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"RESOURCE-CONSTRAINED INNOVATION": CLASSIFICATION AND IMPLICATIONS FOR MULTINATIONAL FIRMS

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Abstract: Today's global and heterogeneous markets increasingly require that firms master the entire range from simple low-cost innovations to advanced, high-end innovations. This is especially true for established Western multinational firms that have traditionally focused exclusively on advanced innovations. Recent developments show that it is no longer enough to serve high-margin markets with high-tech products but that firms must also be able to serve resource-constrained markets with products that deliver high value at ultra-low costs. Resource-constrained consumers are often found in the lower part of the economic pyramid and do not only exist in emerging but also in developed markets. This article discusses the different types of resource-constrained innovations – cost, good-enough, frugal, and reverse innovation – pinpoints the differences between them and discusses the implications for global innovators. It thus offers strategies for firms how to develop innovation capabilities for resource-constrained markets and provides the conceptual grounds for further systematic research in the area of resource-constrained innovation.

Keywords: resource-constrained innovation; emerging markets; classification of innovation; multinational enterprises (MNEs)

1 Introduction and Motivation

Over the last decade, research on emerging markets has gained increasing attention in international business and strategic management literature (Wright et al. 2005). This interest has been triggered by the growing importance of emerging markets for the global economy and thus for multinational corporations (MNCs). According to Drummond (2012) four facets characterize emerging markets and constitute their importance for global businesses. First, the next wave of consumers is domiciled in emerging markets. However, only when firms deeply understand customer requirements in each emerging market and adapt their product offerings accordingly, will they succeed in emerging markets. Second, emerging markets are not only sales markets but also sourcing markets. Firms must learn to incorporate knowledge and capabilities gained in emerging markets and leverage them globally. Third, the local environment in emerging markets is distinctly different from developed markets and competition with local business is fierce, particularly for the mass market customer. Fourth, the global business landscape is affected by emerging market multinationals (EMNEs) which have become global players and challenge established multinationals on global markets. Besides the relevance of emerging markets for firms and firm management, emerging markets serve as important grounds to enhance existing theory and build new theory (Peng, Wang, and Jiang 2008). Apart from the question how multinationals can build new capabilities in emerging markets and leverage them globally (Sarkar 2011), the internationalization process of EMNEs is seen as a promising path to expand the existing understanding of firms' internationalization processes (Drummond 2012; Cuervo-Cazurra 2012).

Initially, emerging economies were characterized by a rapid pace of economic development and by government policies that favor economic liberalization and the adoption of the free-market system (Arnold and Quelch 1998). Some authors divided these rapidly growing economies in emerging economies from Asia, Latin America and the Middle East and transitional economies which formerly belonged to the Soviet Union (Hoskisson and Eden 2000). Goldman Sachs coined the term "BRIC" markets in 2001 as an acronym for Brazil, Russia, India, and China. These economies showed annual growth rates far above the ones of developed markets which is why these markets are expected to catch-up rapidly with the leading countries in the world (O'Neill 2001). In 2011, Goldman Sachs called for a new classification of emerging markets again (GSAM 2011),

dividing the world in developed markets, growth markets (BRICS plus Mexico, Korea, Turkey, and Indonesia) and developed markets (all other non-developed markets). They argue that growth markets have gained a substantial global power (all of them deliver at least 1% of global GDP) and possess a positive growth environment, financial development and accessibility to investors. In combination with the favorable local demographic situation, these markets will experience a rising productivity leading to a faster growth rate than the world average (GSAM 2011). For the purpose of this paper, we use emerging markets as an umbrella term for both growth and emerging markets.

From a theoretical perspective, research on emerging markets has predominantly applied transaction cost theory, institutional theory, and the resource-based theory of the firm (Hoskisson and Eden 2000). More recently, institutional theory (Peng, Wang, and Jiang 2008) has become the dominant theory to explain how and why firms in emerging markets act differently compared to firms in markets with less so called "institutional voids" (Khanna and Palepu 1997).

When Western firms started localizing production in emerging markets to leverage local cost advantages, they also addressed new customers in these markets. However, these customers were mainly the affluent customers at the top of the economic pyramid as existing Western products could be simply adapted (Prahalad 2010; Arnold and Quelch 1998; Soto 2000) and for which the global strategy therefore fitted well. However, building on Prahalad's seminal work on the base of the economic pyramid, Western firms today realize that new approaches and business models are needed to reach the four billion potential consumers at the base of the pyramid which represent a huge and lucrative market (Wright et al. 2005).

However, not all of the resource-constrained customers are found at the bottom of the pyramid. In recent years, the economic rise of emerging markets, especially China and India, has lifted millions of people out of severe poverty and has created a new market segment which is typically referred to as middle market (Govindarajan 2012), low-income market (Hart and Christensen 2002; Sanchez and Ricart 2010) or sometimes good-enough market (Gadiesh, Leung, and Vestring 2007). Spurred by rising incomes in these countries, this market has been labeled the "next global battleground" due to the fierce competition among firms fighting for the emerging middle class consumer (Gadiesh, Leung, and Vestring 2007). Still, emerging middle class consumers have little excess income to spend. Therefore, scholars and practitioners alike have claimed that

customers in these emerging middle markets require new kinds of innovations and business models which are characterized by high value at affordable costs. This kind of innovation has been subsumed under terms such as cost innovation (Williamson 2010), frugal innovation (Zeschky, Widenmayer, and Gassmann 2011), good-enough innovation (Gadiesh, Leung, and Vestring 2007), jugaad (Cappelli et al. 2010; Petrick and Juntiwasarakij 2011), Gandhian innovation (Prahalad and Mashelkar 2010), resource-constraint innovation (Ray and Ray 2010), trickle-up innovation (Prahalad 2010) or reverse innovation (Immelt, Govindarajan, and Trimble 2009; Trimble 2012; Govindarajan 2012). These terms have in common that they promise high customer benefit at very low costs, thereby making respective products attractive or even affordable for resource-constrained customers for the first time. However, many of such product innovations are not merely attractive due to cost reasons. As resource-constraints can also entail for example poor public and private infrastructure (e.g. electricity or roads), poor service availability (e.g. access to health), or an overall poor institutional environment (e.g. access to capital or legal advice), product innovations which overcome these constraints can also be considered as innovations for resource-constrained customers.

However, the different terms are fundamentally different in terms of their product and market novelty and the way they are designed. This creates confusion as to how firms can innovate for the emerging middle market. For example, while the value proposition of cost innovation is essentially driven by extreme cost improvements ("same for less"), the value proposition of frugal innovation is based on an innovative product and application innovation ("new for less"). Therefore, different innovation and organizational capabilities are necessary to address the different customer segments within resource-constrained markets. Furthermore, an inconsistent terminology hinders research from moving forward in a systematic and fruitful manner. Academic research will benefit from a better classification of the field of resource-constrained innovation for theory development as well as for a proper derivation of practical implications. This article sheds light on the different meanings and implications of resource-constrained innovation, provides advice for executives engaged in global innovation management and presents potential starting points for theory delineation.

2 Methods and Data

We started this study by analyzing extant literature on innovation for resource-constrained consumers in emerging markets. Based on our assumption that terms were arbitrarily used but often referred to the same underlying product, our initial aim was to understand the commonalities and differences between cost, good-enough, frugal, and reverse innovation. We used the term resource-constrained innovation as an umbrella term for cost, good-enough, frugal, and reverse innovation due to the lack of an established definition and due to its wide applicability. We then employed the established dimensions of product and market novelty (Ansoff 1965) as a conceptual framework to analyze if and how the product examples were new compared to existing standards. Additionally, we analyzed the typical product traits and the enabler of the innovation (i.e. product, process, or application innovation) for each identified product innovation. We then used again the existing terminology of cost, good-enough, frugal, and reverse innovation and subsequently developed a conceptual understanding of their commonalities and differences. We underpin this classification with examples from extant literature as well as with cases from our own database on resource-constrained innovations that our institute maintains since 2009. In total, our database entails 73 entries of resource-constraint innovations.

In order to enrich our cases and gain an in-depth understanding of processes and structures within firms that innovate for resource-constrained environments, we also interviewed managers from the companies involved in developing resource-constrained innovation. Interviews were recorded and transcribed verbatim immediately after the interviews. Subsequently, the interview transcripts were sent back to the interviewees for confirmation before we eventually developed the case studies. Whenever possible, we triangulated data by interviewing several managers within the same company, as well as by cross-checking interview data with publicly available information and internal documents. In total we conducted interviews with 39 managers from 19 companies.

3 Innovation for Resource-constrained consumers

Cost Innovation

Cost innovations are innovations that deliver the existing and known product functionalities at lower costs. As such, cost innovation is not a novel concept but typically the result of ongoing process improvements enabled by location advantages in low-cost countries. There are numerous examples where low-cost competitors turned a formerly expensive good into a commodity by drastically reducing costs. For example, by developing a method to produce rechargeable lithium-ion batteries at ambient temperatures and humidity (all Western competitors used expensive "dry rooms" for production), BYD from China was able to reduce production costs of lithium-ion batteries by 70% to the point where they matched the price of lower performing nickel-cadmium batteries (Peter Williamson 2010). Huawei whose top-notch smart phones cost about 20% of those of Western competitors is another example. In 2009 they even beat Ericsson on their Swedish home turf in a tender for a 4G mobile network deal as Huawei was able to provide the same functionality and quality at much lower cost (Ward 2009). ZMPC, a Chinese harbor crane manufacturer, was able to hire up to 40 times more engineers than their German counterparts due to the low wages in China. This enabled ZMPC to customize products that could not be customized before, while keeping costs on mass market level (Williamson and Zeng 2009). In 2006, before its decline, Nokia also managed to develop variety at low cost and became capable of developing, manufacturing and selling two to three new low-cost handsets models per month in China (Williamson and Zeng 2009). The revived emergence of cost innovations is largely sparked by emerging market firms often based in China and India. These firms started not only to leverage their cost advantages for low-cost production but also managed to create innovative and disruptive business models (Williamson 2010; Williamson and Zeng 2009). Their cost advantage is mainly achieved through process innovations in terms of cost improvements along all firm processes. But still, the basis for these process innovations usually lay in cost advantages in form of low labor costs, local sourcing, the use of standard components and cost-effective raw materials as well as scale and efficiency in production. The product functionality essentially remains the same.

Despite little novelty as a concept, cost innovations have the power to tap cost-efficiency seeking as well as resource-constrained customers, many of which potentially are first-

time customers (Prahalad 2010). Therefore, cost innovations are not bound to customers of the emerging middle market but typically attract more affluent customers as well. Cost advantages which are rooted in emerging markets have enabled local firms to reach break-even points earlier than Western firms, giving them the opportunity to turn former niche markets into mass markets. Haier did so when they transformed the market for wine refrigerators, which had until then addressed restaurants and wine connoisseurs only, into a mass market by reducing prices and redesigning the products for home use (Peter Williamson 2010).

Good-enough Innovation

In addition to cost innovations, good-enough product innovations entail functionality and features that are designed to meet the specific requirements of customers in resource-constrained environments. Like cost innovations, low price points are achieved by taking advantage of local cost advantages combined with better local sourcing conditions. However, in contrast to cost innovations, they are adapted or re-engineered to fit the specific use-requirements in the low-income segment. Likewise, the concept of good-enough product innovation is also not entirely new but its value proposition incorporates a combined market and technological novelty that can range between low and medium. For example, the Swiss laboratory equipment manufacturer Mettler Toledo developed a basic, good-enough weighing scale for the Chinese market (Zeschky, Widenmayer, and Gassmann 2011). Starting from an existing Western product but following the principles of low cost manufacturing, simple low-cost materials, and design in conjunction with minimal but essential feature sets, this basic weighing scale has become a sought-after product for customers with basic requirements and limited budget. Also Logitech developed several good-enough products within their value product segment for emerging markets (Trimble 2012). The wireless computer mouse M215 entails merely simple core functions while providing high user friendliness. In order to reduce cost, Logitech used cheaper material for non-critical parts, removed features and functions and reduced packaging (Zeschky, Widenmayer, and Gassmann 2011). Saurer Volkmann, a globally leading twisting machine manufacturer in the premium market, also entered the emerging middle market in 2004 (Ryans 2009; Ryans 2006; Ryans 2005). In order to compete against low-cost players, Volkmann developed a twisting machine called Focus which offered a limited range of features and options as well as low energy consumption.

The practical challenge of developing good-enough innovations is grounded in identifying and customizing value-adding functions while eliminating those that do not deliver value – all at very low costs. Therefore, good-enough innovation requires product novelties of some degree which often materialize in the concentration on core features, increased application robustness, high ease of use, and more manual rather than automated processing. Traditionally, good-enough innovations used to be the domain of emerging market firms which addressed price sensitive customers (Gadiesh, Leung, and Vestring 2007). However, also Western firms have begun to develop good-enough products that meet specific customer needs.

Frugal Innovation

The term frugal innovation has recently enjoyed increasing popularity and has been used to denote innovations originally developed for resource-constrained customers in emerging markets (Zeschky, Widenmayer, and Gassmann 2011; Sehgal, Deehoff, and Paneer 2010; Sharma and Iyer 2012). Other terms for frugal innovation are gandhian innovation (Prahalad and Mashelkar 2010) or jugaad (Sharma and Iyer 2012), emphasizing the specific Indian context in which such innovations are often created. The advantage of frugal innovation as a term is that it is not context-based and has become the dominant term in practice and academia (Economist 2010; Zeschky, Widenmayer, and Gassmann 2011; Sarkar 2011). In contrast to good-enough innovations, frugal innovations are not re-engineered products but originally developed products or services targeted at resource-constrained environments. Often based on a new product architecture, they entail new features that enable disruptive applications, for example by making stationary products portable.

An example for frugal innovation is M-Pesa, a joint venture of Kenyan Safaricom and UK based Vodafone. Using existing mobile phone technology (SMS) and infrastructure, they developed a mobile phone-based microfinance service called M-Pesa for people who did not have access to banking before (Graham 2010). The mobile money transfer allows users to transfer funds via SMS without the necessity to possess a bank account. After registration at an M-Pesa outlet, people can load money onto their device which then can be sent via SMS. The recipient of the SMS can pick up the cash at his nearest vendor (Graham 2010). This technologically rather simple solution is much more than sending text messages as it enables financial transactions for people who have no bank account,

increases safety due to moneyless transactions, and revolutionizes the flow of cash of a whole region (Graham 2010). The Dutch firm Qiagen which has specifically developed the careHPV device for the detection of HPV (human papillomavirus) in rural, resource-constrained market environments is another example of frugal innovation. The careHPV includes an easy to use interface, a simple color coded system indicating the test results (i.e. green for ok (not infected); red not ok), high robustness for rough using conditions and portability, a feature previously unknown. The system tolerates changes in the temperature of the blood samples which is important as refrigeration is typically not guaranteed in remote, rural areas. Furthermore, it is so easy to use that even non-medical staff can be trained in hours to conduct the tests, which is a huge advantage especially in remote areas (Qiagen 2013; Qiagen 2012). One of the more prominent examples of frugal innovation is GE's portable ultrasound device. Similar to the Qiagen example, GE developed the portable ultrasound device Logiq Book for rural areas in China (Govindarajan and Ramamurti 2011). This laptop based product has reduced functionality compared to traditional ultrasound machines; however its value proposition was specifically developed for emerging markets. In contrast to the traditional bulky and stationary ultrasound machines, the new device has been made portable so that patients do not need to travel to far-away hospitals but that doctors instead could visit their patients taking the device with them. Apart from bringing ultrasound technology to places where it had not been before – with a price reduction of almost 80% – the new devices come at dramatically lower costs than the traditional ultrasound machines (Immelt, Govindarajan, and Trimble 2009). In addition to cost and good-enough innovations, frugal product innovations are new and innovative both from a technological and market perspective – not just cheaper and re-engineered. In most cases, existing technology is employed in a fundamentally new manner which enables accessing formerly remote and unserved areas.

Reverse Innovation

In contrast to cost, good-enough, and frugal innovation, reverse innovation is a market rather than a product concept. In today's global markets, products are developed and sold worldwide, both in developed and emerging markets. Whereas the flow of innovation in the past has been from West to East, i.e. from developed to emerging markets (Vernon 1966), the occurrence and worldwide leverage of cost, good-enough and frugal innovations partly overthrows this hitherto dominant paradigm. Cost, good-enough and frugal innovations, which are first adopted in emerging markets and later sold in other

emerging as well as developed markets are called reverse innovations (Immelt, Govindarajan, and Trimble 2009; Trimble 2012) or sometimes referred to as trickle-up innovations (Prahalad 2010). Therefore, reverse innovation is a cost, good-enough, or frugal innovation which has found its way to customers in other locations than in emerging markets, for example in Western markets. Up to now, there exist to the best of our knowledge no high-tech reverse innovations, which is why reverse innovations are resource-constrained innovations which today easily find customers also in specific segments of developed countries.

Again, GE's portable ultrasound device is a showcase of reverse innovation. Since its original market introduction in China in 2002, an advanced version of the frugal product has been developed and sold worldwide including Europe and the United States. Due to the value proposition of drastically lower costs while being portable, new applications in the West could be realized. Today, the device is used in emergency and operating rooms where stationary machines do not fit or in ambulance vehicles which make use of the portable ultrasound machine right at the accident site (Immelt, Govindarajan, and Trimble 2009; Govindarajan and Ramamurti 2011). Beyond frugal products also cost and good-enough products can become reverse innovations. For example, Logitech's M215 wireless mouse is sold worldwide (Trimble 2012; Govindarajan and Trimble 2012) as is Mettler Toledo's basic weighing scale (Zeschky, Widenmayer, and Gassmann 2011) and most of the cost innovation products (Peter Williamson 2010).

Table 1 provides an overview of the different types of innovation and summarizes the core differences between them. Essentially, cost innovation are low-cost alternatives of Western products with the same functionality which are enabled through various cost advantages in emerging markets, often complemented by process innovations. Good-enough product innovations are cost innovations where non-value adding functionalities are eliminated but value-adding functionalities are tailored to meet the specific requirements of resource-constrained customers. Frugal innovations build on good-enough innovations that additionally feature new applications originally developed for resource-constrained environments, generating an entirely new value proposition that previously did not exist. Finally, reverse innovation are cost, good-enough or frugal innovations which are transferred from an emerging market environment to markets of developed countries.

Table 1 Typology of resource-constrained innovation.

	RESOURCE-CONSTRAINED-INNOVATION			
Innvation type	Cost Innovation (CI)	Good-enough Innovation (GI)	Frugal Innovation (FI)	Reverse Innovation (RI)
Product Description	Cost-engineered emerging market product	Value-engineered emerging market product	Application-engineered emerging market product	Cost-, value-, or application-engineered global market product
Target Customer	Initially: First time / resource-constrained consumer Potentially: Efficiency seeking high-income customer	Initially: First time / resource-constrained consumer Potentially: Efficiency seeking high-income customer	Initially: First time / severely resource-constrained consumer Potentially: Efficiency seeking high-income customer	Resource-constrained or efficiency seeking consumer
Innovation Strategy	**"Cost cutting"** *Cheaper, existing solution*	**"CI + feature optimization"** *Cheaper and specialized, existing solution*	**"GI + application innovation"** *Cheap and specialized new solution*	**"CI, GI, or FI + global rollout"** *Cheap, good-enough or frugal solution in Western markets*
Type of Innovation	Process innovation	Process and product innovation	Process, product and application innovation	Market innovation
Novelty of Innovation	Technical: low Market: low	Technical: low-med Market: low-med	Technical: med- high Market: high	Technical: low-med Market: low- high
Typical Innovation Traits	Cost-effective raw materials Local sourcing Local production Use of standard components and commodities	Cost-effective raw materials Local sourcing Local production Use of standard components and commodities Limitation to core features Less automation High robustness High ease of use	Cost-effective raw materials Local sourcing Local production Use of standard components and commodities Reduction of size New applications (e.g. portability) Tailored for poor inst. environments High ease of use	Cost, good-enough, or frugal innovation characteristics
Examples	BYD: batteries Huawei: phones Nokia: phones ZMPC: cranes Haier: coolers	MT: scale Logitech: M215 Saurer: Focus	GE: Logiq Book Qiagen: careHPV Sa.Com: M-Pesa	Logitech: M215 MT: scale Saurer: Focus GE: Logiq Book Cost innovations

4 Discussion

The cascade of innovation capabilities: learning step by step

In the previous section we developed a classification of cost, good-enough, frugal, and reverse innovation and aimed to show that the concepts are different with respect to their technological and market novelty. For the same reason, we argue that each of them requires a different set of technological and organizational capabilities. As cost innovation products usually consist of readily available components, their key success factor lays in process capabilities such as mastering production facilities in low-cost regions. In contrast, good-enough innovation additionally requires technological and customer know-how due to their increased novelty in product and market dimensions. The challenge here is to identify and re-engineer existing product features, which makes it necessary to deploy low-cost production strategies as well as specific engineering capabilities for identifying and developing good-enough product innovations. When Mettler Toledo developed the basic weighing scale, its Chinese business, consisting of a large sales force and an R&D unit, had already been developing low-cost scales for over thirteen years (Zeschky, Widenmayer, and Gassmann 2011). The experience from these activities enabled them to develop the good-enough basic scale according to exact customer needs. Cost innovation capabilities are therefore a prerequisite for good-enough and frugal innovation.

From a capability perspective, frugal innovation is even more challenging than good-enough innovation. Often, first-time customers in under-served areas are at the center of innovation efforts so that firms may need to learn how to develop new products defined by entirely new parameters. Before GE was able to develop the portable ultrasound machine, it defined a local team designated to learn about the rural customers and usage requirements. Only after the product requirements were defined was the team free to draw on resources available within GE to develop a prototype of the machine. GE also set up a designated sales team that explicitly focused on this new customer group in rural hospitals in China (Immelt, Govindarajan and Trimble 2009). As one of our interview partners at GE said: “Building up the engineering capability is relatively easy, but we are still learning in building up the marketing and product management capability. This takes a lot more time and it is a more challenging task than the technical.” Similarly to the approach at GE, a global team of four people at Qiagen, supported by specific corporate

functions when needed, was assigned that exclusively focused on the development of the careHPV.

With respect to the technological dimension of resource-constrained product innovations, frugal innovation can be considered the pinnacle of innovation capabilities in resource-constrained environments as cost and good-enough innovation capabilities are constituents of frugal innovation capabilities. For this reason, rather than entering emerging middle markets only with even more cost innovation, firms should alter these markets with good-enough innovation and enter entirely new markets with frugal innovation. Instead of mere cost reduction, Western MNCs can leverage their global strength in the form of e.g. existing sales channels, R&D, or global sourcing structures while staying price competitive by tailoring existing or developing new product functionalities. Volkmann Saurer achieved this differentiation successfully with their twisting machine Focus. Frugal innovation goes even one step further since the application innovation with frugal innovation allows reaching customers that could not be served before. The M-Pesa finance service example underscores this when telecommunication companies brought banking to people without bank accounts. Frugal innovation is therefore a strategy to create a 'blue ocean' rather than competing even harder with low-cost innovators in the 'red ocean' (Kim and Mauborgne 2004).

The practical relevance of reverse innovation: a strategic option

The assumption of the West being the lead market for the world is still widespread in many Western firms. At the same time, there is a profound fear that the center of gravity of markets and innovations continues to shift to emerging markets. However, cost, good-enough, and frugal innovations meet the needs of a growing global population of consumers with limited budget – not only in emerging markets but all over the world (Flatters and Willmott 2009). If Western companies want to keep up with low-cost competitors they have to know how to serve the resource-constrained customer segment.

Also, we argue that multinational firms today need to be 'global all-rounders' in their product offerings and be foresighted as to the future development of emerging middle and high-end markets. As long as there is no low-cost competition in their home markets, Western firms will have no need for transferring cost or good-enough innovations from low-income markets to their high margin markets. But as soon as low-cost competition arrives at home shores, the transfer of good-enough products to specific market segments also in developed countries will become an indispensable move. The situation might be a

bit different for frugal innovations. Here, the new application either meets latent needs in the West or the application innovation is so specific for the emerging market context that no transfer is possible or meaningful. GE was in the position to address the need for ultrasound where it was not applicable before. However, while all reverse innovations are based on cost, good-enough, or frugal innovations, not every successful cost, good-enough or frugal innovation becomes a successful reverse innovation. The M-Pesa service for example is available only in emerging markets as there is no need for such banking services in the West (Graham 2010). The same is true for Qiagen's careHPV which is sold only in emerging markets.

5 Conclusions

In this article we have developed a classification of the widely used terms cost innovation, good-enough innovation, frugal innovation, and reverse innovation and attempted to show that they are conceptually different as well as entail different implications for management practice. Through distinguishing these four different innovation types, we contribute to a better understanding of the resource-constrained consumer, the different prerequisites the development of respective types of innovation require, and shed light on potential areas for further theory delineation.

Managerial Implications

We believe that management practice is provided with a clearer picture of the different types of innovation which enables it to better derive sound strategic decisions based on the type of innovation that the firms intend to generate and based on the capabilities necessary to achieve them. Likewise, researchers are provided with a clear classification of the different innovation types which enables more systematic future research. In particular, the classification also allows a more thorough investigation of the concept of reverse innovation which has attracted a lot of attention in the past. Up to now, reverse innovation was the umbrella term for all types of innovations that were created in emerging markets. However, for management practice, there is a big difference whether innovation is driven by technological progress or by aligning organizational capabilities to leverage local innovations to other markets and countries. In this study we argue that cost, good-enough or frugal innovation is a prerequisite for reverse innovation and that the latter is rather a market than a product innovation. As a consequence, reverse

innovation is merely a strategic option for the additional commercialization of emerging market innovations, either proactively or reactively in the wake of low-cost competition from emerging markets.

Furthermore, we argue that emerging markets should less be understood as being confined to emerging country geographies but that emerging markets in terms of resource-constrained consumers can easily be found in advanced countries as well. Therefore, firms must learn to develop products for resource-constrained customers not only in emerging but also in developed markets. To achieve this, cost, good-enough and frugal innovation capabilities are prerequisites for success in this market segment. Since these capabilities take time to build, a stepwise approach is needed to incrementally develop these. We believe that in any market that has attracted cost innovators, Western firms can only compete in the race for the value seeking customer if they master good-enough and frugal innovation.

Theoretical Implications

The classification of the different innovation types presented in this paper serves as a good starting point for the enhancement of theory in three main areas.

First, prior research has shown that institutional theory is currently one of the most promising theoretical approaches to understand business in the emerging market context. Peng et al. (2008) even labelled institutional theory as the third leg of the "strategy tripod" (the other two legs consist of the industry- and resource-based view). We have illustrated that institutional voids are often accompanied by individual resource-constraints which firms can address by developing resource-constrained innovations. As the three types of resource constrained innovation differ conceptually and in terms of firm capabilities required, the question arises how exactly changing institutional environments influence firms' decision on innovation generation. Future research should therefore explore how the type of innovation may change towards the backdrop of changing institutional environments. This could also generate valuable insights regarding the potential of cost, good-enough, and frugal innovations to be reversed, i.e., to be leveraged to other countries and regions outside of emerging markets. Research that leads to a more fine-grained granularity of institutional environments, which in turn enables the differentiation of institutional voids in different market or regional settings, could be a first step towards this direction.

Second, the findings on frugal innovation capabilities provide a fruitful ground for contributions to the theory of the transnational firm (Bartlett and Ghoshal 1989). As outlined above, innovation for the value seeking, resource-constrained customer is a global task and not confined to the emerging market context. Globally acting companies aiming for the whole range of customers (from high income to low-income and resource-constrained customers in emerging as well as developed markets) therefore need to leverage resource-constrained innovations globally within the MNC network. The center of excellence concept (Frost, Birkinshaw, and Ensign 2002) has so far been investigated through a Western perspective characterized by advanced, high-tech innovation. We believe that organizational units or groups of individuals with distinct frugal innovation capabilities can be regarded as "centers of frugal excellence" within the MNC network. When MNCs adopt a reverse innovation strategy, these centers have a leading role or even e global mandate. Future research on frugal innovation and its implications for the setting of the MNC will add new facets to our understanding of the multinational corporation.

Third and finally, while the presented new classification of resource-constrained innovation explains the difference between the four innovation types, it falls short of explaining how these innovations exactly can be achieved. For example, it remains unclear how and which customer insights need to be gained to create frugal innovation. Apart from knowing that process, product, and application innovation elements characterize these types of innovations, we do not know their interdependencies and how they blend into an adequate business model. Therefore, future research should also study how specific parts of business models can be designed to overcome institutional voids.

The opportunities are big for Western firms that recognize and master the challenge of innovation for the emerging middle market. However, they should not try to beat cost innovators in their own game. They should start playing the game differently with good-enough innovation and start playing a new game with frugal innovation.

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