamic, fix, frugality, indigenous, ingenuity, invent, modest, modify, new, novel, portable, practical, radical, revolutionary, rough, rugged, small, sustain, unique, valuable</td>
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</table>

As can be seen from Table 2, the clustering procedure has usually grouped words with a similar meaning into the same cluster. Of course, there are notable exceptions. For example, the words “economic” and “economical” have been assigned to the same cluster as “ecological”, “environmental” and “social”. This is likely due to the way in which the UMBC Equity service assigns similarity values. This service uses Wordnet Ontology which is used to compute the similarity between two concept pairs using all senses of concept. It organizes words into
hierarchy of is-a, has-part, is made up of, and is an attribute of; for example a wheel is a part of the car, a knife is used to cut the bread and snow is made up of water (Pederson et al., 2004). All these concept senses are used to measure the final relatedness and in this case apart from the first three common letters “eco”, the two concepts “ecology” and “economic” show similarity because both are studies of systems one is about at human systems and the latter is about human systems. Nevertheless, still looking at the commonality of the majority of words within each cluster, it is possible to identify the key factor of innovation embodied by the cluster. To express these factors, we developed both the names as well as the more detailed descriptions of the clusters, listed in Table 2.

RQ2: Relative importance of key factors

Design

Next, a questionnaire was developed based on the results of RQ1 to determine the relative importance of the eight key factors. This questionnaire was sent by e-mail to the product managers or team leaders for new product development in emerging markets in large multinational medical device manufacturing companies.

To derive priorities of the key aspects on a ratio scale and to determine the departure in consistency from the paired comparisons, we employed the methodology of the analytic hierarchy process (AHP) (Saaty and Vargas, 1991; Saaty, 1996). The AHP method provides numerical ratings representing the relative importance of each individual with their associated selection criteria with respect to the goal (“to develop a product for emerging markets”). The questionnaire consisted of one question for each of the 28 pairs of key factors. Within each question, the respondent was asked to rate the relative importance of key factor A over key factor B by describing their attitude toward the statement “While developing a product for emerging markets I prefer key aspect A over key aspect B” based on 19 categories ranging from “extremely agree” to “extremely disagree”. Typically, the ratings given by a respondent in such paired comparisons are not consistent. For example, the rankings implied need not be transitive: key aspect A might be preferred over key aspect B, which in turn is preferred over key aspect C, while key aspect A is rated as less important than key aspect C. Therefore, we assigned the scores shown in Table 3 to the ratings received in each of the 28 questions, following the scale proposed by Saaty and Vargas (1991).
Table 3: Scale for paired comparisons

<table>
<thead>
<tr>
<th>“While developing a product for emerging markets I prefer key aspect A over key aspect B.”</th>
<th>1</th>
<th>“equal”</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>“slightly agree”</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>“strongly agree”</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>“very strongly agree”</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>“extremely agree”</td>
<td></td>
</tr>
<tr>
<td>2, 4, 6, 8</td>
<td>intermediate values</td>
<td></td>
</tr>
<tr>
<td>Reciprocals</td>
<td>for disagreement</td>
<td></td>
</tr>
</tbody>
</table>

AHP methodology helps in grouping and prioritizing the key factors into more and less important sets (Wong & Li, 2006) based on pair wise comparison. Since AHP focuses on a specific goal, large sample may often lead to inconsistent results (Wong & Li, 2006) and hence smaller samples are preferred. In previous research AHP surveys were used with small sample size of 8-9 experts, for example Lam and Zhao (1998) considered 8 experts for their quality-of-teaching AHP survey (Wong & Li, 2006).

For the scope of this study, leading multinational companies in healthcare sector focusing on product development in emerging markets were chosen. From these multinational companies, carefully a set of eight product managers and team leaders were selected who were leading or managing new product development efforts in emerging markets like India and China. One of the companies approached was GE Healthcare and product managers from GE Healthcare, India participated and responded to our questionnaire.

**Findings**

For each one of the eight respondents to our questionnaire, we thus obtained an 8X8 pairwise comparison matrix. The judgments from all respondents were then combined using the geometric means of the individual scores (Saaty, 1996, p. 63). From the aggregated pairwise comparison matrix, the relative priorities of the key factors were obtained as the principal eigenvector of this matrix, normalized to sum to one (Saaty, 1996, p. 51); these priorities are listed in Table 4. Table below gives a sorted relative importance of each of the eight key factors identified in the first part of the research project and helps also to group the factors into more and less important sets based on the closeness of numerical scores.
Table 4: Priorities of the eight key factors

<table>
<thead>
<tr>
<th>Key Factors</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost-effective</td>
<td>0.251</td>
</tr>
<tr>
<td>easy-to-use</td>
<td>0.243</td>
</tr>
<tr>
<td>problem-centric</td>
<td>0.162</td>
</tr>
<tr>
<td>fast-to-market</td>
<td>0.093</td>
</tr>
<tr>
<td>Resourceful</td>
<td>0.074</td>
</tr>
<tr>
<td>no-frills</td>
<td>0.063</td>
</tr>
<tr>
<td>Sustainable</td>
<td>0.061</td>
</tr>
<tr>
<td>Breakthrough</td>
<td>0.053</td>
</tr>
</tbody>
</table>

The consistency ratio, which is derived from the principal eigenvalue of the matrix and which evaluates the extent of inconsistency in the paired comparisons, amounts to 0.020; values up to 0.1 are considered acceptable (Saaty, 1996).

Discussion

Literature review shows a plethora of innovation approaches to understand the BOP customer needs and markets specifications, in exploratory and qualitative studies. However, the overlapping and interrelated approaches often lead to a potpourri of several characteristics. This study is an attempt to bring clarity on the key factors considered during concept development of new products for emerging markets. The paper helps academicians and practitioners to sift through the plethora of theories and succinctly describes what denotes a product’s relevance for the emerging markets.

Figure 3: Unified framework for innovation theories focusing emerging markets
The various existing theories illustrated previously can be unified and represented in eight factors to create a Unified Innovation Framework (UIF) for emerging markets as shown in Figure 3. A product will be considered pertinent for BOP customers if it meets the identified criteria of being cost-effective, easy to use, sustainable, problem-centric, no-frills, fast-to-market, resourceful and breakthrough. Depending on the motivations driving the innovation approach, a selected subset of these factors would gain priority over others. For example jugaad and frugal innovations have a greater impetus on cost-effectiveness and resourcefulness (Radjou, Prabhu and Ahuja, 2012) rather than sustainability. On the other hand, grassroot or gandhian innovations place a premium on sustainability (Gupta, 2013) over ease to use. Disruptive innovations will show a greater propensity towards being fast to market and a no frills approach (Hart and Christensen, 2002). Nevertheless, the UIF as shown in Figure 3 gives the overarching framework for all the innovation theories put together. These results can also be interpreted as a tally of criteria to be met while developing an emerging market specific product or attributes necessary to “play in emerging markets.”

Prahlad (2012) suggested a 4A’s model which claims that four factors mainly awareness, access, affordability and availability are critical for BoP success. However, this study offers an exhaustive list of eight critical factors consolidating the existing literature and use an innovative empirical approach to determine the relative importance of the eight factors as shown in the UIF. This relative importance is seen from the product manager’s perspective and maps the decision process hierarchy while conceptualizing a new product for emerging markets. Table 5 represents the percentage weightage product managers assign to each of the identified eight key factors.

Table 5: Relative importance of the identified factors in percentage

<table>
<thead>
<tr>
<th>Key Factors</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost-effective</td>
<td>25%</td>
</tr>
<tr>
<td>easy-to-use</td>
<td>24%</td>
</tr>
<tr>
<td>problem-centric</td>
<td>16%</td>
</tr>
<tr>
<td>fast-to-market</td>
<td>9%</td>
</tr>
<tr>
<td>Resourceful</td>
<td>7%</td>
</tr>
<tr>
<td>no-frills</td>
<td>6%</td>
</tr>
<tr>
<td>Sustainable</td>
<td>6%</td>
</tr>
<tr>
<td>Breakthrough</td>
<td>5%</td>
</tr>
</tbody>
</table>

The study also helps to group the key factors, based on the closeness of their numerical scores, where a priority value more than 20% implies highest importance, between 10-20% implies intermediate importance and less than 10% connotes less importance. Cost effectiveness and easy to use have very high prioritization which can also be seen from Table 1, where these attributes are present in almost all theories (Lazonick, 2004; Munshi, 2010; Prahalad and Mashelkar, 2010; Zeschky, Widenmayer and Gassmann, 2011; Govindarajan and Trimble, 2012; Radjou, Prabhu and Ahuja, 2012; Gupta, 2013).
As seen in Table 5 and Figure 3, from the eight key factors consolidating the various characteristics needed to “play the game”; the high prioritization given to cost effective, easy to use and problem centric can be viewed as essential factors to “win the game” in emerging markets.

However these results are not to be mis-understood as implying that factors apart from cost effective, easy to use and problem centric are not important. For specific cases like Ghandian innovations, motivated by societal development, attributes such as sustainability is expected to play a critical role (Prahalad and Mashelkar, 2010). Unfortunately, due to the limitations of our sample (healthcare professionals from large multinationals) this is not reflected adequately in our result. The relative importance is subject to change based on the motivation behind and also by external factors like sector and government policies. In other words, the required factors to play in emerging markets would not change, but factors to win in these markets would vary depending on the motivations driving the innovation.

Implications to theory

Experiences in other disciplines have shown that theories that are founded on the “basis of a subset of the existing observations and their driving forces; may be attractive in the short run, but non-robust and eventually non-durable in the long run” (Snowdon, 2008). This paper has made a first attempt to capture the various approaches of product innovations for emerging markets and offers a unified approach towards them.

This paper contributes to existing literature in three fundamental ways. First, it builds upon existing research to offer a comprehensive definition of a product targeting the BOP customers. By creating a Unified Innovation Framework it identifies the critical criteria such as cost-effective, easy to use, sustainable, problem-centric, no-frills, fast-to-market, resourceful and breakthrough to succinctly measure the inherent appropriateness of a new product for emerging markets. Second, it offers a systematic and empirical approach to this relatively new field of research. Despite its increasing popularity, the literature is still limited to anecdotal evidence and dissection of company practices (Cunha et al, 2013). This study uses a creative and translational empirical approach to provide quantitative inputs on theory building. Third, the paper re-iterates the importance of the motivational driver of innovation in determining the importance of the attributes.

Implications to practice

The paper provides a clear prioritization for practitioners based on sample from the healthcare industry. Cost effectiveness, ease of use and resourcefulness are seen here to be the highest contributors for winning in emerging markets. From a practitioner view, these factors would also intuitively be the key foci during a new innovation process. The low affordability of the target customers mandate that the product be cost effective and low priced. There is also a dearth of skilled labor in these countries. Combined with the problems of high employee attrition, it is
necessary to design products which can be learnt easily and used without hassles. An adequate “problem centric” solution would also ensure that important resources are not wasted on features unwanted by the customers.

Limitations & implication to future research
The sample in this study is limited to healthcare experts from large multinationals and hence the results are impacted by the limitations of the sample. These results represent the priorities during product development of healthcare products in emerging markets by large multinational companies. It is possible that the priorities can change if the sample is taken from other sectors or local inventors of grassroot or gandhian innovation. It would be interesting to study the change in priorities from different aspects such as motivation, sectors.

Another limitation of this paper is the limited quantity of research published on this topic, mainly on innovation theories like “jugaad”, “catalytic innovation”, “indigenous innovation”, “gandhian innovation”. Nevertheless these theories are considered important and have been used in the study. This paper does not look at the “flow of innovation” (Govindarajan et al., 2009) but rather addresses only the development of local products for the emerging markets and have considered reverse and frugal innovation together. To address any other innovation flow (von Zedwitz et al., 2015) would impact the prioritization of the factors and can be researched further.

Conclusion
The paper investigates the plethora of existing literature to propose a Unified Innovation Framework for emerging markets that succinctly describes what denotes a product’s relevance for the emerging markets. Further, the authors introduce a common definition for a product considered to be appropriate for BOP customers, namely meeting the identified factors of being cost-effective, easy to use, sustainable, problem-centric, no-frills, fast-to-market, resourceful and breakthrough. These factors are also necessary to “play the game” in emerging markets.

The study also provides the relative importance of the identified eight key factors and maps the decision process hierarchy of healthcare professionals while conceptualizing a new product for emerging markets. The high prioritization given to cost effective, easy to use and problem centric are viewed as essential factors to “win the game” in emerging markets. However, the prioritization is expected to change with the motivation, innovation flows and external factors impacting the innovation theories. In Summary, the paper concludes that the required factors to “play in” emerging markets would not change, but factors to “win in” these markets are subject to change.
References


