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Working Paper

India's potential as a lead market for frugal innovation and the role of socio-cultural context factors

Working Paper, No. 94

Provided in Cooperation with:

Hamburg University of Technology (TUHH), Institute for Technology and Innovation Management

Suggested Citation: Tiwari, Rajnish (2016) : India's potential as a lead market for frugal innovation and the role of socio-cultural context factors, Working Paper, No. 94, Hamburg University of Technology (TUHH), Institute for Technology and Innovation Management (TIM), Hamburg

This Version is available at:

<https://hdl.handle.net/10419/144759>

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**Technology and
Innovation Management**
at Hamburg University
of Technology

Working Paper

**India's Potential as a Lead Market for Frugal Innovation
and the Role of Socio-Cultural Context Factors**

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August 2016
Working Paper No. 94



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India's Potential as a Lead Market for Frugal Innovation and the Role of Socio-Cultural Context Factors

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Abstract

In recent years a phenomenon called “frugal innovation” has increasingly gained traction in the scholarly discourse; and as research reveals, it is often brought in connection with India. Apparently, India has quietly acquired the role of a pioneer for innovations that aim at combining affordability with excellence, cutting across sectoral boundaries. But what is it that makes India a forerunner for an innovation paradigm with increasing global relevance? In this paper, I propose that the “lead market” theory can explain to a quite good extent the attractiveness of India for frugal solutions. On one hand, there are concrete economic factors that give rise to resource-efficient and affordable solutions to problems faced in day-to-day life. On the other hand, frugality has been long regarded as a virtuous social value in India and the socio-cultural context of the country provides a fertile environment for the acceptance of frugal products and services on both demand and supply sides.

This paper, apart from dwelling on the concept of lead markets and its application in the context of frugal innovations in India, also presents some qualitative results of an empirical survey conducted with participation of Indian students that underscore the role of culture as a key determinant for the acceptance of frugal innovation. The study indicates that frugality in India is often driven by financial considerations (“frugality 2.0”), but globally there are other, additional powerful drivers for frugal innovations, e.g. environmental concerns and rejection of status symbols. This makes a case for collaboration and cooperation between emerging and developed economies, such as India, Germany and Japan, to enable “affordable green excellence”.

Keywords

Lead Markets; Frugality 3.0; Frugal Innovation; National Culture; India; Reverse Innovation

* An edited version of this working paper is to be published under the title “Frugality in Indian Context: What Makes India a Lead Market for Affordable Excellence?” in a forthcoming contributed volume called “Lead Market India: Key Elements and Corporate Perspectives for Frugal Innovations” (Heidelberg: Springer), edited by Cornelius Herstatt and Rajnish Tiwari. The author would like to sincerely thank Claussen Simon Foundation for supporting his research at TUHH with a generous grant.

1. Introduction

In recent years, a phenomenon called “frugal innovation” has increasingly and consistently gained traction cutting across boundaries of disciplines, industries and professional domains.¹ The number of entries for academic papers containing the term “frugal innovation” on Google Scholar increased impressively from 11 at year-end 2009 to 1,490 by mid-July 2016 indicating a growing interest of the research community. Today, academics as well as practitioners; engineering sciences as well as management sciences; medicine as well as humanities; developing countries as well as developed nations are trying to comprehend this phenomenon and its (potential) implications for their respective domains.

A recent review of published scholarly articles on frugal innovation showed that “research on frugal innovation has been predominantly contextualized for emerging economies, especially India” (Tiwari, Kalogerakis, and Herstatt, 2016b: 11). A keyword analysis of published peer-reviewed, journal articles on frugal innovations showed that “India” was explicitly cited as a keyword in about 18% of the articles, whilst three other terms (“Jugaad”, “Bottom of the Pyramid”, and “reverse innovation”), often associated with India, accounted for another 56% (Tiwari *et al*, 2016b). A study of media reports on frugal innovations in German-speaking countries brought a similar result (Bergmann and Tiwari, 2016). Apparently, India has quietly acquired the role of a pioneer for innovations that aim at combining affordability with high quality, cutting across sectoral boundaries. But what is it that makes India a forerunner for an innovation paradigm with increasing global relevance? Some very obvious factors that contribute to this image are described below.

First, the prevalence of English language in the country makes reports on innovations emanating from India in the era of the Internet instantly accessible to the global village. Reports appearing in the business press have created a virtuous cycle for India’s pioneering role in inventing affordability-driven solutions (e.g., Philip, 2008; Economist, 2009; Saraf, 2009; Lamont, 2010; Lavalley and Veach, 2010; Menon, 2011; Mitra, 2011; Economic Times, 2012).

Second, the scholarly discourse on innovation paradigms concerned with affordability, inclusion and emerging markets has been often set in the context of India, which has been a large and growing economy beset with serious levels of poverty and infrastructural

¹ (see, e.g., Economist, 2009; Bhatti and Ventresca, 2012; Tiwari and Herstatt, 2012; Brem and Ivens, 2013; Arnett and Claas, 2015; Radjou and Prabhu, 2015; Rosca, Arnold, and Bendul, 2016)

difficulties. This has given rise to a discourse on the need for inclusive growth that can be spurred by inclusive innovation (Dutz, 2007; Hall, Matos, Sheehan, and Silvestre, 2012; Reficco and Márquez, 2012). Then, India also turned into a leading destination for business and knowledge process outsourcing (Kobayashi-Hillary, 2005; KPMG, 2008); partly also contributing to innovative solutions being created by global firms (Immelt, Govindarajan, and Trimble, 2009; Kumar and Puranam, 2012). Indian multinational enterprises (MNEs) started to invest overseas creating a scholarly curiosity in these MNEs and their product and innovation profiles.² These developments have given considerable visibility to India and innovation activities taking place there in the corporate sector and beyond (see, e.g., Cappelli, Singh, Singh, and Useem, 2010; Bound and Thornton, 2012).

Finally, the scholarly discourse on these kinds of innovations has also seen a relatively large participation by Indian-origin academics. For example, the discourse on grassroots innovations has been largely influenced by works of Anil K. Gupta (e.g., 2000; 2003; 2010); the debate on the “Bottom of the Pyramid” (BOP) has been strongly shaped by works of the late C.K. Prahalad (see, e.g., Prahalad, 2002; Hammond and Prahalad, 2004; Prahalad and Mashelkar, 2010; Prahalad, 2012); and the concept of “reverse innovation” got traction with works of Vijay Govindarajan (Immelt *et al*, 2009; Govindarajan and Trimble, 2012; Govindarajan and Ramamurti, 2013). The concept of “frugal innovation” too has seen significant involvement of Indian-origin scholars.³ A recent bibliometric analysis showed that 4 of the top-5 cited first authors (natural persons) in papers on frugal innovation were of Indian-origin; among top-10 the number was 5 (Tiwari *et al*, 2016b). Involvement of many Indian scholars would almost necessarily implicate that they would report on innovative products and services that they more easily come in contact with, resulting in a positive, and also not necessarily false, perception about the innovativeness of the country.

However, I posit that the above mentioned factors alone cannot explain the emergence of a lead market, much less the emanation of so many commercially successful innovative products, services and business models that unite in combining affordability with excellent quality and the “right” amount of functionality. The above-mentioned factors, in my opinion, are more often a result, but not the root cause, of the actual developments on the ground. After all, we have seen India acting as a “test lab” for scores of domestic and global innovators in

² (see, e.g., Bruce, 2009; Pradhan and Singh, 2009; Sauvart, Pradhan, Chatterjee, and Harley, 2010; Bruce and Wäldchen, 2013; Holtbrügge, 2013; Tiwari, 2014)

³ (see, e.g., Agarwal and Brem, 2012; Singh, Gambhir, Sotiropoulos, and Duckworth, 2012; Tiwari and Herstatt, 2012; Basu, Banerjee, and Sweeny, 2013; Radjou and Prabhu, 2013; Rao, 2013; Tiwari, Kalogerakis, and Herstatt, 2014; Radjou and Prabhu, 2015; Ramdorai and Herstatt, 2015; Tiwari *et al*, 2016b)

their pursuit to create highly disruptive and affordable products and services in fields as diverse as healthcare, automobiles, space research, consumer and household goods, or mobile technologies, to name but a few.

In this paper, I propose that the “lead market” theory can explain, to a sufficient extent, the attractiveness of India for frugal solutions and for their subsequent diffusion overseas (“reverse innovation”). On one hand, there are concrete economic factors that give rise to resource-efficient and affordable solutions to problems faced by people and companies in day-to-day life. On the other hand, frugality has been long regarded a virtuous social value in India. The socio-cultural context of the country, therefore, provides a conducive environment for the acceptance of frugal products and services on both demand and supply sides. For example, it has been reported that “to succeed in India, you need a product which costs 30% of the global price and offers 95% of the performance” (Tiwari and Herstatt, 2014a: 6). Managing Director of CLAAS, a German MNE operating successfully with localized products in India, has been quoted as saying that “every step in design also has to answer the question: Is the customer willing to pay for it?” (Böttcher, 2012: 6). The R&D head of a leading carmaker in India told this author, “It’s about the aspirations of the youth in India. They want everything; they know everything; but they are not prepared to pay extra” (Tiwari and Herstatt, 2014a: 6 p.). Head of the manufacturing planning team of the Tata Nano, the world’s cheapest car, was reported by Chacko *et al* (2010: 67) as saying:

“Much of what we are using at our plant is also used by manufacturers such as Mercedes and BMW. [...] What we have done is remove all the frills and all the excess automation. We have taken exactly what we want and we have aggressively chased the costing we wanted”.

India, therefore, seems to favor “design features, which avoid excessive or unjustified economic rents” while inducing demand to an extent that is “sufficient for enabling technological innovation and diffusion” (Quitow, 2015: 236). This might pose a challenge for engineers and product designers in industrialized countries as they are more often used to technological optimization than to radical cost reductions (Oliver Wyman, 2013; Dierig, Doll, Hegmann, and Kaiser, 2015). Many frugal innovations originating in India, on the other hand, are known for radically reducing the total cost of ownership (TCO) and drastically increasing affordability (Govindarajan and Ramamurti, 2013; Rao, 2013). Path dependencies, e.g. resulting from the use of certain technological platforms over a long period of time and spreading across product lines, may also impose invisible-yet-significant barriers on non-

conventional, simple solutions. Researchers have, therefore, raised the question, “whether the firm headquarters located in developed countries fully appreciate the implications of such a challenge and whether this challenge gets duly reflected in the product strategy of the respective firm for the Indian market?” (Tiwari and Buse, 2014: 5).

This study aims to investigate whether India enjoys a lead market advantage in respect of frugal innovations and, if yes, what factors contribute to this advantage. It also seeks to examine the possible connection of soft factors like national culture to this lead market advantage. The study is conceptualized as a qualitative investigation based on thick description (cf. Barzelay, 1993) to generate some potentially significant insights and create impulses for future research. This paper, apart from investigating the concept of lead markets and its application in the context of frugal innovations in India, also presents some qualitative results of an empirical survey conducted by the author that included Indian students at Hamburg University of Technology (TUHH). The results underscore the role of cultural factors as they show a significant variance between the preferences of Indian respondents and those of the rest of the respondents.

The paper is structured as follows: After this brief introduction, a definitional framework for frugal innovations is provided in section 2. The concept of lead markets is introduced and applied to India in regard to frugal innovations in section 3. In section 4.3, culture is connected with the concept of frugality and anecdotal evidence from India is presented regarding social acceptance of frugal lifestyles and solutions. In section 5, selected results of an empirical survey are presented that differentiate between responses by Indian and non-Indian participants. This non-representative survey helps in generating some interesting insights. For example, it appears as if frugal solutions are (a) especially popular with Indian respondents, and (b) their key motivation is of financial nature. The paper concludes with some summarizing thoughts in section 6.

2. Definitional Framework for Frugal Innovations

Frugal innovations can be understood as products, services, technologies or (organizational) processes that do not compromise on *necessary* quality, reliability or safety standards but can enable significant cost reductions by, for example, making use of state-of-the-art technologies, inventive analogies and accessing open global innovation networks (Tiwari and

Buse, 2014; Tiwari *et al*, 2014). They can be a medium to cater to the needs and aspiration of customers in an aspiration-driven market like India (Maira, 2005; Mashelkar, 2011).

However, a suitable definition of frugal innovation today must take into account the trends and development on a global level. Use of advanced technologies such as 3D-printing is reducing the entry barriers for small and medium-sized enterprises (SMEs) because these technologies can significantly reduce the need for economies of scale, and minimize costs (von Hippel, 2005). Many business customers and private consumers in the economically developed world are opening up for frugal solutions and the concept of “voluntary simplicity” is gaining traction (Elgin, 1981). Therefore, Frugal innovations are no more a forte of emerging economies only and frugality as a societal virtue is, broadly speaking, experiencing a third renaissance in the long history of human civilization:

Frugality 1.0: Prior to 1945, frugality was a universal value propagated by all major world religions and schools of philosophy (see, e.g., Witkowski, 2010; Rezvani and Zarei, 2012; Lai, 2013; Tiwari, Fischer, and Kalogerakis, 2016a). The economic crisis of the 1930s and the resultant recourse to “planned obsolescence” led to disappearance of frugality as a social virtue from public life in the industrialized world (London, 1932; Adamson, 2003; Slade, 2007). The affluence of the post-War era further cemented this mind-set, which started to perceive frugality as a potential threat to prosperity and economic growth in saturated markets.

Frugality 2.0: Revival of frugality as an acceptable social value came bottom-up as a means of raising standards of living in emerging economies from non-existent or non-appropriate (“bad”) solutions to appropriate and modest solutions (Baron, 1978; Grieve, 2004; Economist, 2009; Immelt *et al*, 2009; Prahalad and Mashelkar, 2010). Customers sought localized, functional and affordable solutions in lieu of (a) cheap but poor-quality solutions often coming from non-organized local producers (Prahalad, 2004); and (b) non-adopted, over-engineered, expensive and yet technologically outdated solutions of global MNEs (Prahalad and Lieberthal, 1998). In short, frugality 2.0 enabled what Mashelkar (2014) has termed “affordable excellence”.

Frugality 3.0: Today, we can observe spread of frugality and simplicity towards being again a more universal value (Chancellor and Lyubomirsky, 2011; Hanna, 2012; Herstatt, 2015). There are several factors leading to this trend, such as financial constraints, environmental concerns and market saturation in the industrialized world (Tiwari and Herstatt, 2013; Zweck,

Holtmannspötter, Braun, Hirt *et al*, 2015; Tiwari *et al*, 2016a). The increasing trend, at least in some sections of the affluent societies, towards a greater voluntary simplicity (Elgin, 1981; von Schönburg, 2006; Paech, 2012a) can be partly traced back to a certain “feature fatigue” (Thompson, Hamilton, and Rust, 2005) and the desire to reduce unnecessary complexity (Hanna, 2010). There are also concerns about an eventual “end of growth” as per our traditional economic understanding (Heinberg, 2011; Paech, 2012b). These developments are leading to a rethink of the dominant innovation paradigm and there have been calls for “responsible innovation” (Bogner, Decker, and Sotoudeh, 2015; von Schomberg, 2015). If frugality 2.0 taught us to innovate for “affordable excellence”, frugality 3.0 would ideally lead us to “affordable green excellence”.

Therefore, for the purpose of this study, I propose to work with the following definition of frugal innovations that can cater to considerations of frugality 3.0 (Tiwari *et al*, 2016a: 17):

“Frugal innovations seek to create attractive value propositions for their targeted customer groups by focusing on core functionalities and thus minimizing the use of material and financial resources in the complete value chain. They substantially reduce the cost of usage and/or ownership while fulfilling or even exceeding prescribed quality standards.”

That frugal innovations do not necessarily have to be restricted to commercial products and services but can also encompass marketing methods and organizational processes is evident from the definition. Key characteristics of frugal innovations pertaining to this definition have been articulated by Bergmann and Tiwari (2016) using a keyword analysis of around 114 published online reports in German-speaking nations, see Table 1.

Letter	Characteristic	Occurrence
F	Functional	7%
R	Resource-efficient	9%
U	User-friendly	6%
G	Good-enough	4%
A	Affordable	20%
L	Less-complex and simplified	13%

Table 1: Key characteristics of frugal innovations⁴

⁴ Based on: Bergmann and Tiwari (2016). The keywords identified in this study are those attributes that were used in the sentence dealing with frugal innovations and the sentences immediately preceding and following it in the respective reports.

3. India's Lead Market Potential

3.1. Framework for Lead Markets

Lead markets are generally national markets that can be seen as pioneers in specific product categories. Innovations that succeed here have good chances to succeed in other markets as well, as has been proven in case of mobile telephony, robotics, renewable energies or computer industry to cite but a few examples (Beise, 2001; 2004; Cleff and Rennings, 2012; Levsen, 2015). According to Bartlett and Ghoshal (1990: 242 p.):

“In most industries, a few key markets lead the industry's evolution. They are often the largest, most sophisticated and most competitive markets in which the nature of impending global changes is first mirrored”.

Lead markets were long thought to emerge and exist in the economically developed countries. More recent research, however, has shown that developing countries too, despite lacking in high per-capita income and customer “sophistication”, can acquire the role of a lead market if they are large enough and possess technological capabilities (Quitow, Walz, Köhler, and Rennings, 2014; Tiwari and Herstatt, 2014a). The likelihood of the emergence of a lead market in a developing country is greater, “if the product does not require path-breaking, high cost research; or if the innovation process can be contextualized in [open] global innovation networks to reduce market and technological uncertainty” (Tiwari and Herstatt, 2014b: 70). Research with involvement of this author had identified the emergence of a lead market for small cars in India (Tiwari and Herstatt, 2014a). Meanwhile, according to one report, 31% of all small cars sold globally in fiscal year 2014-15 were manufactured in India (IBEF, 2016).

For the purpose of this study, I work with the following definition of lead markets (Tiwari and Herstatt, 2014a: 205):

“A lead market is a national market, which primarily on account of the size of its domestic demand, its access to technological capabilities and its embeddedness in the global economy provides key innovation impetus to a particular category of products.”

The lead market potential of a country depends on several mutually-reinforcing factors (see Figure 1). In the following I will introduce the individual factors briefly; the emphasis however would be on elaborating demand and technological advantages, which have been identified in earlier research as two key factors responsible for the emergence of lead markets in emerging economies (Tiwari and Herstatt, 2014a).

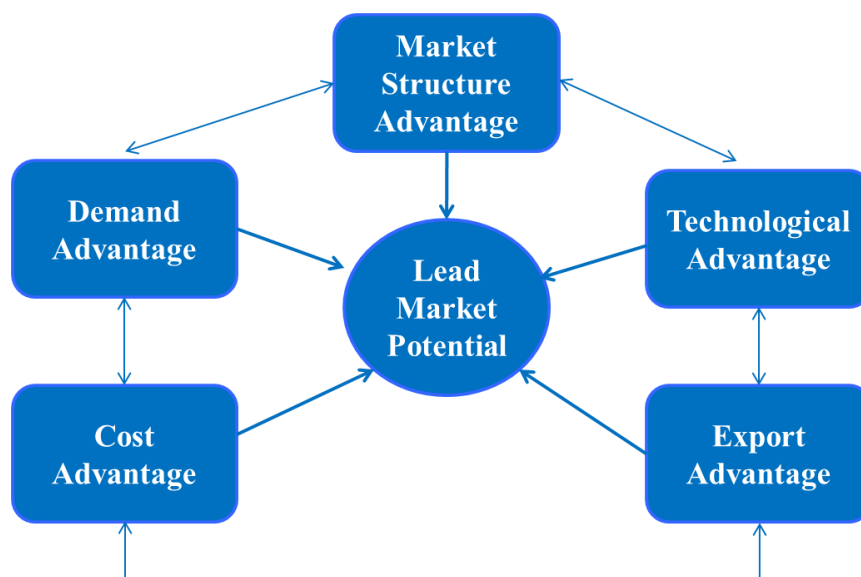


Figure 1: The 'lead market' model

3.2. Lead Market Factors

3.2.1. India's Market Structure Advantage

Market structure advantage means that a value-chain network with sufficient depth is available and that there is enough competition amongst firms to motivate them to innovate. India, unlike many other colonized nations, has had the advantage that already prior to Independence, “a small, but independent (Indian owned and controlled) industrial base had emerged” that enabled domestic entrepreneurs to capture about 75% of the market share (Chandra, Mukherjee, and Mukherjee, 2008: 443). Some large domestic conglomerates, such as the Tatas or the Birlas, had business interests in diverse fields banking, trade, automobiles and could successfully compete with MNEs (Chandra *et al*, 2008). After Independence, however, the government decided to tread on the path of a “mixed economy” that saw restrictions on industrial activity and market competition leading to scarcity of the industrial produce. This can be illustrated with one example from the automobile sector, which has only recently changed from being a seller's market in the “license raj”⁵ era prior to economic liberalization to a fully competitive market. The biography of K.P.S. Gill, former Director General of Police (DGP) in Punjab, who is often credited with putting down a militant insurgency, mentions that in the 1990s the Punjab Police was told by India's Union Home

⁵ The term “license raj” refers to a system of government permits, quotas and licenses in India that were required for almost any kind of industrial activity prior to economic liberalization. The Hindi term “raj” refers to “rule”, and it thus literally translates to the “rule of licenses” pointing to a high degree of bureaucratization. For example, the government decided which company could produce what sort of automobiles, how many models and in what numbers. Partly, it also tried to set the price of the product but was restrained by courts. For further details see, for example, Tiwari *et al* (2011).

Ministry to wait for “two-three years” for *placing* an order for bulletproof cars. Hindustan Motors, then the only licensed manufacturer of passenger cars (“Ambassadors”) in India was able to produce only five bulletproof cars a month and was having a huge backlog (Chandan, 2013). According to R.C. Bhargava (2010: 244), former managing director of Maruti, India’s leading carmaker, “the concepts of marketing and customer satisfaction were almost alien to the automobile industry” in the pre-liberalization era.

In the 1990s a series of economic reforms was launched to liberalize the economy (cf. Ahluwalia, 2002).⁶ Today, India is the seventh largest manufacturer of automobiles with a healthy mix of several domestic and global players. It has a large base of supporting and related industries that have been partly built as a deliberate government policy to promote self-reliance and sometimes also born as a necessity due to shortage of foreign exchange in the pre-liberalization period (Bhargava, 2010; Tiwari *et al*, 2011; GOI, 2012a). With a liberalized economy India is now home to a great number of active and successful entrepreneurs (Khanna, 2008); and it is ranked worldwide on the 13th place in terms of the availability of venture capital according to the Global Competitiveness Report 2015-16 (GOI, 2010). Professionally successful Indian diaspora in Silicon Valley and elsewhere has been active in “seeking to identify, fund and nurture creative entrepreneurship in the mother country” (Varma, 2005: 138). The country’s competitiveness is largely rooted in the success of India’s private sector firms (Das, 2012) and in the “basic physical and human infrastructure” created in the post-Independence era (Chandra *et al*, 2008).

3.2.2. India’s Export Advantage

A country can be seen as enjoying export advantages, when – for example – its domestic demand structure has similarities to foreign market conditions and when it has an industrial base that allows it to export its goods (or services) at competitive prices (Beise and Gemünden, 2004), without being significantly affected by negative country-of-origin effects (Johansson, Ronkainen, and Czinkota, 1994; Kotler and Gertner, 2002). The country should rather have positive visibility in international forums. Foreign trade and openness of a country for both incoming and outbound FDI generally also have a positive impact on innovation capabilities of a country (Goel, Dahlman, and Dutz, 2007). In turn, a lead market enables these innovations to diffuse more easily in other countries (Beise, 2001); creating a virtuous

⁶ For some interesting and detailed accounts of economic liberalization in India in the 1990s see, e.g., Ahluwalia (2002; 2006), Virmani (2009), Chandra (2016), or Ramesh (2015).

cycle between global integration of an economy and its lead market potential (Tiwari and Herstatt, 2014a).

India enjoys a lot of visibility in the field of affordable solutions, as has been discussed in section 1. Furthermore, India's membership in the World Trade Organization (WTO) and other multilateral organizations ensures an unrestricted access to most overseas markets for firms based in India. The country has become increasingly integrated in the global economy. Its total exports grew more than 17-folds within less than 25 years; from around USD 18 billion in FY 1990-91 to USD 311 billion in FY 2014-15 (RBI, 2015). Trade developments of the recent past continue to confirm this trend: in 5 years between FY 2009-10 and FY 2014-15, the export of engineering and electronic goods from India doubled from about USD 39 billion to USD 79 billion. The share of engineering and electronic goods in India's total exports also increased from 21% to 25% within this timeframe (RBI, 2015).

In terms of FDI, too, a similar picture can be observed. According to available data, the stock of outward FDI by Indian firms at the end of 2015 stood at USD 139 billion; up from USD 0.1 billion in 1991; in case of inward FDI by foreign MNEs, the stock at the end of 2015 was about USD 282 billion, while it had stood at USD 1.7 billion in 1991 (UNCTAD, 2016a; b). This has helped open up new export avenues and also reduced the negative country-of-origin effects. Brand names of globally-renowned MNEs using India as an innovation and production base and the "badge engineering"⁷ strategies adopted by some firms have mitigated the eventual negative effects of a "made in India" brand (Tiwari and Herstatt, 2014a).

3.2.3. India's Cost Advantage

India remains a low-cost nation in international comparison and the opportunity to benefit from large economies of scale helps further reduce the unit costs of production. As Table 2 shows, India enjoys a significant cost arbitrage in the manufacturing sector.

	India	China	USA	Germany
2012	1.59	3.07	37.71	42.42

Table 2: Average hourly compensation in manufacturing sector (in USD)⁸

India's cost advantage goes beyond manufacturing and spreads across industry sectors and professions. Lower costs, along with sheer availability of skilled professionals, remain one of

⁷ The term "badge engineering" refers to selling of a product under multiple brand names with minimal changes, e.g. in design or styling (Bracht, Barz, and Bickel, 2011).

⁸ Based on data by the Conference Board (2016)

the key drivers for the growth of India's IT industry (Prasad, 2008; Scholtissek, 2008; Simon, Näher, and Lauritzen, 2008). It is due to the availability of highly-skilled software engineers and their in international comparison well-affordable wages that Bangalore in India has evolved into "a top-caliber cluster for low-cost, high-quality software development" (Simon *et al*, 2008: 368). India's labor cost arbitrage is likely to remain "significant for decades to come" (Haddock and Jullens, 2009: 48).

The large industrial base in India that was set up after Independence as a part of self-reliance strategy, provides almost any industry sector with access to a wide range of domestic supporting and related industries enabling a high degree of localization. Use of local components reduces the dependence on imports of components and helps reduce costs (cf. Bhargava, 2010).

3.2.4. India's Demand Advantage

India possesses a very significant demand advantage in the field of frugal innovations. It is the second most-populous country in the world with close to 1.25 billion people and a large share of youth, which make it one of the largest unsaturated markets worldwide (Maira, 2005; GOI, 2012b). As per Census 2011, the country is home to 247 million households of which many still lack basic assets like refrigerators, televisions, telephones, computers, mediums of mobility, or access to formal banking services (GOI, 2012b). For some items the penetration was reported as low as 3% (access to the Internet) or 5% (ownership of a four-wheeler). A succinct but most articulate elaboration of India's demand advantage is probably given by Rama Bijapurkar (2013: 4 f.) in her book "A Never-Before World: Tracking the Evolution of Consumer India":

Never before have we seen so many consumers, mostly with modest incomes, mostly young (half of them below the age of twenty-five), subjected to so much technology in the after-Internet, after-cell-phones era, living in an age of optimism that comes from having had their real incomes consistently growing, sometimes four-fold in just one generation. Never before has there been a market so globally connected, and so connected at the same time with an ancient past. Never before has there been a youth culture defined by a whopping 600 million people below the age of twenty-five, mostly poor, but raised in a heady environment of rising incomes, aspirations and freedom of thought and speech, stimulated by an overactive media [...]"

India is a growing economy. Its GDP/capita is expected to increase from USD 1,617 in 2015 to USD 2,617 by 2021 (IMF, 2016), creating an immense consumption potential. Apart from

standard, known solutions, this also presents an opportunity for disruptive, non-conventional frugal solutions, e.g. on the basis of share economy or through social entrepreneurs. Even though India also has a large and growing market for luxury goods and services, in terms of sheer volume it constitutes merely a miniscule of the total market and its real potential (see, e.g., Bijapurkar, 2013: 293-297). The opportunities for affordability-enabling, excellent solutions in all industry and customer segments (e.g. public sector, B2B and B2C) are abundant in a growing economy that is home to a very young population and still has to create a large-scale, state of the art public infrastructure (see, e.g., Kalam and Singh, 2011; Ahluwalia, 2014). In fact, Bijapurkar (2009) has attributed the growth in India's overall consumption more to growth in the affordability of products and services than to growth in consumer incomes.

Another reason why India has become a hotbed for frugal innovations seems to lie in the prevailing socio-economic conditions of the country. First, cost-considerations have been always very prominent here. Bijapurkar (2013: 287 f.) cites the example of Indian consumers who ask, "Why should I pay for all these fancy boxes and cartons" and reports that as a result of this consumer behavior, "traditionally, suppliers in India have been very frugal with packaging due to cost considerations". Second, the socio-economic considerations have motivated people to innovate for social welfare. For example, Cyrus Poonawalla, founder of the Serum Institute of India, "got down to developing vaccines because that was the dire need in an agrarian country such as India" (Pawar, 2016: 245). Poonawalla, originally a student of commerce went on to study immune-biology, motivated by a desire to help the society, and is reported to sell "his vaccines on a 'no loss, no profit' basis in India" (Pawar, 2016: 245).

The public sector, too, has been active in finding recourse to frugal solutions for more efficient and effective governance. The state of Gujarat pioneered in launching "evening courts" to speed up the redressal of pending cases by better utilizing existing resources (Mahurkar, 2007). A special focus of these courts, which were first set up in 2006, was "to try cases involving small litigants, particularly daily wagers and self-employed who often had to loose income to attend to court cases" (The Hindu, 2006). In about 9 years since then the courts have helped clear the backlog of about 100,000 cases a year (DeshGujarat, 2016). As of April 2016, there were plans to use evening courts across the country to clear a backlog of about 30 million pending cases (CatchNews, 2016). The government has been reportedly also working on re-engineering procedures and incorporating alternative methods of dispute resolution into the judicial system to "substantially reduce litigation costs and ensure timely

and amicable resolution of disputes” (GOI, 2012c: 17). A whole slew of other measures, such as setting up of e-courts and delivery of summons by e-mail are among the measures that are being considered. There are plans to integrate post offices in this process to reach out to customers without personal access to the Internet (GOI, 2010; 2012c).

Frugal innovations, therefore, find a fertile ground in India where socio-cultural and geographic conditions often demand products, services, technologies or (organizational) processes that have been especially designed catering to these conditions, and where standardized solutions from global MNE portfolios often fall short to meet the needs and wants of people (cf. Prahalad and Lieberthal, 1998). The standard theory of international product lifecycle (Vernon, 1966) often fails to cut ground here, since India – as most other emerging markets – “has specific customer needs and fulfilment methods that have their roots in economic, social and cultural history as well as in business history” (Bijapurkar, 2013: 8). India’s basic demand advantage is rooted in the similarity of these socio-environmental conditions to those in many other developing nations (Tiwari and Herstatt, 2014a), where such innovative products with the necessary adaptations and localizations may be needed and thus demanded.

3.2.5. India’s Technological Asectordvantage

A country is thought to possess technological advantage if it is endowed with the necessary technological infrastructure and has access to tacit, first-hand knowledge (Tiwari and Herstatt, 2014a). Ever since independence, Indian state and the private sector have continuously invested in creating technological capabilities (Gupta and Dutta, 2005; Herstatt, Tiwari, Ernst, and Buse, 2008), which has helped create a domestic technology base with certain pockets of excellence, e.g. in information technology, chemical industries and pharma. Indian companies have learnt to innovate within high resource-constraints (see, e.g., Mashelkar, 2011; Maira, 2015) and are traditionally open to both collaborative and non-technical forms of innovations. Arun Maira, former Head of Boston Consulting Group in India who earlier also worked in various management positions at TELCO as Tata Motors was earlier called, recounts one of his experiences from the pre-economic liberalization era of the 1980s (Maira, 2015: 57 pp.):

“If TELCO wanted to enter the light commercial vehicle market, the government ruled that TELCO would not be allowed to import either technology or parts. The products would have to be designed in India and all parts would have to be made in India. The company decided to take up the challenge. [...] An audacious goal, with very high levels of cooperation within the team, enabled TELCO to produce a very successful 4-tonne

commercial vehicle, the Tata 407, within eighteen months. This was a world record in new product development time. Moreover, the Tata 407 was better suited to Indian conditions than the Japanese products.”

Resource-constraints, in an aspiring environment, are known to trigger cost-effective, good-quality solutions (Gibbert, Hoegl, and Välikangas, 2007; Sharma and Iyer, 2012). NASA's space research to develop “affordable excellence” under resource-constraints is well documented (McCurdy, 2001; Majchrzak, Cooper, and Neece, 2004). Significantly less study of economic aspects of space research by Indian Space Research Organization (ISRO) has taken place, even though it has managed to achieve substantial technological accomplishments like the Lunar and Mars missions on a shoestring budget. But the role of resource-constraints in creating affordable, high-tech solutions in India's space program is well documented in works of Dr. Abdul Kalam, former President of India, who had a long association with ISRO (Kalam and Tiwari, 2002; Kalam, 2003).

Another interesting example is delivered by the Punjab Police, which, while engaged in combating insurgency in the state, reportedly “established a working alliance with research labs all over the country” to overcome resource-constraints (Chandan, 2013: 146). This recourse to “open innovation” produced some very interesting results, apparently leading to certain radical innovations, as described in the biography of then-DGP K.P.S. Gill by author Rahul Chandan (2013: 147 p.)

“Gill laid emphasis on locally produced, low-cost improvements, rather than expensive imported equipment. A workshop was established [... that ...] developed bulletproof vehicles, bulletproof tractors, bulletproof mobile morcha, infrared torches, robots to handle live explosives and mobile elevated police posts/nakas. These innovations proved their mettle during anti-terrorist operations and were highly acclaimed improvisations. [...] The local laboratories also developed an electronic timer detector for time bombs. The device was, at that time, not available even in the international market. The cost of this device was only four percent of the commercial cost of comparable equipment after it was subsequently launched in the international market.”

But also on the formal R&D front, India's expenditure has increased 7-folds within about two decades, as per the last available figures, see Figure 2 (GOI, 2013). The per capita expenditure on R&D doubled from USD 4.8 in FY 2004-05 to USD 9.5 in FY 2009-10.

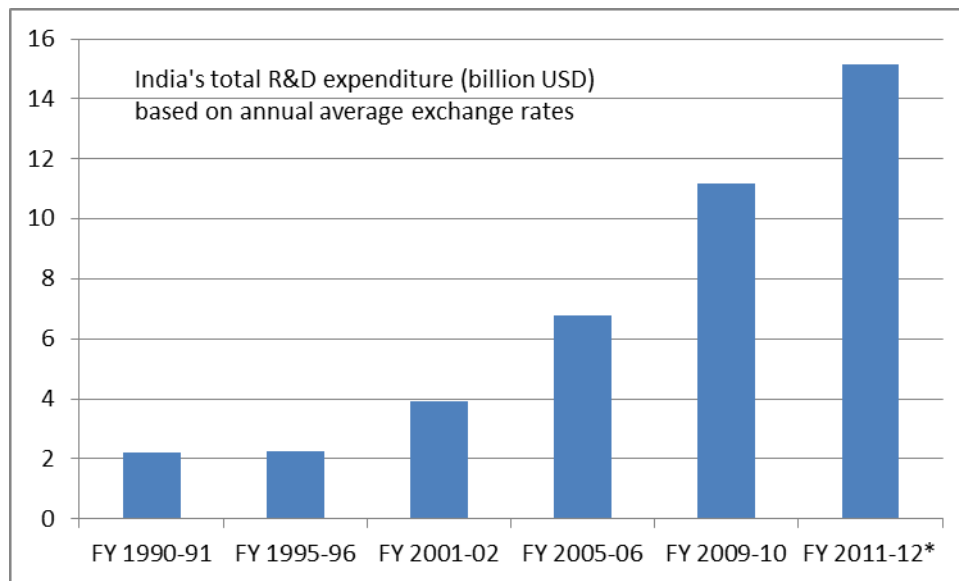


Figure 2: Trends in India's R&D expenditure in billion USD

At the same time, the share of the corporate sector in the national expenditure on R&D remains low. As per results of a national innovation survey in India, more than half of the innovative firms in the country “do not employ any scientists or engineers”, as a result most of the innovations coming out of such firms are incremental innovations that are “new to firm” but not really “new to world” (GOI, 2014).

“The diffusion and absorption of market-relevant knowledge from abroad can occur through a number of complementary channels—including trade and foreign direct investment (FDI), direct trade of knowledge through technology licensing, and mobility of people (foreign education, foreign training of nationals, and knowledge flows driven by the diaspora)” (Goel *et al*, 2007: 85). On all these fronts India possesses significant advantages, some of which are elaborated in the following.

India has a large and professionally successful diaspora abroad. Especially the Indian community in the Silicon Valley in the United States is known to have contributed to India's emergence as a technologically-advanced nation (Kapur, 2001; Nilekani, 2008; Tung, 2008). India is estimated to have a 28% market share in the USD 72 billion-strong global sourcing market for engineering, R&D and product development services, according to industry body NASSCOM (2016). This resultant experience of designing products for global companies and providing engineering and R&D services creates tacit knowledge, which increases the innovative capability of the domestic industry.

Technology licensing can be seen as a “key channel of domestic and global knowledge absorption” that was long underused in India (Goel *et al*, 2007: 89). The situation has, however, changed completely in the past 5-6 years, see Figure 3.

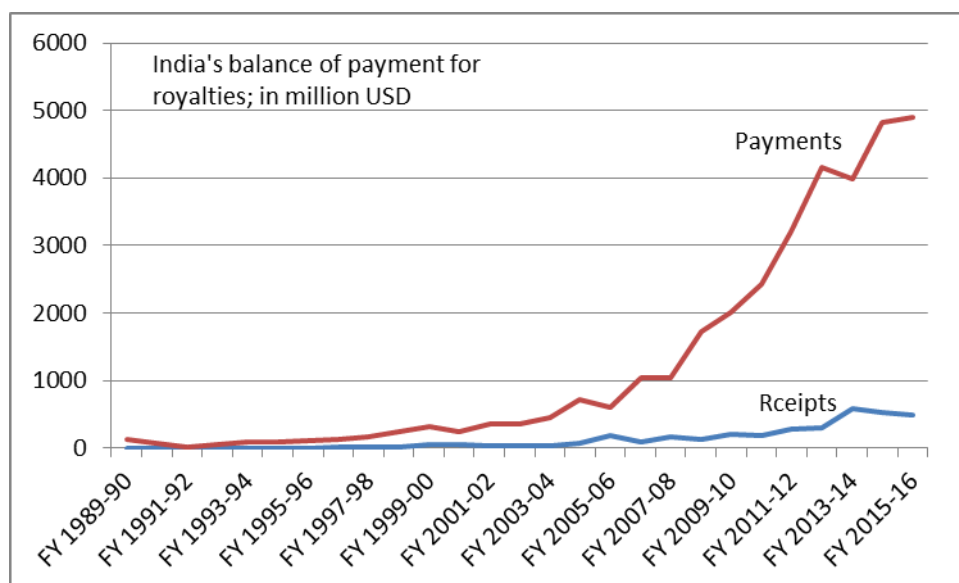


Figure 3: India's balance of payment for use of intellectual property⁹

As Figure 3 shows, India's payments for using intellectual property of overseas entities have grown almost exponentially, from being practically non-existent in the early 1990s, they climbed to almost USD 5 billion in FY 2015-16 as per data released by the Reserve Bank of India (RBI). The data also reveals that Indian organizations, too, even if on a low base, have started to generate revenues for their intellectual property. The integration in the global economy has given rise to new avenues in terms of technology-access for firms (Pradhan and Singh, 2009; Tiwari, 2011), and made it possible for firms to engage in “open global innovation networks” in the post-liberalization era (Tiwari and Herstatt, 2012). For example, the increasing share of sophisticated smart phones in India is estimated to cause India-based handset manufacturers to “together pay at least Rs 2,000 crore [close to USD 300 million] in royalty payments over the next four years [2016-2020] to foreign telecom equipment makers” (Rajendran, 2016).

Also in respect of non-technological innovations India ranks amongst highly innovative nations, as about 60% firms polled in a national innovation survey claimed to engage in non-technological innovations (GOI, 2014). An interesting example of frugality-oriented organizational processes in state institutions is provided by the Punjab Police, which while

⁹ Self-construction based on RBI data from various years; data from FY 2011-12 onwards in in the BPM6 format (1.A.b.8: “Charges for the use of intellectual property n.i.e.”). Prior data relates to payments and receipts for royalties.

fighting an armed insurgency in the state in 1990, came up with the idea of “mobile-cum-naka contingents” (a kind of police barricades) to free-up resources tied up at police pickets and barricades; and thereby created an additional and effective operational force with little extra expenses (Chandan, 2013). Rich descriptions of how organizational innovations have helped create highly disruptive, frugal products and services in India’s automobile industry can be found in Bhargava (2010), Chacko *et al* (2010), and Freiberg and Freiberg (2011).

3.3. Aggregated Factors of Lead Market Potential

Table 3 summarizes the most important factors for the individual advantage groups at a meta-level. It documents that overall India has a very high potential to turn into a lead market for frugal innovations.

Group	Factor	Endowment
Demand advantage	Size of domestic demand (B2C; B2B)	Very large
	Growth prospects (unsaturated market)	High
	Overall share of “frugal solutions” in the market	Very high
	Financial need for low cost of ownership (i.e. less innovation resistance against frugal solutions when per-capita income is low)	Very high (GDP/capita \$1700)
Cost advantage	Economies of scale (see size of demand, above)	Very large
	Manufacturing costs	Low
	State incentives for production of “frugal” solutions	Exist
Export advantage	Significant cost arbitrage (low cost manufacturing)	Yes
	Similarity of demand with key target markets/customer segment	Developing Asia, Africa, South America
	Embeddedness in international trade	Yes
	Overseas presence of domestic MNEs (a proxy for estimating avenues of sales; measured in no. of foreign affiliates and/or outward FDI stock)	Outward FDI stock USD 138 billion
Market structure advantage	A large and competitive industry	Yes
	Presence of strong domestic and global players	Yes
	Industrial base enabling localization of the value chain	Yes
Technology advantage	Availability of skilled professionals & Technical manpower	High
	First-hand, tacit understanding of customer needs/wishes in resource-constrained contexts	High

	A long-established R&D base of domestic firms	Limited
	Policy support for R&D (weighted tax deduction)	Yes
	Level of protection for IPR	Controversial/ improving
	Access to open global innovation networks	High

Table 3: A meta-level assessment of factors of lead market advantage¹⁰

4. Connecting Culture with Frugality

4.1. Role of Culture

While frugal innovations are increasingly gaining relevance in today's world, it is only recently that the role of interdisciplinary research, such as that of psychological and sociological factors as determinants of consumer acceptance for frugal products and services has been highlighted in scholarly discourse (Tiwari *et al*, 2016a). It is a rather undisputed fact that societies respond differently to human needs and desires. While some display greater permissiveness by allowing a more immediate gratification, other show an inclination towards restraint and postponement (see, e.g., Parsons, Shils, and Olds, 1951). In the following I examine some possible connections of the various dimensions of "national culture" (Hofstede, Hofstede, and Minkov, 2010) on the acceptance of frugality in a society.

In Geert Hofstede's model, the societal preference for thrift or frugality explicitly impacts at least two dimensions of culture, i.e. "short-term vs. long-term orientation"; and "indulgence vs. restraint". Societies that display a long-term orientation and/or that are more inclined towards restraint tend to display greater acceptance of thrift/frugality as a value. Indulgence, on the other hand, has been found to correlate "negatively with choosing thrift as a valuable trait for children" (Hofstede *et al*, 2010: 281). Cultures with long-term orientation seem to favor thrift and "being sparing with resources" as people are more willing to subordinate themselves for a purpose, whilst cultures with short-term orientation tend to create "social pressure towards spending" as these are more concerned "with social and status obligations" (Hofstede *et al*, 2010: 243). This can be exemplified by an account provided by Roman author Pliny (23 AD – 79 AD), who writing about the inhabitants of Taprobane (an island in the Indian Ocean, very probably Sri Lanka) narrates (McCrinkle, 1901: 106):

¹⁰ Assessment schema based on Tiwari and Herstatt (2014a: 191)

“Their articles of luxury surpass our own, and they have them in great abundance. They asserted that their wealth is greater than ours, but acknowledged that we excelled them in the art of deriving enjoyment from opulence.”

The quote above suggests that indulgence is not merely a matter of actual endowment with (luxury) goods but also a question of socio-cultural practices that set the extent to which members of the society can derive pleasure out of them.

Also other dimensions, to a varying degree and in specific contexts, let themselves connect to frugality or the lack thereof. For example, Hofstede and his co-authors state that “status symbols are suspect” in cultures with low “power distance”, and that “subordinates will most likely comment negatively to their neighbors if their boss spends company money on an expensive car” (Hofstede *et al*, 2010: 74). Conversely, in cultures with high power distance there may be tendencies to acquire status symbols, leading to extravagance by some; but those not belonging to the elite class may be more open to frugal solutions.

Collectivist societies, on average, tend to have lower per-capita income in comparison to more individualist societies. As a norm, people in collectivist societies seem to be more open to sharing resources with relatives, whereas individualist societies prefer personal ownership of resources, even for small children (Hofstede *et al*, 2010: 113). Therefore, it seems probable that societies, which tend to be rather collectivist, would be more open for a frugal lifestyle and, as a consequence, more willing to adopt frugal solutions.

In societies tending towards masculinity, “challenges, earnings, recognition, and advancements are important”, and men are expected to be “assertive, ambitious, and tough”, whereas in more feminine cultures both genders are expected to be modest (Hofstede *et al*, 2010: 155). Relating this cultural dimension to consumer behavior, Hofstede *et al* (2010: 165) assert that “more status products are sold” in masculine societies. This would indicate that cultures that are rather feminine should be expected to be more open for frugal products and services.

Cultures with less need for “uncertainty avoidance” tend to feel “comfortable in ambiguous situations and with unfamiliar risks”, while people in cultures with high uncertainty avoidance feel more often threatened by unfamiliar risks (Hofstede *et al*, 2010: 203). As a result, we may expect that cultures with high uncertainty avoidance may more often seek “the perfect” solutions and therefore might be more skeptical of frugal solutions. This inference is in line

with the observation by Hofstede *et al* (2010: 208) that in societies with strong uncertainty avoidance advertiser rather use the appeal of expertise than the appeal of humor.

4.2. Conventional Role of Frugality in India

Applying the Hofstede model to India we can observe (see Figure 4) that the country tends more towards restraint than indulgence, which would favor frugality. The high degree of power distance also indicates that there would possibly be a large demand for modest solutions from the non-elite members of the society. Indian society, on average, also seems to be less inclined to avoid uncertainty and rather tends to collectivism and long-term orientation that again are more related to frugality than extravagance. The relative inclination towards masculinity would mitigate this preference for frugal solutions to some extent, though. All in all, the scores suggest that the society's culture, on a generalized level, may be more open to towards frugality in life.

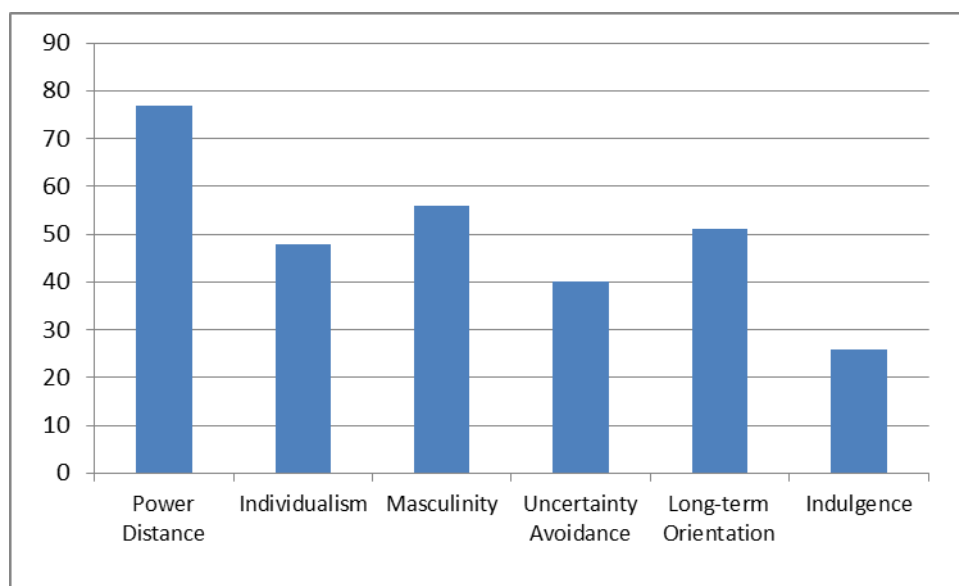


Figure 4: India's scores on the cultural dimensions of the Hofstede model

(based on values available at www.geert-hofstede.com, retrieved July 16, 2016)

I now propose to cross-verify this indication with some anecdotal evidence from ancient and modern-day India to generate some potentially interesting, even if preliminary, insights about the conventional role of frugality in India.

The *Mahabharata*, an important religious-historical epic of Hinduism, sheds light on how frugal lifestyle and contentment were idealized in ancient India.¹¹

“Desire, aversion, and lust, one should dispel by patience; error, ignorance, and doubt, by study of truth [...]

“By frugal and easily digestible fare one should drive off all disorders and diseases. By contentment one should dispel greed and stupefaction of judgment, and all worldly concerns should be avoided by knowledge of the truth.

“By practicing benevolence one should conquer iniquity, and by regard for all creatures one should acquire virtue. One should avoid expectation by the reflection that it is concerned with the future; and one should cast off wealth by abandoning desire itself. The man of intelligence should abandon affection by recollecting that everything (here) is transitory. He should subdue hunger by practicing Yoga. By practicing benevolence one should keep off all ideas of self-importance, and drive off all sorts of craving by adopting contentment.”

The text above, apparently, recommends avoiding indulgence in self-importance; which might explain why status symbols would not have had the same meaning in this cultural context as opposed to some other cultures. The passage here also delivers one possible explanation why India tends more towards restraint (and not indulgence) in the dimensions of national culture proposed by Hofstede *et al* (2010).¹²

In a later period, Kautilya, advisor to Emperor Chandragupta Maurya (ca. 322–297 BCE) and renowned author of *Arthashastra* – a much-celebrated treatise on statecraft – advises the state to be *prudent* (a synonym for being frugal as per its dictionary meaning). According to a translation of original Sanskrit text, Kautilya, sometimes referred to as Indian Machiavelli, advises that “the state should run a diversified economy actively, efficiently, prudently and profitably” (Rangarajan, 1992: 74). Writing about Kautilya’s contemporary Indian society, later-day Greek geographer and historian Strabo (ca. 64 BCE – ca. 24 AD) reported that Indians “live sparingly and are healthy, even though their country produces everything in

¹¹ Section CCLXXIV of the *Mahabharata*. Source: <http://www.sacred-texts.com/hin/m12/m12b101.htm>, retrieved July 29, 2016.

¹² It must be remembered that the religious/moral recommendations were more of an indicator of idealized or preferred moral values and not necessarily the actual ways of life. Nonetheless, they show what values were considered right or wrong in a given society.

abundance” (Jain, 2011: 17).¹³ Quoting accounts provided by Megasthenes, Greek ambassador in the court of Chandragupta Maurya, Strabo writes further:

“The Indians all live frugally [...]. They lead nevertheless happy lives, being simple in their manners and frugal. [...] In contrast to the simplicity they observe in other matters, they love finery and ornament. They wear dresses worked in gold, and adorned with precious stones, and also flowered robes made of fine muslin. [...] they hold beauty in high esteem and resort to any device which helps to improve their looks” (Jain, 2011: 21).

This shows that for ancient Indians frugality was not an outcome of poverty. Rather, it was rooted in culture, which allowed them to indulge in other pleasures. According to Bijapurkar (2013: 319), “acquiring things has not been taboo; the ascetic and abstemious life was not the prescription at all for the householder – it only cautioned people to enjoy, but not get attached”. Looking at the contemporary India one might get the impression that, leaving aside stark generalizations, not much has changed in this regard in the society. Writing about 2000 years after Strabo, Mark Tully, the long-time correspondent of British Broadcasting Corporation in India and a prolific author, observed (Tully, 1992: 101):

“There is nothing that Hindus respect more than austerity in others, no matter how much difficulty they may find in practicing it themselves. Austerity was one of the keys to Mahatma Gandhi’s success.”

So while the frugality of Indians in times of Chandragupta Maurya seems to be more of a voluntary/cultural phenomenon, Tully’s observations, if correct, would point to a set of ideals, which – though not achievable for everyone – act as a “moral compass”. Mahatma Gandhi’s choosing of a frugal lifestyle has been also analyzed by Rajiv Malhotra (2011: 348), who dwells upon the supposed motives of Gandhi:

“The unsustainability of British industrialization was prominent among his [Mahatma Gandhi’s] concerns, making him arguably the first modern environmentalist. He noticed that the ever-increasing consumption in an industrial economy depletes the natural resources and destroys the self-sustaining villages which comprise the social fabric of

¹³ McCrindle (1901) provides a very interesting compilation of ancient India as described in classic Greek and Latin literature. There are several accounts of the contemporary Indian societies, beginning around 400 BC, that showcase the role of frugality in then-India. For example, Strabo is reported as narrating the story of Mandanis, a Brahmin whom messengers of Alexander the Great wanted to take to Alexander “with the promise of gifts if he complied, and threats of punishment if he refused”. But Mandanis did not go. “[...] he wanted none of the gifts of a man whose desires nothing could satiate, and as little did he fear his threats, for while he lived India would supply him with food enough, and when he died he would be delivered from the flesh now wasted with age, and would be translated to a better and purer state of existence” (McCrindle, 1901: 74).

India. In response to this he advocated and embodied a simple lifestyle. The sum total of all of his belongings were his glasses, a pair of sandals, a pen and a few dhotis.”

This brings to the fore a new dimension of another kind of voluntary simplicity, one which arises as a deliberate choice out of social/environmental concerns. Many Indians, for whatever personal or ideological reasons, are attracted to the motto “सादा जीवन, उच्च विचार” (*sada Jeevan, uchch vichar*), which may be translated as “simple living, high thinking”. Many renowned and respected Indian personalities are known for their simple lifestyles. For example, Narayana Murthy, one of the richest persons in the country with estimated assets worth USD 1.9 billion,¹⁴ and co-founder of Infosys, a top-league IT company of India, reportedly “works out of a simple desk in a smallish room whose door is always open. His only luxury is an Opel Astra car [...]” (Varma, 2005: 138). Stories of such simplicity contribute to their popularity

However, yet another dimension, namely that of involuntary frugal lifestyles in India cannot be denied and has been highlighted by Shashi Tharoor (2007: 341): “Asceticism always thrives better in penury”. This statement may well be true for many Indian consumers today who are faced with financial constraints.

Therefore, it may be said that the prevalent cultural norms in India, in conjunction with given socio-economic factors, lead to acceptance of simplicity and frugality as respected social values. A person leading a frugal lifestyle, voluntary or otherwise, in India does not necessarily have to feel ashamed, as can be seen in this narration by Chetan Bhagat (2012: viii p.), a celebrated author from India, of his childhood:

“I come from a simple middle-class family. Both my parents worked for the government and I grew up in Delhi. Throughout my childhood, I remember the shortage of money being a constant theme in the house. We had enough to run the kitchen and pay for utilities but little to build assets on or make major expenses. For instance, we couldn't repair a broken sofa for years. When guests came to our house, we found it expensive to serve Coke and served lemonade instead. We rarely ate out in restaurants and when we did, we did so with caution, figuring out the cheapest and most-filling items on the menu. Funnily enough, we never felt deprived. I took the shortage of money as an essential factor of life. In a country like India, we were still better off than millions.”

¹⁴ Source: <http://www.forbes.com/profile/nr-narayana-murthy/>, retrieved: August 3, 2016.

5. Select Results of an Empirical Survey

5.1. Survey Settings

In a survey conducted with students of Hamburg University of Technology (TUHH) the respondents were asked to state their preferences in the hypothetical situation of purchasing a car. The respondents, who were international students of industrial-engineering related Master courses, all held an engineer's degree in Bachelors and had visited one compulsory course in Intercultural Management and Communication; but they did not necessarily know about frugal innovation. The respondents were asked to imagine that they were about to purchase a car and had financial resources to be able to afford a high-end (premium) car with many technological functions or a frugal car with good-enough quality and better fuel efficiency so that its total cost of ownership (TCO) was 33% lower than that of the high-end car. Both models, otherwise, fulfilled the core needs (e.g. space, number of seats) in a similar fashion. The respondents were then requested to elaborate their answers and state lower and upper thresholds in terms of the "price point" and TCO. Later they were asked to relate their choice to any 3 dimensions of culture based on the Hofstede model and whether they thought their choice was in sync with their respective national culture.

5.2. Key Results and an Indian Perspective

The survey returned 111 valid responses. Respondents displayed a remarkable preference for the frugal model, 76 of the 111 participants (68%) said they would choose a good enough car, while the rest said they preferred a high-end car. Amongst German students (n=62), 61% chose a frugal car. Amongst international students Indians constituted the largest group (n=22), here an overwhelming majority (18; 82%) stated to opt for a frugal model. In general students from developing and emerging economies (31 out of 40; 78%) had an above-average preference for the frugal car, while students from the industrialized world (47 out of 71; 66%) were also not far behind. Within the group of non-industrialized countries excluding India the preference for the frugal car stood at 73%.

The open-ended responses by participants selecting a frugal model were analyzed and condensed into categories that led to identification of 8 primary motivation factors. This analysis brought to fore a few interesting perspectives (see Table 4).

Motivation for Preferring a Frugal Car (multiple options)	Indian Respondents (n = 18)	Other Respondents (n=58)
Save money (for some other purchase)	89%	78%
A car is a mere mode of transport	33%	53%
Avoid unnecessary technological functionalities	28%	29%
Simplicity as a moral principle	17%	10%
Chance to often purchase replacement products	6%	0%
Environmental concerns	6%	43%
Allows me to look different	6%	0%
I reject purchasing status symbols	0%	43%

Table 4: Comparison of motivational factors in preferring frugal solutions

While most respondents desired to save money by preferring a frugal car, this reason was even stronger with Indian respondents. Interesting to note is that this is the singularly dominant reason for survey participants from India to purchase a frugal model, whereas among non-Indian participants many expressed the view that a car is a mere mode of transport. A significant number (43%) of non-Indian respondents also cited environmental concerns or a deliberate rejection of status symbols as a reason for this choice. Interestingly, not a single Indian respondent gave an answer, which could be interpreted as rejecting status symbols. This is in line with Hofstede's assertion that societies with higher power distance tend to value status symbols.

The results, therefore, seem to indicate that the frugality in India, at least among well-educated youth today, is rather motivated by financial considerations;¹⁵ that can be correlated to cultural dimensions like long-term orientation and restraint. It must be, of course, noted that this is a non-representative survey with a small group sample. The results are rather meant to generate some plausible working hypotheses for a more detailed study at a later stage and here they seem in alignment with the insights generated in other sections of this paper.

6. Conclusions

This study set out to assess frugality in the Indian context and then to investigate what makes India a lead market for affordable excellence. For this purpose I followed a two-pronged

¹⁵ Weyrauch and Herstatt (2016) have argued along similar lines by stating the cost reduction along with optimized performance levels and the focus on core functionalities to be *the* defining criteria of frugal innovations. In my opinion, however, the environmental aspects must constitute a core part of frugal innovations to ensure their "social responsibility", especially in the context of the industrialized world ("frugality 3.0").

strategy. First, I applied the lead market model, at a meta level, to the Indian context and analyzed the various advantage factors regarding their lead market potential. These factors revealed that India is endowed with many advantages – especially on the demand and technological capabilities fronts – that make it a very attractive market for frugal innovations, which can be later introduced in other markets with comparable socio-economic conditions or even in the industrialized world. India's increasing integration in the global economy provides a conducive atmosphere for that.

The second component of the study was to analyze India's penchant for frugality through the lens of culture. The analysis shows that India traditionally has had, for a variety of reasons, a positive societal attitude towards frugality. In modern India, resource-constraints have been a key facilitator of affordable yet high-quality solutions while the high social acceptance of uncertainty increases acceptance of unconventional and innovative solutions.

Finally, the survey results with Indian students confirm these insights and indicate that young and well-educated Indian consumers show a high preference for frugal solutions. The acceptance seems to be, however, primarily motivated by financial considerations and in that it varies from their global counterparts, who put emphasis on environmental aspects in their pursuit of frugality and often reject use of status symbols. This also puts some possibly strong limits on India's potential as a lead market, especially for those countries where environmental concerns are a key driver of frugality in life. This is an area needing consideration by Indian managers and policymakers in order to fully utilize the country's lead market potential. In words of Rama Bijapurkar (2013: 287)

“India has the opportunity to get there [green products and sustainable development] ahead of others by not starting down the bad road at all, because most of India is yet to seriously begin its consumption journey. Recycling has always been what the ‘value-conscious’ Indian consumer has always done, never wanting to throw anything away.”

Indian firms and organizations should, therefore, also seek to work together with their counterparts in countries like Germany and Japan. Both countries have significant engineering and design capabilities and have a history of creating “affordable excellence”, even if the concept of frugality has been pushed to the background there in the era of affluence and market saturation. Especially Japan, a country endowed with little natural resources, continues to produce innovations that are characterized by their resource efficiency. Germany has significant societal and governmental support for environmental sustainability and could be a valuable partner in advancing frugal innovations to the next level of “affordable green

excellence". The capacity to uplift its products and services from catering to the needs of frugality 2.0 to meeting needs and wants of frugality 3.0 would be a key determinant for whether India remains a lead market of frugal innovations mostly for the emerging economies or if it would possibly turn into a global lead market for affordable and sustainable excellence.

Even though the results of this study are still of preliminary nature and need to be confirmed in larger-scale, representative studies, they point to a potentially very significant connection, i.e. of national culture with innovation in the context of frugality-driven solutions. This is a research field which has not attracted much attention by scholars yet, but it might hold promising results.

One thing may be, however, said with relative certainty: India is endowed with a culture and other socio-economic factors that increase the acceptance of frugal innovations. Demand for affordable green excellence is increasing globally and India may benefit from it immensely, provided it does its homework.

Bibliography

- Adamson, G., Ed. (2003): *Industrial Strength Design: How Brooks Stevens Shaped Your World*, Cambridge, Mass., MIT Press.
- Agarwal, N. and A. Brem (2012): Frugal and reverse innovation - Literature overview and case study insights from a German MNC in India and China, *Proceedings of the 2012 18th International Conference on Engineering, Technology and Innovation* B. Katzi, T. Holzmann, K. Sailer and K. D. Thoben, Munich, IEEE.
- Ahluwalia, I. J. (2014): *Transforming Our Cities: Postcards of Change*, Noida, HarperCollins.
- Ahluwalia, M. S. (2002): "Economic Reforms in India since 1991: Has Gradualism Worked?," *Journal of Economic Perspectives* 16(3): 67-88.
- Ahluwalia, M. S. (2006): "India's Experience with Globalisation," *Australian Economic Review* 39(1): 1-13.
- Arnett, D. K. and S. A. Claas (2015): Frugal Innovation: Solutions for Sustainable Global Cardiovascular Health, in: J. P. Andrade, F. J. Pinto and D. K. Arnett, *Prevention of Cardiovascular Diseases: From Current Evidence to Clinical Practice*, Cham, Springer International.
- Baron, C. (1978): "Appropriate technology comes of age: a review of some recent literature and aid policy statements," *International Labour Review* 117(5): 625-634.
- Bartlett, C. A. and S. Ghoshal (1990): Managing innovation in the transnational corporation, in: C. A. Bartlett, Y. L. Doz and G. Hedlund, *Managing the Global Firm*, London, Routledge: 215-255.
- Barzelay, M. (1993): "The Single Case Study as Intellectually Ambitious Inquiry," *Journal of Public Administration Research and Theory* 3(3): 305-318.
- Basu, R. R., P. M. Banerjee, and E. G. Sweeny (2013): "Frugal Innovation: Core Competencies to Address Global Sustainability," *Journal of Management for Global Sustainability* 2: 63-82.
- Beise, M. (2001): *Lead Markets: Country-Specific Success Factors of the Global Diffusion of Innovations*, Heidelberg, Physica-Verlag.
- Beise, M. (2004): "Lead Markets: Country-Specific Success Factors of the Global Diffusion of Innovations," *Research Policy* 33(6-7): 997-1018.

- Beise, M. and H. G. Gemünden (2004): "Lead Markets: A New Framework for the International Diffusion of Innovation," *Management International Review* 44(Special Issue 2004/03): 83-102.
- Bergmann, S. and R. Tiwari (2016): Visibility and Acceptance of Frugal Innovation in German-speaking Countries, *Scientific Symposium on Potentials of Frugal Innovation in Industrial Countries*, Leipzig, Fraunhofer Center for International Management and Knowledge Economy.
- Bhagat, C. (2012): *What Young India Wants: Selected Essays and Columns*, New Delhi, Rupa Publications.
- Bhargava, R. C. (2010): *The Maruti Story: How a Public Sector Put India on Wheels*, New Delhi, Collins Business.
- Bhatti, Y. A. and M. Ventresca (2012): "The Emerging Market for Frugal Innovation: Fad, Fashion, or Fit?", Working Paper, Oxford, Said Business School.
- Bijapurkar, R. (2009): *We are like that only: Understanding the logic of Consumer India*, New Delhi, Penguin Books.
- Bijapurkar, R. (2013): *A Never-Before World: Tracking the Evolution of Consumer India*, New Delhi, Penguin Books.
- Bogner, A., M. Decker, and M. Sotoudeh, Eds. (2015): *Responsible Innovation: Neue Impulse für die Technikfolgenabschätzung*, Baden-Baden, Nomos.
- Böttcher, D. (2012): The Land of Many Fields, in: CLAAS Group, *2012 Annual report: New Ways*, Harsewinkel, CLAAS KGaA mbH: 5-13.
- Bound, K. and I. Thornton (2012): *Our Frugal Future: Lessons from India's innovation system*, London, NESTA.
- Bracht, U., D. Barz, and H. Bickel (2011): "Kooperation bei Fahrzeugprojekten im Rahmen des Badge-Engineering: Methode zur Unterstützung der Aufbauphase entsprechender Kooperationen in der Automobilindustrie," *wt Werkstattstechnik online* 101(4): 187-193.
- Brem, A. and B. Ivens (2013): "Do Frugal and Reverse Innovation Foster Sustainability? Introduction of a Conceptual Framework," *Journal of Technology Management for Growing Economies* 4(2): 31-50.
- Bruche, G. (2009): "The emergence of China and India as new competitors in MNC's innovation networks," *Competition & Change* 13(3): 267-288.
- Bruche, G. and D. Wäldchen (2013): "Racing to the top? Catch-up strategies of Chinese and Indian independent car manufacturers," *International Journal of Automotive Technology and Management* 13(1).
- Cappelli, P., H. Singh, J. Singh, and M. Useem (2010): "The India Way: Lessons for the U.S.," *Academy of Management Perspectives* 24(2): 6-24.
- CatchNews (2016, April 23): "Evening courts will be revived to help clear 3 crore pending cases," Retrieved August 2, 2016.
- Chacko, P., C. Noronha, and S. Agrawal (2010): *Small Wonder: The Making of the Nano*, Chennai, Westland Ltd.
- Chancellor, J. and S. Lyubomirsky (2011): "Happiness and thrift: When (spending) less is (hedonically) more," *Journal of Consumer Psychology* 21: 131-138.
- Chandan, R. (2013): *KPS Gill: The Paramount Cop*, Noida, Maple Press.
- Chandra, B., M. Mukherjee, and A. Mukherjee (2008): *India Since Independence*, Gurgaon, Penguin Books.
- Cleff, T. and K. Rennings (2012): "Are there any first-mover advantages for pioneering firms?: Lead market orientated business strategies for environmental innovation," *European Journal of Innovation Management* 15(4): 491-513.
- Das, G. (2012): *India grows at Night: A Liberal Case for a Strong State*, in, New Delhi, Allen Lane.
- DeshGujarat (2016, April 24): "CM-CJ Conference: Evening courts resolved over 9 lakh cases in Gujarat," Retrieved August 2, 2016, from <http://deshgujarat.com/2016/04/24/cm-cj-conference-evening-courts-resolved-over-9-lakh-cases-in-gujarat/>.
- Dierig, C., N. Doll, G. Hegmann, and T. Kaiser (2015, June 30): "Made in Germany: Dank deutscher Naivität schnappt China-Falle zu," Retrieved 17.07.2015, from <http://www.welt.de/wirtschaft/article143307503/Dank-deutscher-Naivitaet-schnappt-China-Falle-zu.html>.

- Dutz, M. A., Ed. (2007): *Unleashing India's Innovation: Toward Sustainable and Inclusive Growth*, Washington D.C., The World Bank.
- Economic Times (2012): Solar ATMs fuel rural revolution in India, *Economic Times*, Mumbai, 03.01.2012.
- Economist (2009): Health care in India: Lessons from a frugal innovator, *The Economist*, 18.04.2009: 67-68.
- Elgin, D. (1981): *Voluntary Simplicity: Towards a Way of Life that is Outwardly Simple, Inwardly Rich*, New York, Harper.
- Freiberg, K., J. Freiberg, and D. Dunston (2011): *Nanovation: How a Little Car Can Teach the World to Think Big & Act Bold*, Nashville (Tennessee), Thomas Nelson.
- Gibbert, M., M. Hoegl, and L. Välikangas (2007): "In Praise of Resource Constraints," *MIT Sloan Management Review* 48(3): 15-17.
- Goel, V. K., C. Dahlman, and M. A. Dutz (2007): Diffusing and Absorbing Knowledge, in: M. A. Dutz, *Unleashing India's Innovation: Toward Sustainable and Inclusive Growth*, Washington D.C., The World Bank: 83-103.
- GOI (2010, n.d.): "Courts of Tomorrow," Retrieved August 2, 2016, from http://innovationcouncilarchive.nic.in/index.php?option=com_content&view=article&id=329&Itemid=115.
- GOI (2012a): "Courts of Tomorrow: Technology adoption for delivery of timely justice", Working Paper, New Delhi, Office of Adviser to the Prime Minister: Public Information Infrastructure & Innovations, Government of India.
- GOI (2012b): "Housing, Household Amenities and Assets - Key Results from Census 2011", New Delhi, Government of India - Registrar General & Census Commissioner.
- GOI (2012c): "National Mission for Delivery of Justice and Legal Reform: 'Towards Timely Delivery of Justice to All'", A Blueprint for Justice Reforms, Strategic Initiatives, 2009-2012, New Delhi, Ministry of Law and Justice, Government of India.
- GOI (2013): "Research and Development Statistics, 2011-12", New Delhi, Government of India - Department of Science and Technology (NSTMIS Division).
- GOI (2014): *Understanding Innovation: Indian National Innovation Survey*, New Delhi, National Science and Technology Management Information System (NSTMIS), Department of Science and Technology (DST), Government of India.
- Govindarajan, V. and R. Ramamurti (2013): "Delivering World Class Healthcare, Affordably: Innovative Hospitals in India are Pointing the Way," *Harvard Business Review* 91(11): 1-7.
- Govindarajan, V. and C. Trimble (2012): "Reverse innovation: a global growth strategy that could preempt disruption at home," *Strategy & Leadership* 40(5): 5-11.
- Grieve, R. H. (2004): "Appropriate Technology in a Globalizing World," *International Journal of Technology Management and Sustainable Development* 3(3): 173-187.
- Gupta, A. and P. K. Dutta (2005): Indian Innovation System - Perspectives and Challenges, in: UN-ESCAP, *National Innovation Systems (NIS) in the Asia-Pacific Region*, New York, United Nations' Economic and Social Commission for Asia and the Pacific: 92-114.
- Gupta, A. K. (2000): Grassroot Innovations for Survival, *LEISA India*, 2 (2) July: 20-21.
- Gupta, A. K. (2003): Conserving Biodiversity and Rewarding Associated Knowledge and Innovation Systems: Honey Bee Perspective, in: T. Cottier and P. C. Mavroidis, *Intellectual property: Trade, competition, and sustainable development*, Ann Arbor, Michigan, University of Michigan Press, Vol. 3: 373-402.
- Gupta, A. K. (2010): Grassroot Green Innovations for Inclusive, Sustainable Development, in: A. López-Carlos, *The Innovation for Development Report 2009-2010: Strengthening Innovation for the Prosperity of Nations*, Hampshire, Palgrave Macmillan: 137-146.
- Haddock, R. and J. Jullens (2009): "The Best Years of the Auto Industry Are Still to Come," *strategy+business* Issue 55(Summer): 36-48.
- Hall, J., S. Matos, L. Sheehan, and B. Silvestre (2012): "Entrepreneurship and Innovation at the Base of the Pyramid: A Recipe for Inclusive Growth or Social Exclusion?," *Journal of Management Studies* 49(4): 785-812.
- Hammond, A. L. and C. K. Prahalad (2004): Selling to the Poor, *Foreign Policy*, May-June: 30-37.
- Hanna, N. K. (2010): *Enabling Enterprise Transformation: Business and Grassroots Innovation for the Knowledge Economy*, New York, Springer.

- Hanna, P. (2012): "The Evolution of Simplicity and Meaning," *Journal of Product Innovation Management* 29(3): 352-354.
- Heinberg, R. (2011): *The End of Growth: Adapting to Our New Economic Reality*, Gabriola Island, New Society Publishers.
- Herstatt, C. (2015): Produkteentwicklung: Konsum in Zeiten « frugaler Innovationen », *Neue Zürcher Zeitung*, Zurich, Jun. 10.
- Herstatt, C., R. Tiwari, D. Ernst, and S. Buse (2008): "India's National Innovation System: Key Elements and Corporate Perspectives", Economics Series, Working Paper No. 96, Honolulu, Hawaii, East-West Center.
- Hofstede, G., G. J. Hofstede, and M. Minkov (2010): *Cultures and Organizations: Software of the Mind - Intercultural Cooperation and its Importance for Survival*, New York, McGraw-Hill Books.
- Holtbrügge, D. (2013): "Indigenous Management Research," *Management International Review* 53: 1-11.
- IBEF (2016): "Automobile Industry in India", New Delhi, India Brand Equity Foundation.
- IMF (2016): *World Economic Outlook (April 2016): Too Slow for Two Long*, Washington, D.C., International Monetary Fund.
- Immelt, J. R., V. Govindarajan, and C. Trimble (2009): "How GE Is Disrupting Itself," *Harvard Business Review* 87(10): 56-65.
- Jain, S., Ed. (2011): *The India They Saw. Foreign Accounts: 5th Century BC - 7th Century AD*, New Delhi, Ocean Books.
- Johansson, J. K., I. A. Ronkainen, and M. R. Czinkota (1994): "Negative Country-of-Origin Effects: The Case of the New Russia," *Journal of International Business Studies* 25(1): 157-176.
- Kalam, A. P. J. A. (2003): *Ignited Minds: Unleashing the Power within India*, New Delhi, Penguin Books.
- Kalam, A. P. J. A. and S. P. Singh (2011): *Target 3 Billion - PURA: Innovation Solutions towards Sustainable Development*, New Delhi, Penguin Books.
- Kalam, A. P. J. A. and A. Tiwari (2002): *Wings of Fire: An Autobiography*, Hyderabad, Universities Press.
- Kapur, D. (2001): "Diasporas and Technology Transfer," *Journal of Human Development* 2(2): 265-286.
- Khanna, T. (2008): *Billions of Entrepreneurs: How China and India are Reshaping their Fortunes - and Yours*, New Delhi, Penguin.
- Kobayashi-Hillary, M. (2005): *Outsourcing to India: The Offshore Advantage*, Heidelberg, Springer-Verlag.
- Kotler, P. and D. Gertner (2002): "Country as brand, products, and beyond: A place marketing and brand management perspective," *Journal of Brand Management* 9(4/5): 249-261.
- KPMG (2008): "Knowledge Process Outsourcing: Unlocking top-line growth by outsourcing "the core"", IT Advisory, KPMG.
- Kumar, N. and P. Puranam (2012): *India Inside: The Emerging Innovation Challenge to the West*, Boston, MA, Harvard Business Review Press.
- Lai, W. (2013): Frugality, in: O. Leaman, *Encyclopedia of Eastern Philosophy*, London, Routledge: 208-209.
- Lamont, J. (2010): The age of 'Indovation' dawns, *The Financial Times*, London, 14.06.2010.
- Lavallee, A. and E. Veach (2010): "Tata Water Purifier Wins the Top Prize for Novel Product," *Wall Street Journal*, 25.02.2012, from <http://online.wsj.com/article/SB10001424052702304388304575574022361799134.html>.
- Levsen, N. (2015): *Lead Markets in Age-based Innovations: Demographic Change and Internationally Successful Innovations*, Wiesbaden, Springer Gabler.
- London, B. (1932): "Ending the Depression Through Planned Obsolescence," Retrieved March 25 2016, from https://upload.wikimedia.org/wikipedia/commons/2/27/London_%281932%29_Ending_the_depression_through_planned_obsolescence.pdf.
- Mahurkar, U. (2007, March 12): "After-Hours Gavel Gazing," Retrieved August 2, 2016, from <http://indiatoday.intoday.in/story/evening-courts-for-pending-cases/1/156163.html>.

- Maira, A. (2005): "Aspiration alignment: a hidden key to competitive advantage," *Journal of Business Strategy* 26(6): 12-18.
- Maira, A. (2015): *An Upstart in the Government: Journeys of Change and Learning*, New Delhi, Rupa Publications.
- Majchrzak, A., L. P. Cooper, and O. E. Neece (2004): "Knowledge Reuse for Innovation," *Management Science* 50(2): 174-188.
- Malhotra, R. (2011): *Being Different: An Indian Challenge to Western Universalism*, Noida, HarperCollins.
- Mashelkar, R. A. (2011): *Reinventing India*, Pune, Sahyadri Prkashan.
- Mashelkar, R. A. (2014, 20 March): "Accelerated Inclusive Growth through Inclusive Innovation," Retrieved 14.04.2013, from http://www.oecd.org/sti/inno/Session_3_Mashelkar_Keynote.pdf.
- McCrinkle, J. W. (1901): *Ancient India as Described in Classical Literature*, Patna, Eastern Book House.
- Mccurdy, H. E. (2001): *Faster, Better, Cheaper: Low-cost Innovation in the U.S. Space Program*, Baltimore, John Hopkins University Press.
- Menon, N. (2011): Indovation or Indian Jugaad goes abroad, *Economic Times*, Mumbai, 26.11.2011: 5.
- Mitra, M. (2011): Indovation nation: Creating products in India for the Indian market, *Economic Times*, Mumbai, 25.11.2011: 5.
- NASSCOM (2016, n.d.): "ER&D and Product Development - Snapshot," Retrieved July 19, 2016, from <http://www.nasscom.in/engineering-rd-erembedded-systems>.
- Nilekani, N. (2008): *Imagining India: Ideas for the New Century*, New Delhi, Penguin.
- Oliver Wyman (2013): *Global Construction Equipment Market: Chinese Companies Set the Pace*, New York, Oliver Wyman Group.
- Paech, N. (2012a): *Befreiung vom Überfluss: Auf dem Weg in die Postwachstumsökonomie*, Munich, Oekom Verlag (7th edition, 2014).
- Paech, N. (2012b): *Nachhaltiges Wirtschaften jenseits von Innovationsorientierung und Wchatum: Eine unternehmensbezogene Transformationsthoerie*, Marburg, Metropolis-Verlag.
- Parsons, T., E. H. Shils, and J. Olds (1951): Values, Motives, and Systems of Action, in: T. Parsons and E. H. Shils, *Toward a General Theory of Action*, Massachusetts, Harvard University Press (Seventh Printing 1976): 47-243.
- Pawar, S. (2016): *On My Terms: From the Grassroots to the Corridors of Power*, New Delhi, Speaking Tiger Publishing.
- Philip, L. (2008): Mumbai to be design hub for Renault's ultra low cost car, *Economic Times*, Mumbai, 20.09.2008.
- Pradhan, J. P. and N. Singh (2009): "Outward FDI and Knowledge Flows: A Study of the Indian Automotive Sector," *International Journal of Institutions and Economies* 1(1): 106-133.
- Prahalad, C. K. (2002): "Strategies for the Bottom of the Economic Pyramid: India as a Source of Innovation," *Reflections* 3(4): 6-17.
- Prahalad, C. K. (2004): *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits*, Upper Saddle River, NJ, Wharton School Publishing.
- Prahalad, C. K. (2012): "Bottom of the Pyramid as a Source of Breakthrough Innovations," *Journal of Product Innovation Management* 29(1): 6-12.
- Prahalad, C. K. and K. Lieberthal (1998): "The End of Corporate Imperialism," *Harvard Business Review* 76(4): 68-79.
- Prahalad, C. K. and R. A. Mashelkar (2010): "Innovation's Holy Grail," *Harvard Business Review* 88(7/8): 132-141.
- Prasad, S. (2008): "India emerging as low-cost development hub," 05.08.2008, Retrieved 25.12.2010, from <http://www.zdnetasia.com>.
- Quitow, R. (2015): "Assessing policy strategies for the promotion of environmental technologies: A review of India's National Solar Mission," *Research Policy* 44: 233-243.
- Quitow, R., R. Walz, J. Köhler, and K. Rennings (2014): "The concept of "Lead Markets" revisited: Contribution to environmental innovation theory," *Environmental Innovation and Societal Transitions* 10: 4-19.

- Radjou, N. and J. Prabhu (2013, Jan. 10): "Frugal Innovation. A New Business Paradigm," Insead Knowledge, Retrieved Jan. 2, 2016, from <http://knowledge.insead.edu/innovation/frugal-innovation-a-new-business-paradigm-2375>.
- Radjou, N. and J. Prabhu (2015): *Frugal Innovation: How to do more with less*, London, The Economist.
- Rajendran, M. (2016, February 23): "Make in India runs into high royalty fee hurdle," Retrieved July 16, 2016, from <http://www.hindustantimes.com/business/make-in-india-runs-into-high-royalty-fee-hurdle/story-yUJWvgL1KSRBhAJ0R4ty6I.html>.
- Ramdorai, A. and C. Herstatt (2015): *Frugal Innovation in Healthcare: How Targeting Low-Income Markets Leads to Disruptive Innovation*, Heidelberg, Springer.
- Ramesh, J. (2015): *To the Brink and Back: India's 1991 Story*, New Delhi, Rupa.
- Rangarajan, L. N. (1992): *Kautilya: The Arthashastra - Edited, Rearranged, Translated and Introduced*, New Delhi, Penguin Books.
- Rao, B. C. (2013): "How disruptive is frugal?," *Technology in Society* 35(1): 65-73.
- RBI (2015): "Handbook of Statistics on the Indian Economy", Mumbai, Reserve Bank of India.
- Reficco, E. and P. Márquez (2012): "Inclusive Networks for Building BOP Markets," *Business & Society* 51(3): 512-554.
- Rezvani, A. and M. Zarei (2012): "The Effects and Consequences of Extravagance and Frugality from the Perspective of Qur'an," *Journal of Basic and Applied Scientific Research* 2(4): 3508-3514.
- Rosca, E., M. Arnold, and J. C. Bendul (2016): "Business models for sustainable innovation - an empirical analysis of frugal products and services," *Journal of Cleaner Production* forthcoming: 1-13.
- Saraf, D. (2009, July 13): "India's Indigenous Genius: Jugaad," Retrieved April 30, 2016, from <http://www.wsj.com/articles/SB124745880685131765>.
- Sauvant, K. P., J. P. Pradhan, A. Chatterjee, and B. Harley, Eds. (2010): *The Rise of Indian Multinationals: Perspectives on Indian Outward Foreign Direct Investment*, New York, Palgrave Macmillan.
- Scholtissek, S. (2008): *Multipolare Welt: Die Zukunft der Globalisierung und wie Deutschland davon profitieren kann*, Hamburg, Murmann Verlag.
- Sharma, A. and G. R. Iyer (2012): "Resource-constrained product development: Implications for green marketing and green supply chains," *Industrial Marketing Management* forthcoming.
- Simon, S., U. Näher, and M. D. Lauritzen (2008): R&D: Aligning the Interface with Production, in: E. Abele, T. Meyer, U. Näher, G. Strube and R. Sykes, *Global Production: A Handbook for Strategy and Implementation*, Heidelberg, Springer: 350-371.
- Singh, S. K., A. Gambhir, A. Sotiropoulos, and S. Duckworth (2012): "Frugal Innovation: Learning from Social Entrepreneurs in India", Hampshire The Serco Institute.
- Slade, G. (2007): *Made to Break: Technology and Obsolescence in America*, Cambridge, Mass., Harvard University Press.
- Tharoor, S. (2007): *The Elephant, the Tiget & the Cellphone: Reflections on India in the Twenty-first century*, New Delhi, Penguin Books.
- The Conference Board (2016, April 12): "International Comparisons of Hourly Compensation Costs in Manufacturing, 2015 - Summary Tables," Retrieved July 17, 2016, from <https://www.conference-board.org/ilcprogram/index.cfm?id=38269>.
- The Hindu (2006, November 15): "Evening courts launched in Gujarat," Retrieved August 2, 2016.
- Thompson, D. V., R. W. Hamilton, and R. T. Rust (2005): "Feature Fatigue: When Product Capabilities Become Too Much of a Good Thing " *Journal of Marketing Research* XLII: 431-442.
- Tiwari, R. (2011): Indian Investments in Germany: Innovation and R&D gain momentum in a stable partnership, in, *Annual Review 2011*, Mumbai, Indo-German Chamber of Commerce: 119-123.
- Tiwari, R. (2014): R&D Internationalisation from an Indo-German Perspective, in: B. Dachs, R. Stehrer and G. Zahradnik, *The Internationalisation of Business R&D*, Cheltenham, Edward Elgar: 159-182.
- Tiwari, R. and S. Buse (2014): German Mittelstand Discovers BRIC: A Survey of Product Strategies of German 'Hidden Champions' in China and India, *Indo-German Economy*, Mumbai, Indo-German Chamber of Commerce, 58: 5-11.

- Tiwari, R., L. Fischer, and K. Kalogerakis (2016a): "Frugal Innovation in Scholarly and Social Discourse: An Assessment of Trends and Potential Societal Implications", Joint working paper of Fraunhofer MOEZ Leipzig and Hamburg University of Technology in the BMBF-ITA project, Leipzig/Hamburg.
- Tiwari, R. and C. Herstatt (2012): "Frugal Innovation: A Global Networks' Perspective," *Die Unternehmung* 66(3): 245-274.
- Tiwari, R. and C. Herstatt (2013): "Too good to succeed? Why not just try 'good enough'! Some deliberations on the prospects of frugal innovations", Working paper No. 76, Hamburg, Institute for Technology and Innovation Management, Hamburg University of Technology.
- Tiwari, R. and C. Herstatt (2014a): *Aiming Big with Small Cars: Emergence of a Lead Market in India*, Heidelberg, Springer.
- Tiwari, R. and C. Herstatt (2014b): Changing Dynamics of Lead Markets: A New Role for Emerging Economies as Innovation Hubs, *The European Financial Review*, London, April-May: 69-72.
- Tiwari, R., C. Herstatt, and M. Ranawat (2011): "Benevolent benefactor or insensitive regulator? Tracing the role of government policies in the development of India's automobile industry," *Policy Studies* 58.
- Tiwari, R., K. Kalogerakis, and C. Herstatt (2014): Frugal Innovation and Analogies: Some Propositions for Product Development in Emerging Economies, *R&D Management Conference*, Stuttgart, Fraunhofer IAO, IAT Universität Stuttgart: 15-23.
- Tiwari, R., K. Kalogerakis, and C. Herstatt (2016b): Frugal Innovations in the mirror of scholarly discourse: Tracing theoretical basis and antecedents, *R&D Management Conference*, Cambridge, UK.
- Tully, M. (1992): *No Full Stops in India*, New Delhi, Penguin Books.
- Tung, R. L. (2008): "Brain circulation, diaspora, and international competitiveness," *European Management Journal* 26(5): 298-304.
- UNCTAD (2016a, n.d.): "Foreign direct investment: Inward and outward flows and stock, annual, 1980-2014," Retrieved 27.07.2015, from <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx>.
- UNCTAD (2016b): *World Investment Report 2016 - Investor Nationality: Policy Challenges*, New York, United Nations Conference on Trade and Development.
- Varma, P. K. (2005): *Being Indian*, New Delhi, Penguin Books.
- Vernon, R. (1966): "International Investment and International Trade in the Product Cycle," *Quarterly Journal of Economics* 80(2): 190-207.
- Virmani, A. (2009): *The Sudoku of India's Growth*, New Delhi, Business Standard Books.
- von Hippel, E. (2005): *Democratizing Innovation*, Cambridge, Massachusetts, The MIT Press.
- von Schomberg, R. (2015): Responsible Innovation: The New Paradigm for Science, Technology and Innovation Policy, in: A. Bogner, M. Decker and M. Sotoudeh, *Responsible Innovation: Neue Impulse für die Technikfolgenabschätzung*, Baden-Baden, Nomos: 47-70.
- von Schönburg, A. (2006): *Die Kunst des stilvollen Verarmens: Wie man ohne Geld reich wird*, Reinbek, Rowohlt Taschenbuch Verlag.
- Weyrauch, T. and C. Herstatt (2016): Frugal innovation – What is it? Criteria for frugal innovation, *R&D Management Conference*, Cambridge, July 3-6.
- Witkowski, T. H. (2010): "A brief history of frugality discourses in the United States," *Consumption Markets & Culture* 13(3): 235-258.
- Zweck, A., D. Holtmannspötter, M. Braun, M. Hirt, et al (2015): "Gesellschaftliche Veränderungen 2030: Ergebnisband 1 zur Suchphase von BMBF-Foresight Zyklus II", Zukünftige Technologien Nr. 100, Düsseldorf, Innovationsbegleitung und Innovationsberatung der VDI Technologiezentrum GmbH.