

# **Resource-Constrained Innovation and Business Models in Emerging Markets**

DISSERTATION

of the University of St. Gallen,  
School of Management,  
Economics, Law, Social Sciences  
and International Affairs  
to obtain the title of  
Doctor of Philosophy in Management

submitted by

**Stephan Winterhalter**

from

St. Gallen

Approved on the application of

**Prof. Dr. Oliver Gassmann**

and

**Prof. Dr. Elgar Fleisch**

Dissertation no. 4431

Difo-Druck GmbH, Bamberg 2015

The University of St.Gallen, School of Management, Economics, Law, Social Sciences and International Affairs, hereby consents to the printing of the present dissertation, without hereby expressing any the views herein expressed.

St.Gallen, May 19, 2015

The President:

Prof. Thomas Bieger





## Acknowledgements

This doctoral thesis is the result of my work at the Institute of Technology Management at the University of St.Gallen (ITEM-HSG). Even though writing a dissertation is an individual effort in the end, many people contributed to the successful outcome of this endeavor. I thank them all for their support.

First and foremost, I thank Professor Oliver Gassmann for supervising my thesis and giving me the freedom to pursue my academic aspirations. I am also thankful to my co-supervisor Professor Elgar Fleisch for having supported my dissertation.

I am very much indebted to all my co-authors. Prof. Marco Zeschky has been my main sparring partner and co-author. I thank him for his assistance and comradeship during the three years. I extend my gratitude to my other co-authors Prof. Oliver Gassmann, Dr. Tobias Weiblen, Prof. Max Palmié, Bernhard Lings, Dr. Bastian Widenmayer, Dr. Christoph Wecht, Dr. Philip Sauter, Roman Sauer, Naomi Haefner, Dr. Lukas Krieg and Lukas Neumann. I have always appreciated the constructive teamwork and I hope that our joint research efforts will yield fruits in future publications. Dr. Bastian Widenmayer deserves particular credit for introducing me into the world of frugal and reverse innovation. My thanks are also extended to several interns and thesis students who have provided helpful research assistance as well as to Ursula Elsässer and Elisabeth Vetsch for helping me mastering all kinds of administrative tasks.

During the three years at the institute, I had the pleasure of working with Dr. Christoph Wecht on numerous consultancy projects. I thank him for being a great source of inspiration and teacher.

I also want to thank all my other colleagues and friends at the institute. You made this time very much enjoyable. Your fellowship and humor in the office and our extracurricular activities in particular helped to stick out the cyclical ups and downs during the PhD program. Representative for the whole crew, I want to mention Bernhard Lings for being a critical discussion partner and “co-thought-leader” in our competence center and Florian Homann for being a great office mate.

Some parts of this research were carried out at the IESE Business School, University of Navarra, in Barcelona. I thank Professor Joan Enric Ricart for being my host-supervisor and for inviting me to this prestigious institution. Further, I want to say thanks to my fellow research colleagues in Barcelona. You made my time in this vibrant city a true experience. This experience was only possible by the financial support of the Swiss National Science Foundation (SNF), which deserves credit for providing me with this unique opportunity.

Last, my family deserves my deepest gratitude. I thank my parents Maya and Bruno for always supporting and encouraging me far beyond the horizon of this thesis in all aspects of life. I am thankful for having my brothers Christian and Matthias and my sister Martina. Most importantly, I am deeply grateful to Noëmi for her unconditional love, patience and support throughout all the years.

Barcelona, June 2015

Stephan Winterhalter

## **Abstract**

Global business has experienced a strong shift from developed markets towards emerging markets, particularly to China and India. This is not only true for production and sourcing activities, but increasingly for innovation. The growing group of people advancing from poverty to the emerging middle class has become one of the major growth drivers in these markets. Still, compared to middle class customers in developed markets, the emerging middle class in emerging markets has very little disposable income. Furthermore, emerging markets entail institutional voids and infrastructure gaps, which make it not only challenging for firms to operate in these environments but also create a demand for specifically tailored innovations – so-called resource-constrained innovations.

While many such examples were reported in anecdotal fashion, the body of empirical academic literature remains scarce and thorough conceptualizations of this emerging phenomenon are missing. Moreover, owing to the novelty of the topic, the questions of how firms actually bring forth these kinds of innovation, embed them in adequate business models, and integrate these business models in existing premium business models have hardly been studied.

Consisting of four self-standing research articles, this dissertation aims to address these gaps. After an introductory chapter, which presents the overall research background and approach, the first article provides a conceptualization of resource-constrained innovation. The second article explores how Western firms can organize for resource-constrained innovation and how these innovations can be transferred back to developed markets. The third article studies business models for a specific kind of resource-constrained innovation – so-called frugal innovations. The fourth article sheds light on the topic of “dual business models” by examining how Western firms integrate low-cost business models for emerging markets into their existing premium business models.

Overall, this thesis provides new, in-depth insights into the highly relevant field of innovation and business models in and for emerging markets. It is amongst the first to adopt a more detailed perspective on the phenomenon of resource-constrained innovation by providing empirical evidence of how firms can achieve this kind of innovation as well as how they can organize their business models for emerging and global markets.





## Kurzdarstellung

In den vergangenen Jahren hat die Geschäftstätigkeit westlicher Unternehmen in Schwellenländern deutlich zugenommen. Dies betrifft nicht nur Produktion und Beschaffung als Tätigkeiten zur Umsetzung bestehender Produkte, sondern immer mehr auch Innovationstätigkeiten, die die Grundlage zukünftiger Geschäftstätigkeiten einer Firma sind. Hauptwachstumstreiber hierfür ist vor allem die schnell wachsende Bevölkerungsschicht der aufstrebenden Mittelklasse in diesen Märkten. Diese Zielgruppe hat in den letzten Jahren zwar eine deutliche Steigerung ihres durchschnittlichen Einkommens erreicht, liegt diesbezüglich jedoch immer noch weit hinter vergleichbaren Bevölkerungsschichten westlicher Länder. Darüber hinaus herrschen in Schwellenländern häufig relativ schlechte oder gar inexistenten Infrastrukturen und Marktinstitutionen vor. Dieses Umfeld stellt Firmen nicht nur vor grosse Herausforderungen, sondern induziert auch eine Nachfrage nach innovativen Produkten, die trotz oder gerade wegen dieser spezifischen Gegebenheiten Wert stiften – sogenannte resource-constrained innovations.

Auch die Forschung hat diesen wichtigen Trend erkannt und zahlreiche Beispiele solcher Innovationen anekdotenhaft geschildert. Allerdings mangelt es an wissenschaftlich fundierten empirischen Studien und damit auch am konzeptionellen Unterbau des Themas. Aus diesem Grund sind viele Kernfragen nach wie vor nicht oder nur unzureichend beantwortet: Diese sind vor allem: Wie entwickeln Firmen solche Innovationen? Wie sehen geeignete Geschäftsmodelle aus? Und vor allem: Wie können Firmen allgemein ihre Geschäftsmodelle für Schwellenländer in ihre bestehenden Geschäftsmodelle integrieren? Die vorliegende Dissertation widmet sich diesen Lücken in vier eigenständigen Beiträgen. Nach einem Einleitungskapitel, das den allgemeinen Forschungshintergrund und -ansatz darlegt, stellt der erste Artikel eine Konzeptionalisierung von resource-constrained innovation vor. Der zweite Artikel untersucht, wie westliche Firmen resource-constrained innovations entwickeln und global zum Einsatz bringen können. Der dritte Artikel beleuchtet Geschäftsmodelle für eine spezifische Unterart von resource-constrained innovation – sogenannte frugal innovations. Der letzte Artikel befasst sich mit „dualen Geschäftsmodellen“ und untersucht, wie westliche Firmen Low-Cost und Premium Geschäftsmodelle in Schwellenländern integrieren können.

Mit diesen Schwerpunkten stellt diese Dissertation eine der ersten Arbeiten dar, die einen detaillierten Blick auf das Phänomen von resource-constrained innovation legt und dadurch zu einem diesbezüglichen Erkenntnisgewinn in Wissenschaft und Praxis beiträgt.



# Overview

<b>Figures.....</b>	<b>X</b>
<b>Tables .....</b>	<b>XI</b>
<b>List of abbreviations.....</b>	<b>XII</b>
<b>1 Emerging market customers for future growth .....</b>	<b>1</b>
1.1 Motivation for and relevance of emerging market customers .....	1
1.2 State of the art in research .....	3
1.3 Goal of this thesis and research questions .....	9
1.4 Structure of the thesis.....	14
<b>2 From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness .....</b>	<b>17</b>
2.1 Introduction.....	18
2.2 Method .....	19
2.3 Findings.....	19
2.4 Discussion .....	25
2.5 Conclusion.....	30
<b>3 Achieving low-end disruption and new market creation in emerging and global markets: The role of headquarters in Western MNCs .....</b>	<b>31</b>
3.1 Introduction.....	32
3.2 Literature review .....	34
3.3 Method and data.....	37
3.4 Findings.....	39
3.5 Discussion and propositions development .....	45
3.6 Implications to literature.....	50
3.7 Managerial implications .....	51
3.8 Limitations and future research .....	51
3.9 Conclusion.....	52
3.10 Appendix: List of interviews .....	53
<b>4 Business models for frugal innovations in emerging markets: The case of the medical device and laboratory equipment industry .....</b>	<b>55</b>
4.1 Introduction.....	56
4.2 Literature review .....	57
4.3 Method .....	60
4.4 Results: Value proposition, creation, and capturing.....	64

4.5	Discussion .....	73
4.6	Conclusion.....	75
4.7	Appendix: List of interviews and interview partners.....	78
<b>5</b>	<b>Managing dual business models in emerging markets: An ambidexterity perspective .....</b>	<b>79</b>
5.1	Introduction.....	80
5.2	Literature review .....	80
5.3	Method .....	85
5.4	Findings.....	89
5.5	Discussion .....	94
5.6	Conclusion, limitations, and future research.....	97
5.7	Appendix 1: Separation/integration of domains .....	100
5.8	Appendix 2: Overview of empirical data for case studies .....	100
<b>6</b>	<b>Conclusion .....</b>	<b>101</b>
6.1	Overall summary .....	101
6.2	Implications for literature and future research opportunities .....	101
<b>7</b>	<b>References .....</b>	<b>107</b>

# Table of Contents

<b>Figures</b> .....	<b>X</b>
<b>Tables</b> .....	<b>XI</b>
<b>List of abbreviations</b> .....	<b>XII</b>
<b>1 Emerging market customers for future growth</b> .....	<b>1</b>
1.1 Motivation for and relevance of emerging market customers .....	1
1.2 State of the art in research .....	3
1.2.1 Innovation in and for emerging markets .....	3
1.2.1 Business models .....	5
1.2.2 International business and emerging markets .....	6
1.3 Goal of this thesis and research questions .....	9
1.3.1 Main research question .....	10
1.3.2 Sub-questions .....	11
1.4 Structure of the thesis.....	14
1.4.1 Overall structure .....	14
1.4.2 Thesis outline .....	14
<b>2 From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness</b> .....	<b>17</b>
2.1 Introduction.....	18
2.2 Method .....	19
2.3 Findings.....	19
2.3.1 Cost innovation: same functionality at a lower cost.....	21
2.3.2 Good-enough innovation: tailored functionality at a lower cost .....	22
2.3.3 Frugal innovation: new functionality at a lower cost .....	23
2.3.4 Reverse innovation: selling low-cost innovations elsewhere .....	24
2.4 Discussion .....	25
2.5 Conclusion.....	30
<b>3 Achieving low-end disruption and new market creation in emerging and global markets: The role of headquarters in Western MNCs</b> .....	<b>31</b>
3.1 Introduction.....	32
3.2 Literature review .....	34
3.2.1 Resource-constrained environments in emerging markets .....	34
3.2.2 Innovation in and for emerging markets .....	35
3.2.3 Transfer of innovation from emerging to developed markets .....	36

3.3	Method and data.....	37
3.3.1	Research design and setting.....	37
3.3.2	Data collection.....	38
3.3.3	Data analysis.....	38
3.4	Findings.....	39
3.4.1	The case of GoodenoughFirmA .....	39
3.4.2	The case of GoodenoughFirmB .....	40
3.4.3	The case of FrugalFirmA.....	41
3.4.4	The case of FrugalFirmB.....	42
3.5	Discussion and propositions development .....	45
3.5.1	Extending existing vs. creating new markets.....	45
3.5.2	Local initiative: location, autonomy, and prior experience .....	46
3.5.3	Global initiative: engagement and transferability .....	48
3.6	Implications to literature.....	50
3.7	Managerial implications .....	51
3.8	Limitations and future research .....	51
3.9	Conclusion.....	52
3.10	Appendix: List of interviews .....	53
<b>4</b>	<b>Business models for frugal innovations in emerging markets: The case of the medical device and laboratory equipment industry .....</b>	<b>55</b>
4.1	Introduction.....	56
4.2	Literature review .....	57
4.2.1	Resource-constrained innovation for emerging markets .....	57
4.2.2	Core elements of business models .....	58
4.2.3	Business models in emerging markets.....	59
4.3	Method .....	60
4.3.1	Research design and background.....	60
4.3.2	Data sample, collection, and analysis .....	61
4.3.3	Case overviews .....	63
4.4	Results: Value proposition, creation, and capturing.....	64
4.4.1	Value proposition .....	65
4.4.2	Value creation .....	66
4.4.3	Value capturing .....	69
4.5	Discussion .....	73
4.5.1	The threefold value proposition in frugal business models.....	73
4.5.2	The nature of and the organization for application innovations .....	74

4.6	Conclusion.....	75
4.6.1	Summary and contributions.....	75
4.6.2	Future research.....	76
4.7	Appendix: List of interviews and interview partners.....	78
<b>5</b>	<b>Managing dual business models in emerging markets: An ambidexterity perspective .....</b>	<b>79</b>
5.1	Introduction.....	80
5.2	Literature review .....	80
5.2.1	Business model elements .....	82
5.2.2	Ambidexterity and dual business models .....	82
5.2.3	Innovation and business models for emerging markets .....	84
5.3	Method .....	85
5.3.1	Research design and sampling.....	86
5.3.2	Data collection.....	87
5.3.3	Data analysis.....	87
5.4	Findings.....	89
5.5	Discussion .....	94
5.5.1	Different degrees of domain separation for different target customers.....	94
5.5.2	Business models as new unit of analysis for ambidexterity research.....	95
5.6	Conclusion, limitations, and future research.....	97
5.7	Appendix 1: Separation/integration of domains .....	100
5.8	Appendix 2: Overview of empirical data for case studies .....	100
<b>6</b>	<b>Conclusion .....</b>	<b>101</b>
6.1	Overall summary .....	101
6.2	Implications for literature and future research opportunities .....	101
6.2.1	General management theories.....	101
6.2.2	Literature on innovation in and for emerging markets .....	102
6.2.3	Literature on business models .....	103
6.2.4	Literature on international business and emerging markets .....	103
6.2.5	Implications for management practice.....	104
<b>7</b>	<b>References .....</b>	<b>107</b>

# Figures

Figure 1: Research articles in the context of the research fields. .... 11

Figure 2: Thesis structure overview. .... 16

Figure 3: The reverse innovation corridor. .... 20

Figure 4: Hierarchy of resource-constrained innovation. .... 29

Figure 5: The value proposition of frugal business models. .... 73

Figure 6: Overall domain separation for low-cost business models. .... 94

Figure 7: Separation at domain level and sequence of separation. .... 95



## Tables

Table 1: Literature review on innovation in and for emerging markets .....	5
Table 2: Literature review on business models.....	6
Table 3: Literature review on international business and emerging markets. ....	9
Table 4: Overview of research articles.....	13
Table 5: Sample overview of resource-constrained innovation cases. ....	20
Table 6: Typology of resource-constrained innovation. ....	27
Table 7: Case firm descriptions. ....	38
Table 8: Summary of findings. ....	44
Table 9: List of interview partners.....	53
Table 10: Overview of case firms. ....	62
Table 11: Overview of all frugal business models under study. ....	72
Table 12: Overview of interviews.....	78
Table 13: Integration of low-cost business models in premium business models.....	93
Table 14: Separation/integration of domains. ....	100
Table 15: Overview of empirical data. ....	100

## List of abbreviations

BM	Business model
BoP	Base / Bottom of the pyramid
CI	Cost innovation
DM	Developed market
DMNC	Developed market multinational corporation
e.g.	For example
EM	Emerging market
EMNC	Emerging market multinational corporation
FI	Frugal innovation
GI	Good-enough innovation
i.a.	Inter alia
i.e.	That is
MNC	Multinational corporation
NPD	New product development
RCI	Resource-constrained innovation
RCE	Resource-constrained environments
RI	Reverse innovation

# 1 Emerging market customers for future growth

## 1.1 Motivation for and relevance of emerging market customers

“A key phenomenon of the early twenty-first century is the rise of emerging markets as players in extant global R&D networks, as centers for development of new business models, and as sources of groundbreaking yet ‘frugal’ innovations” (Mudambi, 2011, p. 317). This rise of emerging markets is mainly driven by the large number of consumers in emerging markets that have upgraded and are still upgrading from the poor at the base of the pyramid to the emerging middle class (Hart & Christensen, 2002; Kravets & Sandikci, 2014; Prahalad, 2010; Zeng & Williamson, 2007). The OECD estimates that by 2060, 60% of the world’s global gross domestic product (GDP) will come from today’s emerging markets, and that by 2050, 50% of the global middle class will be living in China and India (OECD, 2012). The spending power of people that grow out of poverty and become first time consumers is expected to reach US\$ 20 billion until 2025 (Kravets & Sandikci, 2014). Particularly in China’s tier-three cities, the number of middle class households will have doubled by 2020 (Silverstein, Singhi, Liao, & Michael, 2012). Overall, consumption in emerging cities will rise by US\$ 10 trillion until 2025 (Dobbs et al., 2012). Hence, it is evident that global firms need to address these customers, if they want to profit from the growth in emerging markets. Still, the middle class in emerging markets has lower incomes and suffers from institutional voids and infrastructure gaps compared to Western middle class customers (Ricart, Enright, Ghemawat, Hart, & Khanna, 2004), which is why they are referred to as resource-constrained customers (Hang, Chen, & Subramanian, 2010). Therefore, products and business models innovated for developed markets are often not adequate to reach these customers (George, McGahan, & Prabhu, 2012). However, firms that manage to address these potential customers with products and business models that deliver high value at very low cost – so called “resource-constrained innovations” (RCI) – can tap new growth markets (Zeschky, Winterhalter, & Gassmann, 2014).

In particular, firms from China and India have managed to develop resource-constrained innovations (Brown & Hagel, 2005; London & Hart, 2004; Prahalad & Mashelkar, 2010). For example, in 1992, the Chinese firm Galanz developed an energy-efficient, low-cost microwave that was small enough to fit inside often highly cramped Chinese kitchens. Since 1993, Galanz has managed to develop what had

been a minor market, in which initially only 2% of households could afford a microwave, into a mass market, of which it now controls more than 60%. Today, the company is one of the biggest microwave manufacturers in the world (Ge & Ding, 2007; Hart & Christensen, 2002). A similar case was reported with Suzlon Energy Ltd, an Indian wind turbine manufacturer. This company grew big by developing and manufacturing tailored, small, low-cost wind turbines for industrial customers and became the global number five in the industry (Govindarajan & Ramamurti, 2011; Hang et al., 2010).

Besides these examples of emerging market firms being successful developers of resource-constrained innovations, Western companies have also started to produce these kinds of innovations. General Electric, for example, developed a portable electrocardiograph (ECG) device for rural areas in India (Govindarajan & Trimble, 2012; Immelt, Govindarajan, & Trimble, 2009). Logitech developed low-cost computer equipment for China (Trimble, 2012) and Procter & Gamble developed a low-cost, single-bladed Gillette shaver for Indian men (Gassmann, Winterhalter, & Wecht, 2014). However, these examples of resource-constrained innovations implemented by Western firms should not hide the fact that innovation for and doing business in emerging markets is still a big challenge for Western firms. This challenge mainly arises from the bad or missing infrastructure (Hoskisson, Wright, Filatotchev, & Peng, 2013) and the poor institutional environment in emerging markets (Khanna & Palepu, 2000; Ricart et al., 2004), a situation Western firms are not used to from their operations in Western advanced economies (Khanna, Palepu, & Sinha, 2005). Further, most Western firms have become successful by addressing the needs of affluent customers in developed markets with advanced, sophisticated, and rather expensive products (Arnold & Quelch, 1998; Govindarajan & Ramamurti, 2011), which is however contrary to what is needed for resource-constrained innovation. Thus, Western firms often struggle to engage in resource-constrained innovations (Halme, Lindeman, & Linna, 2012).

While the body of practitioner literature on this emerging phenomenon has grown considerably in recent years, academic literature is still at an early state and thus remains scarce. The field lacks commonly accepted definitions and only very recently have scholars started to conceptualize the phenomenon by distinguishing different types of resource-constrained innovations (e.g. Brem & Wolfram, 2014; Soni & Krishnan, 2014). Early studies argue that resource-constrained innovations need to be specifically developed for these customer segments and that simple low-cost versions of Western products often fail (Hart & Christensen, 2002; Immelt et al., 2009; London

& Hart, 2004). However, very little is known about how firms can actually develop resource-constrained innovations and how they can design adequate business models for these harsh environments. From a global perspective, some examples of resource-constrained innovations that found their way to developed markets were reported. However, apart from some noteworthy exceptions (e.g. Corsi, Di Minin, & Piccaluga, 2014; Widenmayer, 2012; Zeschky, Widenmayer, & Gassmann, 2014), these cases of “reverse innovation” are rather anecdotal in character and provide very limited insights into strategic aspects stemming from resource-constrained innovation activities and their implications for global product management. Therefore, it is also unknown how Western firms can integrate resource-constrained innovations and business models for emerging markets into their existing business models.

Overall, the research on resource-constrained innovation is a young and striving field of study that has attracted great attention in practitioner literature. However, management research has only recently started to investigate this field. Thus, this dissertation aims to begin to close some of the gaps in this field through empirical research.

The next section provides an overview of publications in the research streams most important for this research. This thesis draws upon and aims to contribute to three major streams of literature, namely innovation in and for emerging markets, international business and emerging markets, and business model literature. For each stream, the general foundations as well as a more detailed picture of those aspects relevant for the following chapters, will be presented. The remainder of this introductory chapter presents the structure and the outline of the thesis.

## **1.2 State of the art in research**

### **1.2.1 Innovation in and for emerging markets**

Innovation in and for emerging markets has gained a prominent role in recent research as it breaks with existing innovation paradigms. Driven by the aim of innovating for resource-constrained consumers at the Base of the pyramid (BoP) and in the emerging middle class (Prahalad, 2010), as well as by the insights that Western products are not tailored enough to deliver high value at very low cost (London & Hart, 2004), a new category of “low-cost” innovation – so-called “resource-constrained innovations” (Ray & Ray, 2010) emerged. Due to the novelty of the concept, these kinds of innovations are termed and used differently in literature. Common terms are frugal innovation (Cappelli, Singh, Singh, & Useem, 2010; Cunha, Rego, Oliveira, Rosado, & Habib,

2014; Zeschky, Widenmayer, & Gassmann, 2011), good-enough innovation (Gadiesh, Leung, & Vestring, 2007; Hart & Christensen, 2002), cost innovation (Williamson & Zeng, 2009; Williamson, 2010), jugaad (Sharma & Iyer, 2012) Gandhian innovation (Pralhad & Mashelkar, 2010), shanzhai (Hu, Wan, & Zhu, 2011; Zhu & Shi, 2010) or reverse innovation (Govindarajan, 2012; Immelt et al., 2009; Von Zedtwitz, Corsi, Sørensen, & Frega, 2015). The key difference to Western advanced innovations is that all these innovations are targeted at resource-constrained consumers, with limited budgets but urgent and demanding needs. It has been found that firms need specific capabilities to develop resource-constrained innovations and that firms' efforts for this kind of innovation pay off financially (Ernst, Kahle, Dubiel, Prabhu, & Subramaniam, 2015). Further it was argued that resource-constrained innovations are disruptive innovations and can address new customer segments (Immelt et al., 2009; Lim, Han, & Ito, 2013; Wan, Williamson, & Yin, 2015; Williamson, 2010). These works have made important contributions to this field of research, however there are very limited insights regarding the market outcomes caused by resource-constrained innovation. While it has been acknowledged that resource-constrained innovations are disruptive innovations, it remains unclear which kind of disruption (i.e. low-end vs. new market) is triggered (Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006). Furthermore, a major drawback inherent in current studies is that very different sorts of resource-constrained innovations for emerging markets have been treated the same and have often been mixed in the same sample set (e.g. Ernst et al., 2015; Hang, Garnsey, & Ruan, 2014; Rao, 2013; Sanchez & Ricart, 2010; Von Zedtwitz et al., 2015). This is problematic, as resource-constrained innovations differ drastically with regard to their novelty and radicalness (Wan et al., 2015) and firms require different capabilities to achieve different kinds of resource-constrained innovations (Zeschky, Winterhalter, et al., 2014).

Hence, this field of research lacks a conceptual foundation. Recent attempts to close this gap have examined how resource-constrained innovation may add a geographical element to the theory of disruptive innovation (Corsi & Di Minin, 2014), have called for a more holistic view on resource-constrained innovation (Brem & Wolfram, 2014; Soni & Krishnan, 2014), have aimed to distinguish resource-constrained innovation from other related fields of research (Bhatti & Ventresca, 2013), and have differentiated different kinds of constraints (Cunha et al., 2014).

This research contributes to this stream of literature by providing the first product centered conceptualization of different types of resource-constrained innovations.

Building on this more fine-grained perspective as a basis, this thesis contributes to a better understanding of how firms can achieve different kinds of resource-constrained innovations, the consequences on market outcomes, and the reverse transfer potential. Table 1 provides an overview of the major works in this research field.

Anecdotal	(Brown & Hagel, 2005; Cappelli et al., 2010; Gadiesh et al., 2007; Gassmann, Winterhalter, & Wecht, 2013; Gassmann & Winterhalter, 2013; Govindarajan, 2012; Hart & Christensen, 2002; Hoover, 2006; Immelt et al., 2009; Prahalad & Hammond, 2002; Prahalad & Lieberthal, 1998; Prahalad & Mashelkar, 2010; Prahalad, 2010; Williamson & Zeng, 2009; Zeng & Williamson, 2007)
Empirical	(Agarwal & Brem, 2012; Ernst et al., 2015; Kahle, Dubiel, Ernst, & Prabhu, 2013; Lim et al., 2013; Ramani & Mukherjee, 2014; Rao, 2013; Schanz, Hüsigg, Dowling, Gerybadze, & Hu, 2011; Sharma & Iyer, 2012; Tiwari & Herstatt, 2012; Wan et al., 2015; Zeschky et al., 2011; Zeschky, Widenmayer, et al., 2014)
Conceptual	(Bhatti & Ventresca, 2013; Brem & Wolfram, 2014; Corsi & Di Minin, 2014; Cunha et al., 2014; Von Zedtwitz et al., 2015)

*Table 1: Literature review on innovation in and for emerging markets.*

### 1.2.1 Business models

The business model describes “how a firm organizes itself to create and distribute value in a profitable manner” (Baden-Fuller & Morgan, 2010) and emerged as a concept during the dot.com boom (Magretta, 2002). The business model concept, which has its origin in practice and only recently found its way into research, still lacks a unified and generally accepted definition in academia (George & Bock, 2011). One reason for this is the fact that the concept is still rather new, the other being that researchers from different domains have independently used and developed it in silos (Zott, Amit, & Massa, 2011). This thesis adopts the notion that business models are activity systems consisting of various interdependent activities, such as the firm’s value chain activities, its choice of customers as well as its choice of products and services (Casadesus-Masanell & Ricart, 2010b; Markides, 2013; Teece, 2010; Zott & Amit, 2010). Table 2 provides an overview of major works in the business model literature.

One group of scholars regards the business model as a boundary-spanning concept (Shafer, Smith, & Linder, 2005; Zott & Amit, 2007, 2010) that includes collaboration with partners (Al-Debei & Avison, 2010; Osterwalder, Pigneur, & Tucci, 2005; Teece, 2010), as an integral part of business models. Other authors have a more firm-centric view claiming that the business model concept can but does not necessarily need to go beyond the boundary of the firm (Afuah & Tucci, 2001; Frankenberger, Weiblen, & Gassmann, 2013, 2014; Linder & Cantrell, 2001; Morris, Schindehutte, & Allen, 2005). Under the term „dual business models“ (Markides & Charitou, 2004), an emerging sub stream particularly relevant for this thesis is concerned with the question of how firms



may compete with more than one and potentially conflicting business models in the same market (Casadesus-Masanell & Tarziján, 2012; Markides & Charitou, 2004; Markides, 2013).

Due to its novelty as a concept in research and its mixed origins in different domains, a large part of the business model literature is concerned with conceptual topics (e.g. definitions, components constituting a business model, developing representational forms, and clarifying relations to theory and other domains such as strategy). Empirical work, which is mainly qualitative in nature, is largely focused on business models in developed markets (DMs). Most studies focus on IT or internet related business, as well as the role of technology for business models or performance implications of certain business model configurations.

Conceptual	Definitions, components & representations, relation to theory and other domains	(Abraham, 2013; Afuah & Tucci, 2001; Al-Debei & Avison, 2010; Casadesus-Masanell & Ricart, 2010a, 2010b, 2011; DaSilva & Trkman, 2014; George & Bock, 2011; Hedman & Kalling, 2003; Johnson, Christensen, & Kagermann, 2008; Kiani, Gholamian, Hamzehei, & Hosseini, 2009; Magretta, 2002; Markides, 2013; Morris et al., 2005; Osterwalder et al., 2005; Osterwalder & Pigneur, 2010; Pateli & Giaglis, 2004; Perkmann & Spicer, 2010; Shafer et al., 2005; Teece, 2010; Zott et al., 2011)
Empirical in DMs	E-business, IT and Technology	(Björkdahl, 2009; Calia, Guerrini, & Moura, 2007; Chesbrough & Rosenbloom, 2002; Chesbrough, 2007; Desyllas & Sako, 2013; Doganova & Eyquem-Renault, 2009; Gambardella & McGahan, 2010; Holm, Günzel, & Ulhøi, 2013; Isckia & Lescop, 2009; Pateli & Giaglis, 2005; Rappa, 2004; Tapscott, Ticoll, & Lowy, 2000; Timmers, 1998; Weill & Vitale, 2001; Wirtz, Schilke, & Ullrich, 2010)
	Performance	(Alexy & George, 2011; Amit & Zott, 2001; Casadesus-Masanell & Tarziján, 2012; Frankenberger et al., 2013; Malone et al., 2006; Markides & Charitou, 2004; Weill, Malone, & Apel, 2011; Zott & Amit, 2007)
Empirical in EMs	Focus on 'non-profit' or social value creation	(Anderson & Markides, 2007; Bruton, Khavul, & Chavez, 2011; Gold, Hahn, & Seuring, 2013; Halme et al., 2012; London, Anupindi, & Sheth, 2010; Payaud, 2014; Seelos & Mair, 2007; Sinkovics, Sinkovics, & Yamin, 2014; Thompson & MacMillan, 2010; Yunus, Moingeon, & Lehmann-Ortega, 2010)
	Focus on 'for profit'	(Sanchez & Ricart, 2010; Williamson, 2010)

*Table 2: Literature review on business models.*

Business models in emerging markets (EMs) have been studied very little, and mostly in the context of non-profit business, so-called “social business models” (Baden-Fuller & Mangematin, 2013). Often, it has been argued that business models in resource-constrained environments need to create value both for firms and for the people and



social environment (London et al., 2010; Seelos & Mair, 2007; Sinkovics, Sinkovics, & Yamin, 2014; Mair & Marti, 2009; Yunus et al., 2010). Examples of business models in emerging markets include microfinance solutions (Bruton et al., 2011; Foster & Heeks, 2013; Hughes & Lonie, 2007; Seelos & Mair, 2007; Yunus et al., 2010) new ways of value delivery (Anderson & Markides, 2007; Payaud, 2014) or mobile solutions for power generation (Halme, Lindeman, & Linna, 2012). A notable exception from the anecdotal business model studies in emerging markets mentioned above are Sanchez & Ricart (2010) who studied the success factors of business models in resource-constrained markets. They found that business models in emerging markets can be either low-cost replications of established Western business models for developed markets or entirely new business models, which specifically create value in low-income environments.

Overall, the empirical foundations of business model research can be characterized as rather thin (Coombes & Nicholson, 2013). This is particularly true for research on business models for emerging markets, where anecdotal evidence is the basis of most works (e.g. Thompson & MacMillan, 2010; Yunus et al., 2010). Similar to research on resource-constrained innovation, research on business models has also not yet adopted a fine-grained perspective by considering different degrees of novelty and disruptiveness of the underlying innovation. Further, there is rather little understanding of how and to what extent traditional “for profit” business models can be employed in emerging markets. Lastly, the highly relevant question of how Western firms can integrate their resource-constrained business models into their existing global business models remains unanswered so far. Starting to close these gaps through empirical research is a goal of this work.

### **1.2.2 International business and emerging markets**

The international business literature picked up the topic of emerging markets with a focus on the BRIC States (Brazil, Russia, India, and China) just before the year 2000. Traditional approaches focused on existing global products and business models that were applied to emerging markets, thereby approaching only the affluent customer segment at the top of the economic pyramid in major cities (Arnold & Quelch, 1998; London & Hart, 2004; Prahalad & Lieberthal, 1998). Based on Prahalad’s seminal work on the base of the pyramid (Prahalad & Hammond, 2002; Prahalad, 2010), scholars subsequently started to investigate how firms can do business and improve the lives of poor people in emerging markets. Most authors refer to a 3-tier market segmentation in emerging markets (e.g. Gadiesh et al., 2007; Gebauer, Fischer, & Fleisch, 2009):

The premium market at the top end is where mainly Western firms serve affluent customers within emerging markets. At the other end, the low-end market consists of small local firms and micro businesses that provide BoP customers with products for their basic needs. In the middle, the so-called good-enough market is where Western and local firms compete for the emerging middle class.

In emerging markets, institutional voids (Khanna & Palepu, 1997, 2000) and the absence of adequate infrastructure such as water supply, basic sanitation, roads etc. (Ricart et al., 2004) create various constraints that both firms and customers have to deal with (Hoskisson et al., 2013). Moreover, local cultural peculiarities especially in rural regions are something most Western firms are not familiar with (Anderson & Markides, 2007; London & Hart, 2004), which makes this a highly demanding environment for them. Research in this stream has also led to different types of classifications of emerging economies. For example, Hoskisson et al. (2013) differentiate between traditional emerging economies, mid-range economies, and newly developed economies. The countries differ in their levels of infrastructure / factor market development and institutional development and thus pose different sets of constraints on firms and consumers.

International business in emerging markets has also influenced the understanding of internationalization processes. It has been found that firms can achieve location advantages for knowledge-seeking and knowledge-retrieving activities when active in emerging markets (Alcácer & Chung, 2011a, 2011b). The rise of emerging markets has caused much of the labor intensive work to be transferred to low-cost countries (Drummond, 2012; Weber, Hiete, Lauer, & Rentz, 2010) starting a new line of inquiry in the off-shoring literature (Kenney, Massini, & Murtha, 2009). Further, innovation for foreign markets is and has been a phenomenon of internationalization activities of firms exploiting competitive advantages in foreign markets (Kuemmerle, 1997; Nobel & Birkinshaw, 1998; von Zedtwitz & Gassmann, 2002). In line with this, firms also started to transfer high value functions such as R&D and innovation to emerging markets (Athreye, Tuncay-Celikel, & Ujjual, 2014) with the aim of gaining a competitive advantage in the global race for talent (Lewin, Massini, & Peeters, 2009) and developing tailored innovations for local requirements (Mudambi, 2011). Other studies investigated specific strategies applied in emerging markets such as new marketing strategies (Dawar & Chattopadhyay, 2002), adequate intellectual property protection strategies (Keupp, Beckenbauer, & Gassmann, 2008; Keupp, Friesike, & von Zedtwitz,

2012) or how firms can deal with the problem of high employee turnover (Yang & Jiang, 2007).

Very recently a new line of inquiry emerged from the fact that emerging market firms internationalize somewhat differently than Western firms, which enhances existing internationalization theories (Buckley & Hashai, 2014; Cuervo-Cazurra, 2012; Moghaddam, Sethi, Weber, & Wu, 2014). The phenomenon of “reverse innovation” – i.e. the transfer of innovations originally developed for emerging markets, which are subsequently commercialized in advanced economies (Immelt et al., 2009; Zeschky, Widenmayer, et al., 2014) also challenges established theories such as for example Vernon’s (1966) International Product Lifecycle theory or Beise’s (2004) lead market concept. Table 3 displays major contributions in the international business literature focusing on emerging markets (EMs).

Context factors	(Bruton, Ketchen, & Ireland, 2013; Bruton et al., 2011; Gadiesh et al., 2007; Gebauer et al., 2009; Hoskisson, Eden, Lau, & Wright, 2000; Hoskisson et al., 2013; Khanna et al., 2005; Khanna & Palepu, 1997, 2000; Mair, Martí, & Ventresca, 2012; Mair & Marti, 2009; Peng, Wang, & Jiang, 2008; Prahalad & Hammond, 2002; Prahalad & Lieberthal, 1998; Prahalad, 2010; Wright, Filatotchev, Hoskisson, & Peng, 2005)
Strategy and internationalization into EMs	(Alcácer & Chung, 2011a, 2011b; Athreye et al., 2014; Dawar & Chattopadhyay, 2002; Drummond, 2012; Gulati, 2010; Kenney et al., 2009; Keupp et al., 2008, 2012; Khanna et al., 2005; Khanna & Palepu, 2000, 1997; Lewin et al., 2009; London & Hart, 2004; Meyer, Mudambi, & Narula, 2010; Pogrebnyakov & Kristensen, 2011; Ricart et al., 2004; Sarkar, 2011; Weber et al., 2010; Yang & Jiang, 2007)
Internationalization out of EMS	(Brouthers, Donnell, & Hadjimarcou, 2005; Brown & Hagel, 2005; Corsi & Di Minin, 2014; Gaur, Kumar, & Singh, 2014; Govindarajan & Ramamurti, 2011; Govindarajan & Trimble, 2012; Govindarajan, 2012; Immelt et al., 2009; Santangelo & Meyer, 2011; Sarkar, 2011; Trimble, 2012; Verbeke & Yuan, 2013; Von Zedtwitz et al., 2015; Widenmayer, 2012; Zeschky, Widenmayer, et al., 2014)

*Table 3: Literature review on international business and emerging markets.*

Overall, research on emerging markets provides various facets that can enhance and better explain existing theory as well as create new theory. This research contributes to this stream of literature by showing how firms can organize for resource-constrained innovation through global operations, how resource-constrained innovations can bridge institutional voids and constraints, and how these innovations for emerging markets may be transferred and address new customers in developed markets, too.

## 1.3 Goal of this thesis and research questions

### 1.3.1 Main research question

This dissertation aims to contribute to the growing body of literature on innovation in and for emerging markets, business models, and international business and emerging markets. In particular, these insights lead to a better understanding regarding the conceptualization of resource-constrained innovation, how firms can achieve these kinds of innovation, the design of business models for the most disruptive type of resource-constrained innovation (i.e. frugal innovation), and the integration of low-cost business models into existing premium business models of Western firms. The previous literature reviews illustrated that these are thriving but still nascent fields of research. Consequently, the overall goal of this thesis is to provide new insights in these fields that bear new findings for literature that are also useful for managerial practice. The overall research question guiding this study is as follows:

*Q: How can firms manage resource-constrained innovation for emerging markets?*

This paper-based dissertation will divide this broad research question and address specific sub-questions in four independent articles. The first two focus on the conceptualization of and the organization for resource-constrained innovation in emerging markets, as well as how firms can commercialize these innovations in developed markets. The other two articles focus on how resource-constrained innovations can be embedded in adequate business models and how these low-cost business models can be integrated into existing premium business models. Figure 1 illustrates the four research articles and their overlap with literature streams presented in the previous section. Each article will be presented in more detail in the following sections. Table 4 below provides an overview of the four research articles of this thesis including their main findings, methods and research approaches, as well as their publication status.

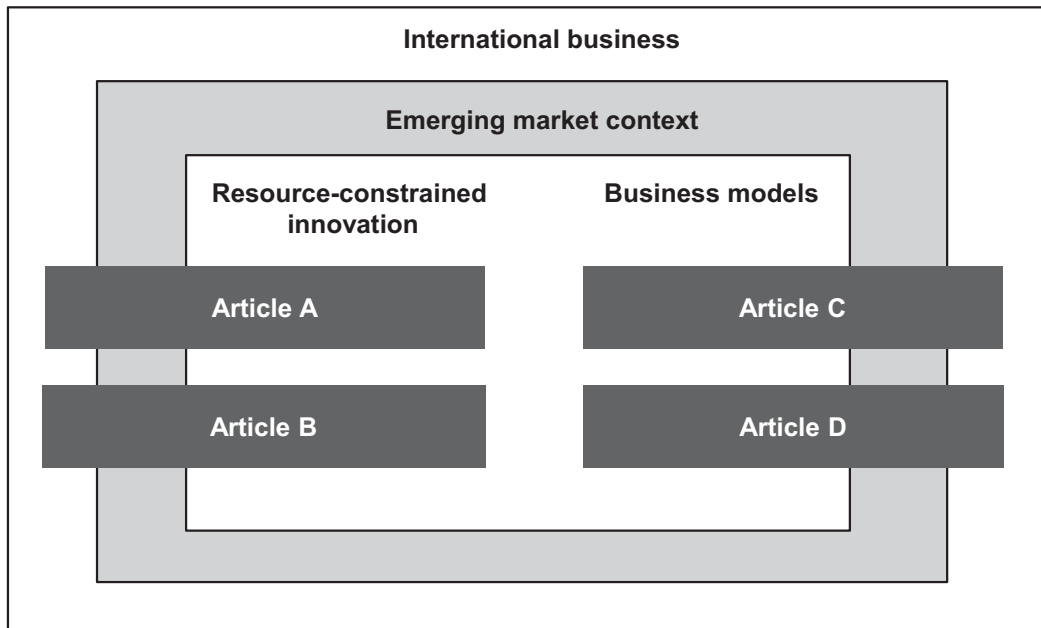


Figure 1: Research articles in the context of the research fields.

### 1.3.2 Sub-questions

As illustrated by the literature review, resource-constrained innovation is an umbrella term for different sorts of low-cost innovations stemming from emerging markets. While numerous concepts in scholarly research and consultancy work have confirmed the existence of this phenomenon, this large number of concepts also creates confusion due to non-existent conceptual foundations. The first article (A) builds on research arguing that resource-constrained innovations are very heterogeneous (Wan et al., 2015) and develops a typology of different types of resource-constrained innovations in emerging markets. Consequently, the research question of article A is as follows:

*Q1: How can resource-constrained innovation be conceptualized?*

Article B builds on the results of article A, which finds that resource-constrained innovations differ with regard to product novelty and disruptiveness. It investigates empirically how resource-constrained innovations with different degrees of product novelty differ with regard to their antecedents and outcomes. To do so, a multiple case study with four Western multinational firms is conducted. This study complements earlier case studies on resource-constrained innovation by Western firms (Corsi et al., 2014; Immelt et al., 2009; Zeschky et al., 2011; Zeschky, Widenmayer, et al., 2014). The research question is as follows:

*Q2: How do resource-constrained innovations with different degrees of product novelty differ with regard to their antecedents and outcomes?*

Article C investigates the business model for a specific type of resource-constrained innovation, i.e. frugal innovation. The article is based on a multiple case study with five firms that developed frugal medical and laboratory devices for applications in rural India and China. This is among the first multiple case studies to focus solely on frugal innovation and thereby advances prior research that did not employ such a focused perspective. The research question is as follows:

*Q3: How can firms design business models for frugal innovations in emerging markets?*

Article D addresses the question of how Western firms can integrate low-cost business models for emerging markets into their existing global premium business models. This research responds to calls for a deeper investigation of how firms manage two business models in one market (Markides, 2013), particularly for the case of low-cost business models at premium firms (Kachaner, Lindgardt, & Michael, 2011). Using an ambidexterity perspective (O'Reilly & Tushman, 2004, 2008), this study provides the grounds for future research on business models in emerging markets and global ambidexterity. The research question is as follows:

*Q4: How can Western firms integrate low-cost business models into their existing premium business model?*

Q	Title	Authors	Method and data	Findings
Q1	From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness Published in <i>Research-Technology Management (RTM)</i>	Zeschky, M.; Winterhalter, S.; Gassmann, O.	Qualitative (13 cases; Western and emerging market firms )	<ul style="list-style-type: none"> <li>▪ Conceptualization of resource-constrained innovation</li> <li>▪ Cost innovation: “same for less”</li> <li>▪ Good-enough innovation: “tailored for less”</li> <li>▪ Frugal innovation: “new for less”</li> <li>▪ Reverse innovation: “elsewhere”</li> </ul>
Q2	Achieving low-end disruption and new market creation in emerging and global markets: the role of headquarters in Western MNCs	Winterhalter, S.	Qualitative (4 cases; Western firms)	<ul style="list-style-type: none"> <li>▪ First time RCI initiatives are started by HQs not emerging market subsidiaries.</li> <li>▪ Strategic autonomy at subsidiary level is no prerequisite for the development of RCI.</li> <li>▪ Initial target market and operational autonomy influence degree of product novelty.</li> <li>▪ Degree of product novelty influences type of market disruption.</li> <li>▪ Good-enough and frugal innovations differ with regard to reverse transferability.</li> </ul>
Q3	Business models for frugal innovations in emerging markets: The case of the medical device and laboratory equipment industry	Winterhalter, S.; Zeschky, M.; Gassmann, O.	Qualitative (5 cases of Western and emerging market firms)	<ul style="list-style-type: none"> <li>▪ Identification of threefold value proposition in frugal business models</li> <li>▪ Role of “frugal mindset” in organizations: Maximization of efficiency and creation of application innovation.</li> <li>▪ Two distinct R&amp;D strategies for frugal innovation</li> </ul>
Q4	Managing dual business models in emerging markets: An ambidexterity perspective  Accepted for publication in <i>R&amp;D Management</i>	Winterhalter, S.; Zeschky, M.; Gassmann, O.	Qualitative (11 cases of Western firms)	<ul style="list-style-type: none"> <li>▪ Western companies choose different degrees of value chain separation to address new customer segments in emerging markets.</li> <li>▪ Line of separation between business models goes across organizational boundaries.</li> <li>▪ Elaboration on the business model as a new unit of analysis for ambidexterity research.</li> <li>▪ First notion of “global ambidexterity”</li> </ul>

Table 4: Overview of research articles.



## 1.4 Structure of the thesis

### 1.4.1 Overall structure

Due to the nature of a paper-based dissertation, the above stated research questions are answered in four independent research articles. These articles form the main body of this thesis, which is preceded by the introductory chapter that provides the state of the art in literature, research questions and the thesis outline. A conclusion subsequent to the articles closes the thesis with a brief summary and by presenting consolidated contributions and providing a broader outlook for future research. The next section provides a short outline of the independent research articles, before Figure 2 at the end of the next section summarizes the structure of this thesis<sup>1</sup>.

### 1.4.2 Thesis outline

In chapter 2, the article *“From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness”* addresses research question Q1 by providing a typology of resource-constrained innovation. The paper is based on a literature review that carves out that there is great ambiguity in extant literature regarding what resource-constrained innovation is and in which forms it can occur. Using a sample of thirteen case examples, three distinct forms of resource-constrained innovations, i.e. cost innovation, good-enough innovation, and frugal innovation, are identified. These types all address prevailing needs of resource-constrained customers in emerging markets by being low cost and by incorporating specific features or characteristics. However, these innovation types differ with regard to product novelty and disruptiveness. Further, the article also argues that reverse innovation is always based on either a cost, good-enough or frugal innovation, which is later commercialized in developed markets. A definition for each type is proposed as a basis for future research. The main contribution of this article is to provide conceptual clarity and a more fine-grained perspective on resource-constrained innovation.

In chapter 3, the article *“Achieving low-end disruption and new market creation in emerging and global markets: the role of headquarters in Western MNCs”*, addresses research question Q2 by empirically investigating differences and commonalities regarding how Western firms organize for good-enough and frugal innovation.

---

<sup>1</sup> Notice: For the purpose of this introduction, the four sub-research questions presented in the previous section have been summarized and condensed to their core. Thus, the research questions presented in each of the four articles differ in the sense that they are more detailed and specific.



Following a multiple case study approach (Eisenhardt, 1989; Yin, 2014) at four Western multinationals in China and building on extant literature, this article challenges established assumptions regarding the management of subsidiaries in Western multinationals; particularly regarding the role of autonomy for subsidiary innovativeness (Asakawa, 2001; Mudambi, Mudambi, & Navarra, 2007). Building on extant research that distinguishes between operational and strategic autonomy (Birkinshaw & Morrison, 1995; Keupp, Palmié, & Gassmann, 2011), it is argued, against current notions in literature, that initial resource-constrained innovation activities are initiated by the Western headquarters. Further, it is found that strategic autonomy at the subsidiary level is no precondition for resource-constrained innovation in Western MNCs, nor is the presence of R&D units in emerging markets. The initial target market defined and the degree of operational autonomy assigned to the unit in charge of the development influences the degree of product novelty achieved (i.e. frugal or good-enough innovation). Lastly, it is shown that good-enough and frugal innovation cause different kinds of market disruptions (Christensen & Raynor, 2003), which differ with regard to their reverse transferability.

In chapter 4, the article *“Business models for frugal innovations in emerging markets: The case of the medical device and laboratory equipment industry”* addresses research question Q3 by studying business models for frugal innovations. Following a multiple case study approach (Eisenhardt, 1989; Yin, 2014) and building on extant literature, the paper argues that firms need to incorporate a “frugal mindset” to maximize cost efficiency in their business model, while at the same time creating frugal innovations. The empirical evidence is based on two Western MNCs and three Indian firms that developed business models for frugal innovations in India or China. The paper identifies a threefold value proposition inherent in all frugal business models that creates value at the level of patients, doctors, and the healthcare system. Further, the article provides insights about how firms design their value creation mechanisms for frugal business models and identifies two distinct R&D strategies to achieve frugal innovation.

In chapter 5, the article *“Managing dual business models in emerging markets: An ambidexterity perspective”* addresses research question Q4 by studying how Western firms manage premium and a low-cost business models, i.e. dual business models (Markides & Charitou, 2004), in emerging markets. Following a multiple case study approach (Eisenhardt, 1989; Yin, 2014) and building on extant literature, the paper is the first to explicitly employ an ambidexterity perspective (O’Reilly & Tushman, 2004,

2008) to examine this question as requested by Markides (2013). The empirical context of the study is formed by eleven case studies of Western firms that successfully employed a low-cost business model in parallel to their traditional premium business model in emerging markets to address the needs of resource-constrained customers. The paper argues that firms may achieve ambidexterity in business models through domain separation (Lavie, Kang, & Rosenkopf, 2011) and that different degrees of domain separation allow firms to reach new customer segments, which they were unable to serve with the initial premium business model. This article holds research propositions and an agenda for future research for business models and ambidexterity.

Thesis structure		
<b>Chapter 1</b>	Introduction	State of the art in literature, research questions, thesis structure and outline
<b>Chapter 2</b>	Article A	From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness.
<b>Chapter 3</b>	Article B	Achieving low-end disruption and new market creation in emerging and global markets: the role of headquarters in Western MNCs
<b>Chapter 4</b>	Article C	Business models for frugal product innovations in emerging markets: The case of the medical device industry
<b>Chapter 5</b>	Article D	Managing dual business models in emerging markets: An ambidexterity perspective
<b>Chapter 6</b>	Conclusion	Summary, implications for research and management practice

Figure 2: Thesis structure overview.

## 2 From cost to frugal and reverse innovation: Mapping the field and implications for global competitiveness

Co-authored by Marco Zeschky and Oliver Gassmann

Published in *Research-Technology Management (RTM)* <sup>2</sup>

### Abstract

*Product and service innovations aimed at resource-constrained customers in emerging markets have recently attracted much research and management attention. Despite the prominence of this topic, however, there are some misconceptions around the different innovation types in this domain that may limit managers' ability to derive informed implications for strategy and operations. This article analyzes the different types of resource-constrained innovation – cost, good-enough, frugal, and reverse innovation – conceptualizes the distinctions between them, and discusses the implications for strategy providing a framework for managers to systematically analyze their own approaches to resource-constrained innovation and craft proper development processes. By highlighting the differences between the various types of resource-constrained innovation, this article also provides the conceptual grounds for further systematic research.*

**Keywords:** Cost innovation, good-enough innovation, frugal innovation, reverse innovation, resource-constrained innovation, emerging markets

---

<sup>2</sup> This article is published as: Zeschky, M., Winterhalter, S., & Gassmann, O. (2014). From Cost to Frugal and Reverse Innovation: Mapping the Field and Implications for Global Competitiveness. *Research-Technology Management*, 57(4), 20–27.

## 2.1 Introduction

The economic rise of emerging markets, especially in China and India, has created a new market segment, variously referred to as the middle market (Govindarajan, 2012), the low-income market (Hart & Christensen, 2002; Sanchez & Ricart, 2010), and sometimes the good-enough market (Gadiesh et al., 2007). The fierce competition among firms fighting for the middle class consumers emerging in these areas has made this market segment the “next global battleground” (Gadiesh et al., 2007, p. 82). However, despite increasing incomes, emerging middle-class consumers still have little excess income compared to Western consumers and often suffer from additional constraints, such as poor public and private infrastructure or poor service availability. As a result, firms have started to develop market-specific solutions that are characterized by high value and low costs.

These solutions, which have attracted much attention from both managers and researchers, have been captured under the terms cost innovation (Williamson, 2010), good-enough innovation (Gadiesh et al., 2007; Hang et al., 2010), frugal innovation (Economist, 2010; Zeschky et al., 2011), resource-constrained innovation (Ray & Ray, 2010), trickle-up innovation (Reena, 2009), and reverse innovation (Govindarajan & Trimble, 2012; Govindarajan, 2012; Immelt et al., 2009). The innovation types described by these terms are structurally different from each other with respect to their original motivation, value proposition, and value creation mechanisms. For example, while some solutions may emerge from the redesign of an existing product to make it drastically cheaper, others may be entirely new and create new markets, as well.

However, researchers and practitioners alike often use these terms interchangeably, obscuring the important strategic implications of the differences among them. In fact, based on a survey of the literature and a series of case studies, we argue that there are three distinct types of resource-constrained innovation for emerging markets: cost, good-enough, and frugal innovation. These three types differ from each other with respect to their technology and market novelty and therefore significantly affect how firms approach, develop, and position solutions. Therefore, a sound conceptualization of the different innovation types is essential for management practice and research to move forward in a systematic and fruitful manner.

## 2.2 Method

We started this study by analyzing extant literature on innovation for resource-constrained consumers in emerging markets. Our initial aim was to understand the commonalities and differences between the most frequently used terms – cost, good-enough, frugal, and reverse innovation. We then began to construct a database of cases of resource-constrained innovations; the database now includes 85 cases collected between 2009 and 2013; while some cases were based on data gathered through personal interviews, some relied on extensive secondary data analysis.

While all of the cases in our database were characterized by drastically lower prices or operating costs compared to Western products, we employed the Ansoff matrix (Ansoff, 1965) as an analytical framework to classify the cases. In the Ansoff matrix, innovations are distinguished according to their technical and market novelty; the matrix thus classifies innovations by whether they are market extensions based on existing technologies, original product development activities for existing markets, or newly developed products for entirely new markets.

For this article, we have selected 13 cases that are most illustrative to substantiate our conceptualization. Four of these cases rely on interviews with managers (including two cases representing good-enough innovations and two representing frugal innovations). For the other nine cases (seven cost innovations, one good-enough, and one frugal innovation), we used data gathered from well-respected resources.

## 2.3 Findings

Our final definitions of the three types of resource-constrained innovation emerged from an iterative process of analysis of the cases we had collected, using the Ansoff matrix to categorize the various examples. Ultimately, we defined solutions or products that scored low on both the market and technical novelty dimensions as cost innovations, those that scored low to medium on both dimensions as good-enough innovations, and those that scored medium to high on both dimensions as frugal innovations (Figure 3). During our analysis, it became clear that reverse innovation was not congruent with the other types of resource-constrained innovation. Rather, reverse innovation cut across the other categories; reverse innovations were always built on cost (CI), good-enough (GI), or frugal innovations (FI) (Figure 3). About half of all cost, good-enough, and frugal innovations we analyzed were ultimately transferred

to developed markets, becoming reverse innovations (Table 5; number of reverse innovation in parentheses).

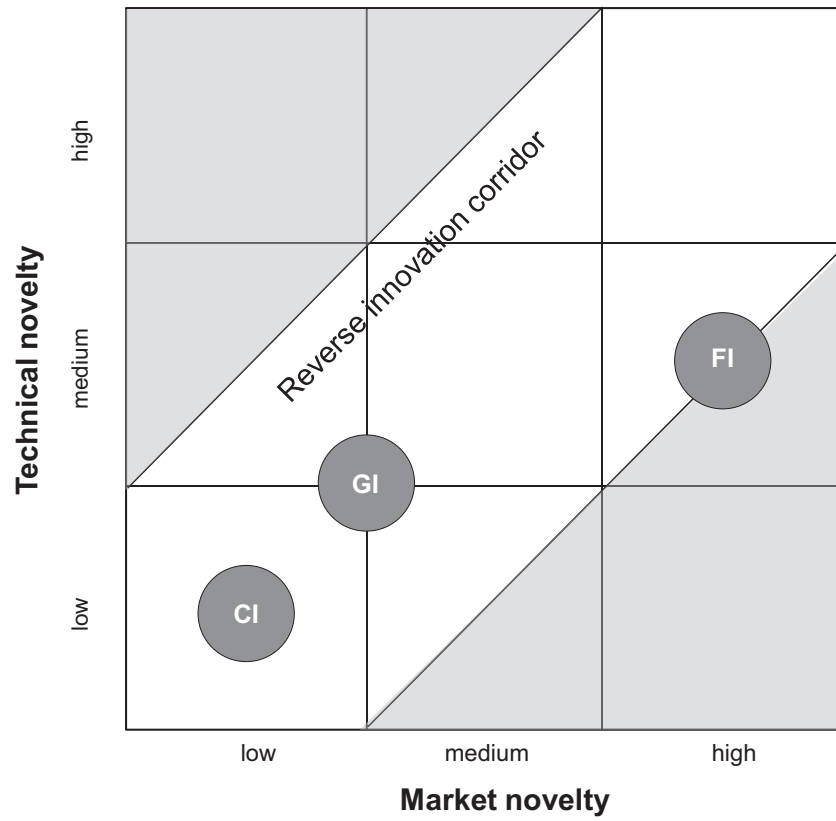


Figure 3: The reverse innovation corridor.

Industry	Cost Innovation	Good-enough Innovation	Frugal Innovation	Total
Automotive & transportation	4 (2)	4 (2)	0	8 (4)
Chemicals	1 (1)	1	2	4 (1)
Energy and infrastructure	2 (2)	3 (1)	4	9 (3)
Financial services	0	1	2	3
Food, health, & hygiene	5 (1)	4 (1)	0	9 (2)
Household	2 (2)	4 (2)	0	6 (4)
Information & communication	4 (1)	3 (2)	2 (1)	9 (4)
Medtech	3 (1)	11 (8)	8 (3)	22 (12)
Tools & machinery	3 (1)	10 (9)	1	14 (10)
<b>Total</b>	<b>25 (11)</b>	<b>41 (25)</b>	<b>19 (4)</b>	<b>85 (40)</b>

Table 5: Sample overview of resource-constrained innovation cases.

### **2.3.1 Cost innovation: same functionality at a lower cost**

Cost innovations are solutions that offer similar functionalities to Western products at lower costs for resource-constrained customers. Cost innovation is not a novel concept. There are numerous cases in which low-cost competitors have turned an expensive good into a commodity by drastically reducing costs. For example, by developing a method to produce rechargeable lithium-ion batteries at ambient temperature and humidity (all Western competitors used expensive “dry rooms” for production), the Chinese company BYD was able to reduce the production costs of lithium-ion batteries by 70 percent, to the point where they could be priced at a point that matched lower-performing nickel-cadmium batteries (Williamson, 2010). Another Chinese firm, Huawei, is able to sell top-notch smartphones at about 20 percent of the cost of Western competitors. In 2009, the Chinese company even beat Ericsson on its Swedish home turf in a tender for a 4G mobile network deal, by offering the same functionality and quality of the Swedish company at a much lower cost (Ward, 2009).

The purest form of cost innovation can be found in consumables, for which the cost of a product can be reduced simply by reducing its size until it fits into the “affordability zone” for resource-constrained consumers. The Indian firm Godrej sells its established soaps Cinthol and Fair Glow to the rural Indian market in packs of only 50 grams (Kaur, 2013). Similarly, Hindustan Unilever (HUL) re-launched its Rin Shakti detergent powder in 2004 in pack sizes between 2 kilograms and 25 grams to make it affordable for every customer segment (Ghosh, 2004).

Cost innovations are triggered by the economic realities of emerging markets. To respond to these realities, firms often exploit local cost advantages that help improve R&D and production processes, which ultimately result in cost innovations. For example, China’s lower wages allowed ZPMC, a Chinese harbor crane manufacturer, to hire up to 40 times more engineers than its German counterparts for the same cost. This enabled ZPMC to offer a very high level of customization in its products, while keeping costs at a mass-market level (Williamson & Zeng, 2009).

The revival of cost innovation has largely been sparked by emerging market firms based in China and India. These firms have achieved huge cost reductions through process innovations largely grounded in cost advantages enabled by low labor costs, local sourcing, standardized components, and cost-effective raw material sourcing, as well as scale and efficiency (Williamson, 2010). But they have built on these cost reductions with innovative and disruptive business models (Williamson & Zeng, 2009).



Despite their low technical and market novelty, cost innovations can expand a company's market by tapping potential customers who are resource-constrained primarily in terms of capital, making them first-time customers (Prahalad, 2010). However, the appeal of cost innovations is not necessarily limited to emerging-market customers. They can also attract more affluent customers seeking a bargain or expand the market for what had once been a niche or specialty product. Haier, for instance, created a consumer market for wine refrigerators, which had until then been designed primarily for restaurants and wine connoisseurs, redesigning the products for home use and reducing prices (Williamson, 2010).

### **2.3.2 Good-enough innovation: tailored functionality at a lower cost**

Good-enough innovations are solutions that include functionalities and features designed to meet a range of resource constraints beyond capital constraints. Like cost innovations, good-enough innovations achieve low price points by taking advantage of local cost advantages combined with better local sourcing conditions. However, in addition to cost innovations, good-enough innovations are adapted or re-engineered to fit the specific use requirements of the low-income market. For example, the Swiss laboratory equipment manufacturer Mettler Toledo developed a basic, good-enough weighing scale for the Chinese market that achieved cost reductions both through low-cost manufacturing and materials, but also by incorporating a more basic minimum feature set than Mettler's Western products (Zeschky et al., 2011). This basic weighing scale has now become a sought-after product for customers in many markets seeking basic functionality at a low cost. Logitech has developed several good-enough products for emerging markets. The wireless computer mouse M215 offers simple core functions and user friendliness in a product that incorporates cheaper materials for noncritical parts and drastically reduced packaging to cut costs (Zeschky et al., 2011). Similarly, Saurer Volkmann, a global manufacturer of twisting machines entered the emerging middle market in 2004 with a twisting machine called Focus that offered fewer features, tailored to emerging-market needs, as well as low energy consumption – a crucial benefit for customers needing to keep operational costs low (Ryans, 2005, 2006, 2009).

The practical challenge of developing good-enough innovations lies in identifying and customizing value-adding functions while eliminating those that do not deliver value for the target customer – all at very low cost. Successful good-enough innovation usually requires some degree of product novelty, which often emerges from the concentration on core features, increased robustness, high ease of use, and manual rather than



automated processing. While Logitech's good-enough mouse is a low-cost product, it uses the same state-of-the-art transmission and laser sensors used in the company's high-end products. Logitech incorporated these features because the mouse is frequently used as a remote control for the computer (which is often used as a television) and therefore needs to work properly on a wide variety of surfaces. Because of the higher transmission power required to perform this function, the shielding of the mouse was improved to avoid interference with the remote controls of other people in highly crowded urban areas (Govindarajan & Trimble, 2012). Traditionally, good-enough innovations have been the domain of emerging-market firms that address price-sensitive customers (Gadiesh et al., 2007). However, as our examples show, Western firms have begun to develop good-enough products to meet the specific customer needs of these growing markets.

### **2.3.3 Frugal innovation: new functionality at a lower cost**

The term "frugal innovation" has been used to denote innovations specifically developed for resource-constrained customers in emerging markets (Sehgal, Dehoff, & Panneer, 2010; Sharma & Iyer, 2012; Zeschky et al., 2011). Other terms for frugal innovation are Ghandian innovation (Prahalad & Mashelkar, 2010) or jugaad (Cappelli et al., 2010; Petrick & Juntiwassarakij, 2011; Sharma & Iyer, 2012), terms that emphasize the specific Indian context in which such innovations have often been created. In contrast to good-enough innovations, frugal innovations are not re-engineered solutions but originally developed products or services for very specific applications in resource-constrained environments. Frugal innovations based on new product architectures are often quite disruptive; for example, by making a stationary product portable, a frugal innovation may reach an entirely new customer group.

A case in point is the mobile phone-based microfinance service M-Pesa, a joint venture of Kenyan Safaricom and UK-based Vodafone, which uses existing mobile phone technology and infrastructure to reach people who previously had no access to banking (Graham, 2010). The mobile money transfer service allows users to transfer funds via short message service (SMS) without a bank account. This technologically simple solution has revolutionized the flow of cash for an entire region by enabling financial transactions for people who have no bank account and it has increased personal safety by reducing the need for people to carry cash (Graham, 2010). The Dutch firm Qiagen offers another example of frugal innovation with its careHPV device, designed specifically for the detection of HPV (human papilloma virus) in rural environments. The careHPV includes an easy-to-use interface, a simple color-coded system for

indicating test results, high robustness for rough use conditions, and portability, a feature previously unavailable for this kind of system. The system tolerates changes in the temperature of blood samples, which is important, as refrigeration is often not available in remote rural areas, and is so simple to use that non-medical staff can be trained to use it in just a few hours. As an interview partner at Qiagen told us, *“The device is so intuitively easy to operate that we can deploy it in any market in the world.”*

Another prominent example of frugal innovation is General Electric’s (GE) portable ultrasound device, Logiq Book, developed for use in rural areas in China (Govindarajan & Ramamurti, 2011). This notebook computer-based product has significantly fewer features than traditional ultrasound machines; however, it offers other benefits important for its rural target markets. On top of a price reduction of almost 80 percent over traditional ultrasound machines, the Logiq Book is much smaller and lighter and offers only core functions; its portability means that rural patients do not have to travel to far-away cities for diagnosis and treatment (Immelt et al., 2009).

Overall, in contrast to cost and good-enough innovations, frugal innovations are fairly novel from both the technology and market perspectives. Although existing technologies are employed in most cases, frugal innovations are typically built on new product architectures that enable entirely new applications at much lower price points than existing solutions.

#### **2.3.4 Reverse innovation: selling low-cost innovations from emerging markets elsewhere**

In contrast to cost, good-enough, and frugal innovation, reverse innovation refers to a market rather than a product concept. In the past, the flow of innovation has predominantly been from developed to emerging markets (Vernon, 1966). But as developed market customers have been attracted to cost, good-enough and frugal innovations often developed for emerging markets, this dominant paradigm has been at least partly overthrown. More and more, companies are redeploying their resource-constrained innovations to Western markets, to attract cost-minded customers or to fill gaps in these large, developed markets.

GE’s Logiq Book portable ultrasound device is a popular showcase of reverse innovation. Since its market introduction in China in 2002, an advanced version of the frugal product has been developed and sold worldwide, including Europe and the United States. The device’s value proposition – drastically lower costs and portability – has led to the development of new applications in the West. Today, the device is

used at doctors' offices and in operating rooms that are too small for stationary machines, or deployed in ambulance vehicles to be used at the site of an accident (Govindarajan & Ramamurti, 2011; Immelt et al., 2009). Logitech's M215 wireless mouse is now sold worldwide (Govindarajan & Trimble, 2012; Trimble, 2012) as is Mettler Toledo's basic weighing scale (Zeschky et al., 2011). Cost innovations have been particularly successful in finding their way to developed markets. For example, ZPMC has become the largest player in the global market for harbor cranes, selling their products in developed markets as well as developing economies. In addition to the crane business, ZPMC has begun to leverage its cost innovation capabilities to move into other areas, such as bridge construction. As one of their first projects in this field, they directly won a tender in the U.S. to construct the new San Francisco Bay Bridge (Barboza, 2011).

Govindarajan and Ramamurti (2011) have defined reverse innovation as innovations that are first adopted in emerging markets before being adopted in rich countries. Without exception, all of the reverse innovation examples we analyzed were either cost, good-enough, or frugal innovations. Therefore, we conclude that reverse innovations are cost, good-enough, or frugal innovations that find a market among customers outside of the emerging markets at which they were originally targeted.

## **2.4 Discussion**

Our analysis has shown that cost, good-enough, and frugal innovation are distinct concepts with clear differences in technology and market novelty and in other key traits of the products (Table 6):

- Cost innovations are low-cost alternatives to Western products, with cost reductions realized through process innovations and cost advantages in emerging markets.
- Good-enough innovations are also cost innovations, but in addition, the products are tailored to the resource-constrained market, with non-value-adding functions eliminated and specific value-adding functions designed to meet the specific requirements of resource-constrained customers.
- Frugal innovations build on good-enough innovations but feature new applications developed specifically for resource-constrained environments, generating an entirely new value proposition.

- Finally, reverse innovations are cost, good-enough, or frugal innovations that are transferred from the emerging-market environment to developed-country markets. Reverse innovation, as a market innovation rather than a product innovation, may be based on any one of these innovation types.

The different natures of cost, good-enough, and frugal innovation suggest that each will require a different set of technological and organizational capabilities (Zeschky, Widenmayer, et al., 2014). As cost-innovation products are usually made up of readily available components, the key success factor for these innovations is process capabilities such as managing production facilities in low-cost regions. The example of BYD highlights this: lithium-ion batteries are not new, but BYD's innovative production capabilities have paved the way for market success.

Good-enough innovation, with its increased novelty in product and market dimensions, requires additional technological and customer know-how. For example, to create a low-cost mouse that would meet customer needs, Logitech had to go beyond simply cutting costs; developing a successful product required an in-depth knowledge of customer behavior and the use environment – and the technological know-how to meet customer demands at an acceptable price. The Mettler Toledo example also illustrates this: It took the firm thirteen years to develop the in-depth customer insights necessary to develop the basic weighing scale tailored to the needs of customers with basic requirements at affordable cost. The process required not only the establishment of an extensive sales and marketing network in China, but also the creation of a local R&D unit dedicated to the development of affordable products.

From a capability perspective, frugal innovation is even more challenging than good-enough innovation. Often, first-time customers in underserved areas are at the center of these innovation efforts, requiring that firms learn to develop new products defined by entirely new parameters. As one of our interview partners at GE told us, in reference to GE's portable ultrasound device, *“Building up the engineering capability is relatively easy, but we are still learning to build up a marketing and product management capability. This takes a lot more time and it is a more challenging task than the technical.”* When developing the Logiq Book, GE addressed this challenge by creating a local team to learn about rural customers and their use requirements. Only after the product requirements were defined could the team draw on GE's internal resources to develop a prototype. GE also set up a designated sales team focused on the device's customer group – rural hospitals in China.

<b>Resource-constrained Innovations</b>					
	<i>Cost innovation (CI)</i>	<i>Good-enough innovation (GI)</i>	<i>Frugal innovation (FI)</i>	<i>Reverse innovation (RI)</i>	
<i>Examples</i>	BYD – batteries Huawei – phones and infrastructure Nokia – cell phones ZPMC – cranes Haier – wine coolers Godrej – soap HUL – detergent	MT – weighing scale Logitech – M215 Saurer – Focus	GE – Logiq Book Qiagen – careHPV Safaricom – M-Pesa	Logitech – M215 MT – Weighing scale Saurer – Focus GE – Logiq Book	
<b>Product perspective</b>	<i>Novelty of solution</i>	Tech: low Market: low	Tech: low–med Market: low–med	Tech: med–high Market: med–high	Tech: low–med Market: low–high
	<i>Description</i>	Cost-engineered emerging market solution	Value-engineered emerging market solution	Application-engineered emerging market solution	Cost-, value-, or application-engineered global market solution
	<i>Typical Traits</i>	<ul style="list-style-type: none"> <li>▪ Cost-effective raw materials</li> <li>▪ Local sourcing</li> <li>▪ Local production</li> <li>▪ Standard components, commodities</li> <li>▪ Smaller package sizes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cost-effective raw materials</li> <li>▪ Local sourcing</li> <li>▪ Local production</li> <li>▪ Standard components, commodities</li> <li>▪ Limitation to core features</li> <li>▪ Less automation</li> <li>▪ High robustness</li> <li>▪ High ease of use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cost-effective raw materials</li> <li>▪ Local sourcing</li> <li>▪ Local production</li> <li>▪ Standard components, commodities</li> <li>▪ Reduction of size</li> <li>▪ New applications (e.g., portability)</li> <li>▪ Tailored for environments with poor infrastructures</li> </ul>	Cost, good-enough, or frugal innovation characteristics
<b>Firm perspective</b>	<i>Innovation Strategy</i>	Cost cutting	CI + feature optimization	GI + application innovation	CI, GI, or FI + global rollout
	<i>Target Customer</i>	Initially: First-time / resource-constrained customer  Potentially: Efficiency-seeking high-income customer	Initially: First-time / resource-constrained customer  Potentially: Efficiency seeking high-income customer	Initially: First-time / severely resource-constrained customer  Potentially: Efficiency-seeking high-income customer	Cheaper, existing solution  Cheaper, specialized existing solution  Cheap, specialized new solution  Cheap, good-enough or frugal solution for Western markets  Resource-constrained or efficiency-seeking customer
	<i>Enabler</i>	Improved processes	Improved processes and engineered product features	Improved processes, engineered product features, new applications	Other geographic market or market segment with resource-constrained needs

Table 6: Typology of resource-constrained innovation.

There is a cascade-like dependency between the various types of resource-constrained innovation; more novel resource-constrained innovations typically entail all of the traits of

less novel ones (Figure 4). Cost innovations are enabled through process innovations that reduce operational costs. For example, Godrej adapted its production lines to allow production of smaller lot sizes of its soap, and BYD developed process technologies that allowed them to produce lithium-ion batteries in settings with variable humidity and temperature, reducing production costs by eliminating traditional dry rooms. Good-enough innovation combines cost-cutting process innovations with the elimination of features that are not important to resource-constrained customers while tailoring or enhancing features specifically required in the use environments. Logitech, for example, began by offshoring its production plants to China to reduce production costs (Williamson & Zeng, 2009); using the insights it gained into resource-constrained customers, the company then developed a good-enough mouse specifically for the Chinese market.

The most complex technical and organizational capabilities are required for frugal innovation. This is illustrated by GE's development of the Logiq Book, which presented both technical and market challenges: the company had to create an entirely new product architecture based on software rather than hardware, and then sell it to an entirely new market. Although the software components were not entirely new (a GE team in Israel developed them and passed them on to the Chinese team), the team had to integrate the right technical, engineering, production, and sourcing capabilities with distinct market knowledge of former non-customers. For this reason, from a product development perspective, frugal innovation can be considered the pinnacle of innovation capabilities in resource-constrained markets.

Reverse innovation requires different organizational capabilities than any of the other types, and these may vary depending on the type of innovation being reversed. Clearly, internal knowledge transfer from emerging markets to developed markets is crucial. Firms that are reversing cost, good-enough, or frugal innovations must first sense solutions for resource constraints in emerging markets and then seize opportunities to leverage these to relevant customer segments in developed markets.

The value and impact of reverse innovation depends on the kind of innovation being reversed. Reverse innovation of cost or good-enough innovations can help firms extend their product portfolio at the low end to tap cost-conscious or efficiency-seeking customers in developed markets. In this way, cost and good-enough innovations created for emerging markets may provide firms with additional flexibility as they can be strategically reversed when needed (for instance, when low-cost competition arrives at home or the opportunity arises to target new customer segments).

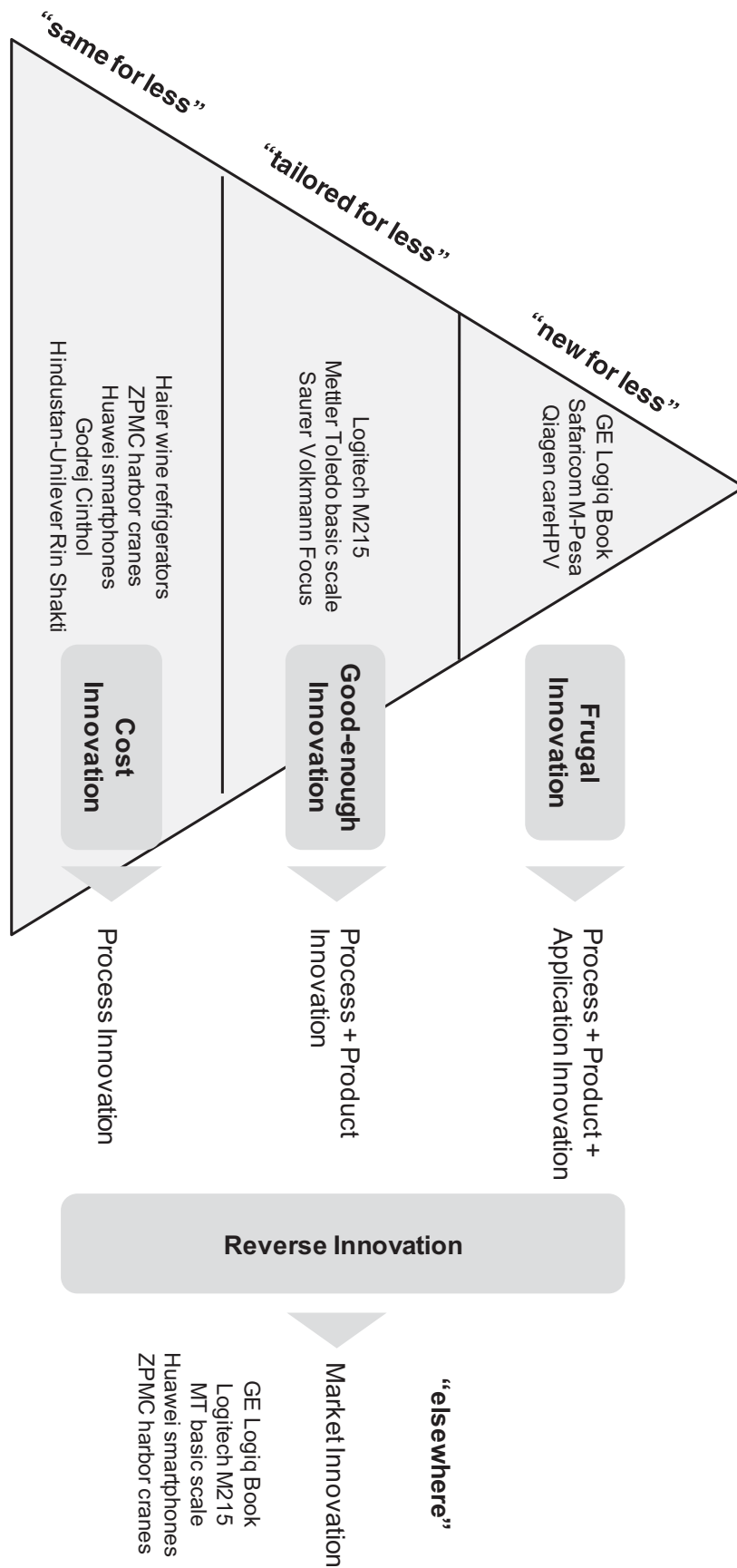


Figure 4: Hierarchy of resource-constrained innovation.



The situation is a bit more complex for frugal innovations, which are typically more closely tailored to their emerging market use environments. Frequently, the frugal value proposition is so unique to the emerging market that there is no reverse transfer potential; when a frugal innovation can be reversed, it frequently creates an entirely new market in the West. For example, text message–based microfinance services fill a very clear need in Africa, where the banking infrastructure is missing or fragmented; such a service has very little application in developed markets with strong banking systems. This is a difficult innovation to reverse – and in fact, these solutions have not been successfully transferred to a developed market so far. By contrast, although the Logiq Book was developed for emerging markets, GE was able to identify a need for mobile and portable ultrasound machines in developed markets as well – allowing the company to build an entirely new mobile ultrasound business.

## **2.5 Conclusion**

Innovation for resource-constrained consumers in emerging markets has received increasing attention, but the discussion thus far has lacked a common understanding with regard to the definition of the various types of resource-constrained innovation. As emerging markets continue to grow, capabilities for resource-constrained innovation of all types will become key elements of growth for global firms. A clearer understanding of the various types of innovation in play, and their requirements and challenges, is important for firms seeking to craft appropriate offerings for emerging markets – and, ultimately to bring them back to Western markets. Relying on process improvements and offshoring to create a cost innovation is a very different undertaking from developing entirely new products tailored to resource-constrained markets, and each offers different advantages. Entering resource-constrained markets with a simple set of cost innovations offers different competitive advantages and strategic options than altering products to create a good-enough innovation or creating entirely new markets with frugal innovation.

Our conceptualization contributes to a clearer understanding of existing innovation concepts for resource-constrained environments and thereby provides the grounds for systematic future research.



### **3 Achieving low-end disruption and new market creation in emerging and global markets: The role of headquarters in Western MNCs**

**Single authored**

#### **Abstract**

*Western multinationals are increasing their efforts to innovate for resource-constrained customers in emerging markets with the aim of commercializing these innovations also in developed markets. Extant literature lacks empirical insights how firms organize for these kinds of innovation. This study employs a multiple case study approach at four Western MNCs in China. Contrary to extant notions in literature, this study finds that the first resource-constrained innovation within a Western MNC is initiated by the HQs and that strategic autonomy in emerging market subsidiaries is no prerequisite. The initial target market defined and the operational autonomy assigned by the HQs influence the degree of product novelty achieved. The degree of product novelty has effects on the type of market disruption caused by these resource-constrained innovations.*

**Keywords:** Frugal innovation, reverse innovation, Western MNCs, emerging market, initiatives, strategic autonomy, operational autonomy

### 3.1 Introduction

The influence of emerging markets on global business has increased significantly in recent years (Drummond, 2012; Mudambi, 2011). Emerging markets, particularly the emerging middle class and the lower parts of the economic pyramid, have grown in recent years and are expected to be one of the major growth driver for the next decades (Dobbs et al., 2012; Schmid, Dzedek, & Lehrer, 2014). The OECD estimates that the consolidated GDPs of today's emerging markets will account for 60% of the global GDP by 2020, and that half of the global middle class will be living in China and India by 2050 (OECD, 2012). Other analysts similarly estimate that the new middle class customers will entail up to 2 billion consumers and accumulate a spending power of up to US\$ 20 billion until 2025 (Dobbs et al., 2012). Thus, in order to stay globally competitive, firms need to address the needs of these new consumers in their future business (Govindarajan & Trimble, 2012). Consequently, leading firms have started to innovate tailored products and business models for these new customer segments. These innovations are summarized under the umbrella term "resource-constrained innovations" (Ray & Ray, 2010; Sharma & Iyer, 2012). They differ significantly from traditional advanced innovations in developed markets, which are typically targeted at the affluent customers at the top of the economic pyramid. Advanced innovations are based on the latest technology and have high premium quality, while offering a wide range of functionalities (Govindarajan & Ramamurti, 2011). In contrast, resource-constrained innovations offer a completely different value proposition. They are typically very low-cost and entail some sort of tailored functionality that creates unique value in resource-constrained environments in emerging markets (Ernst et al., 2015; Zeschky, Winterhalter, et al., 2014). Beyond the geographies of emerging markets, resource-constrained innovations increasingly find their way back to developed markets (i.e. reverse innovations), where they are appealing to resource-constrained customers (by Western standards) who value affordable products sufficient for their needs (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Von Zedtwitz et al., 2015; Zeschky, Widenmayer, et al., 2014). While practitioner-oriented management literature has provided insights in various successful cases of resource-constrained innovations, rigorous research in general and research based on empirical evidence in particular is still limited. Recent studies made first attempts in investigating how firms can organize for resource-constrained innovations (Hang et al., 2015; Sharma & Iyer, 2012). However, these studies do not take into account different degrees of product novelty of the underlying innovation. This is problematic as recent studies argue that resource-constrained innovations vary with respect to their product novelty (i.e. differences in their value propositions) (Wan et al., 2015; Zeschky, Winterhalter, et al., 2014). We know very little about how different types of resource-

constrained innovations address different customer needs in different environments. Some scholars suggested that different degrees of product novelty might require different approaches of firms to achieve them (Zeschky, Winterhalter, et al., 2014), which calls for product specific approaches. Literature concerned with global strategy has argued that the development of resource-constrained innovations in Western firms requires that a high degree of strategic autonomy is assigned to the emerging market subsidiary in charge of the development (Govindarajan & Ramamurti, 2011; Mudambi, 2011). Many works executed in developed market contexts indicate that autonomy has a positive effect on subsidiary innovativeness (Asakawa, 2001; Mudambi et al., 2007). Nevertheless, this notion has not been empirically studied in emerging markets. With regard to reverse innovation, i.e. the global commercialization of resource-constrained innovations, it is unanswered what actually leads to transfers from emerging to developed markets (Ernst et al., 2015; Von Zedtwitz et al., 2015). Further, there is a lack of agreement on the form in which reverse innovations occur. They have been reported in the forms of a discrete subsidiary initiative (Immelt et al., 2009) but also as an evolutionary process between HQs and subsidiary (Corsi et al., 2014). Overall, research on resource-constrained innovation is incomplete. Much more research is needed to understand how Western firms can organize for and profit from this kind of innovation. Hence, the overall question that guides this research is as follows: *How do resource-constrained innovations with different degrees of product novelties differ with regard to their antecedents and outcomes?*

This qualitative study is based on a multiple case study approach (Eisenhardt, 1989) with four Western MNCs that innovated resource-constrained innovations for China. The contribution of this research is fourfold and mainly to literature on the management of the MNC. *Firstly*, this study is the first to distinguish empirically between strategic and operational autonomy (Birkinshaw & Morrison, 1995; Keupp et al., 2011) in the context of innovation in emerging markets. Based on this distinction and contrary to extant research, it is found that strategic autonomy assigned to units in charge of the development is no precondition for resource-constrained innovation in Western MNCs. Operational autonomy assigned to development units, together with the initial target market defined, influences the degree of product novelty achieved. *Secondly*, it has been found against current notions in literature (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Mudambi, 2011; Zeschky, Widenmayer, et al., 2014) that the local presence of R&D units in emerging markets is not necessary a condition for the development of resource-constrained innovations. *Thirdly*, this study contributes to literature on subsidiary initiatives (Birkinshaw, 1997) as it is amongst the very few to provide evidence of initiatives by emerging market subsidiaries in Western firms. *Fourth*, this research also contributes to literature on

innovation by advancing and refining the understanding of the relationship between product novelty in resource-constrained innovation and disruptive innovation (Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006).

## **3.2 Literature review**

### **3.2.1 Resource-constrained environments in emerging markets**

Emerging markets are characterized by institutional voids such as a weak legal and institutional system (Khanna et al., 2005; Khanna & Palepu, 2000), poor infrastructure (Hoskisson et al., 2013) and low purchasing power of customers (London & Hart, 2004; Sanchez & Ricart, 2010). Institutional voids arise where specialized intermediaries that facilitate market transactions in functioning market settings are absent (Ricart et al., 2004). The lack of these formal market institutions and poor infrastructure cause market transactions to be more expensive and make it generally more difficult to serve resource-constrained markets, which requires firms to adopt new approaches (Mair & Marti, 2009; Sanchez & Ricart, 2010). Even though emerging markets are often treated as homogenous groups of economies, they are in fact very heterogeneous not only when compared to other emerging markets (Hoskisson et al., 2013) but also regionally within their national boundaries (Cao, Wang, & Wang, 2009; Yao, Zhang, & Hanmer, 2004). For example, cities in coastline China have developed significantly and represent the richest area in China (Yao et al., 2004), becoming somewhat similar to Western cities. However, even though these metropolises have generally reduced prevailing institutional voids and resource-constraints in recent years, they are still not at the level of Western cities. In contrast to the urban areas, China's remote rural regions are very different. These areas still suffer heavily from inexistent infrastructure and institutions (Cao et al., 2009) and represent a setting where people are very poor and often live on less than two dollars a day (Anderson, Markides, & Kupp, 2010; Mair & Marti, 2009). The regions adjacent to the urban metropolises with their second and third tier cities have been one major growth driver in the last decade and played a significant part for the growth of emerging markets. Residing between urban and rural environments, these cities and their inhabitants face an intermediate level of resource-constraints, higher than in urban areas but lower than in remote rural areas (McMillan, 2011). Overall, while resource-constraints are prevailing in almost all regions of emerging markets, infrastructure gaps and institutional voids as well as poverty generally increase the more rural and remote an area in an emerging market is (Anderson et al., 2010).

### 3.2.2 Innovation in and for emerging markets

Traditionally, innovation for emerging markets was seen with a Western perspective. This view implies that an existing product originally developed for the West is adapted for the specific use in the emerging market environment (Arnold & Quelch, 1998; Dawar & Chattopadhyay, 2002; Govindarajan & Ramamurti, 2011). However, in recent years, scholars have developed the notion that resource-constrained customers need specifically designed products – not simply adapted Western products (Govindarajan & Trimble, 2012). Research has produced a plethora of concepts that can be consolidated under the term “resource-constrained innovations” (Ray & Ray, 2010). All the concepts share common ground in that they aim at reducing costs to increase affordability. They are all instances of disruptive innovations (Wan et al., 2015) and are able to create low-end market disruptions (Christensen & Raynor, 2003; Hang et al., 2014; Lim et al., 2013). However, resource-constrained innovations differ in terms of product novelty and create different kinds of value propositions (Wan et al., 2015; Zeschky, Winterhalter, et al., 2014).

This study distinguishes between *good-enough innovations* (Gadiesh et al., 2007) and *frugal innovations* (Cunha et al., 2014; Zeschky et al., 2011). Good-enough innovations, originate from Western products, that have been specifically re-engineered and tailored for the emerging market environment. For these products, value adding functions are strengthened or newly developed and non-value adding functions are omitted (Zeschky, Winterhalter, et al., 2014). The range of good-enough products is wide and includes for example Logitech’s computer mouse M215 (Trimble, 2012), the Tata Nano (Lim et al., 2013; Ray & Ray, 2011), or Haier’s tiny and specialized washing machines (Hang et al., 2010). *Frugal innovations* (Cunha et al., 2014; Zeschky et al., 2011), in contrast to good-enough innovation, offer new applications that have been specifically designed for resource-constrained environments in emerging markets and did not exist in the West before (Wan et al., 2015). These application innovations are not re-engineered versions of a Western product, but are new product developments and frequently built from scratch. A well-reported example is an ultra-portable ECG machine from General Electric specifically developed for the rural market in India. Apart from being battery operated, this machine has an in-built printer enabling doctors to visit their patients in remote villages instead of transporting patients to far-away hospitals (Immelt et al., 2009). Frugal innovation is the most radical type of resource-constrained innovation as it is not only drastically cheaper but also enables completely new applications (Wan et al., 2015; Zeschky, Winterhalter, et al., 2014).

Research has recently started to investigate how firms can innovate for resource-constrained customers in emerging markets. The need for local presence to sense

customer requirements and create tailored products has been a dominant force behind internationalization of R&D (von Zedtwitz & Gassmann, 2002). And indeed, R&D internationalization towards emerging markets has increased in the last decade (Athreye et al., 2014; Dunning & Lundan, 2009; Gassmann & Keupp, 2008). In the case of China, most of the R&D hubs installed are market driven and technology oriented with the aim of better adapting products to local conditions, speed up R&D cycle times and save cost by better exchanging with local manufacturing (Gassmann & Han, 2004). Extant studies suggest that Western firms need to set up R&D units in emerging markets to be able to design products for the requirements of resource-constrained customers (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Zeschky et al., 2011). Scholars have argued that these units in charge for resource-constrained innovation should be separated from activities for developed markets and be given a high degree of strategic autonomy (Govindarajan & Ramamurti, 2011; Mudambi, 2011). Strategic autonomy means that sub units can set their own agenda (Bailyn, 1985; Keupp et al., 2011). This way, local units can develop independently without being impeded by Western units, which might be too strongly attached to advanced product innovation (Govindarajan & Ramamurti, 2011; Govindarajan & Trimble, 2012; Immelt et al., 2009).

### **3.2.3 Transfer of innovation from emerging to developed markets**

Flow of innovation, often more generalized as flow of knowledge, is regarded a substantial element of the multinational firm (Foss & Pedersen, 2004; Gupta & Govindarajan, 2000; Kogut & Zander, 2003) and has been studied in various directions between HQs and subsidiaries. Driven by increasing internationalization and wider dispersion of R&D locations, subsidiary initiatives (Birkinshaw, Hood, & Jonsson, 1998; Birkinshaw, 1997; Schmid et al., 2014) and “reverse technology transfer” (e.g. Håkanson & Nobel, 2001) have particularly gained attention. These instances are knowledge flows from the periphery of an organization (i.e. subsidiary) to the center (i.e. HQs), which also constitutes the case of reverse innovation at Western firms. While research results on reverse flows are not always homogeneous (Palmié, Keupp, & Gassmann, 2014), the overall notion is that subsidiary autonomy (decentralization of decision making) and the exclusion of HQ involvement, particular in early phases of initiatives, are regarded supportive for subsidiary initiative taking (e.g. Birkinshaw & Fry, 2003; Birkinshaw, 1999). However, these studies almost exclusively focused on developed Western economies, hence very little is known about how innovation and knowledge flows out of emerging markets, and whether these flows are similar to the ones examined in developed markets.



Only recently have scholars brought up the phenomenon of “reverse innovation” referring to innovations that are first adopted in emerging or developing markets and only subsequently transferred to and commercialized in developed markets (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Sarkar, 2011). Extant findings in this regard are not consistent. Some authors suggest that local units in emerging markets should be given a high degree of strategic autonomy including the responsibility to develop emerging market innovations and transfer them to developed markets (Govindarajan & Ramamurti, 2011; Immelt et al., 2009). This bottom-up view implies that reverse innovations occur in a form similar to subsidiary initiatives as described by Birkinshaw (1997) but from emerging market subsidiaries. However, more recently there have been works, which found that a global product mandate assigned in the emerging market subsidiary is not a prerequisite for a transfer from emerging to developed market (Zeschky, Widenmayer, et al., 2014). A recent single case study in an Italian MNC further argues that reverse innovations may not be linear but a complex, iterative and context-specific process between the subsidiary in the emerging market and their Western HQs (Corsi et al., 2014). Thus, there is no consensus on how reverse innovations occur and proceed. The essence behind reverse innovation is a market concept, which states that an innovation is first targeted for and marketed in a resource-constrained area in an emerging market and not in the resource-rich developed market (Govindarajan & Ramamurti, 2011).

### **3.3 Method and data**

#### **3.3.1 Research design and setting**

This study investigates how Western MNCs organize for good-enough and frugal innovation as well as how they manage to transfer these innovations from emerging to developed markets. Since cases of reverse innovations are still rare (Govindarajan & Ramamurti, 2011; Schmid et al., 2014) and since this field of research is very young, a qualitative research approach is adopted using a multiple case study design (Yin, 2014). This approach is appropriate when a phenomenon is new and little is known or existing research is fragmented or incomplete (Eisenhardt, 1989). To study the research question, theoretical sampling was applied (Eisenhardt, 1989) by choosing Western MNCs in the medical device sector that successfully launched good-enough and frugal innovations in China, which subsequently were transferred or tried to be transferred to developed markets. In all cases, the innovations studied were the first of that kind for each MNC. Two MNCs developed good-enough innovations (i.e. re-designs for emerging markets) which could be transferred to developed markets (GoodenoughFirmA and B); the two other MNCs

managed to develop frugal innovations (i.e. application innovations). However, only one of the MNCs (FrugalFirmA) could reverse the frugal product to developed markets. This setting allows to identify similarities and differences between the frugal and good-enough innovations and their respective reverse innovations. Table 7 displays the case MNCs analyzed for this study.

### 3.3.2 Data collection

A total of 15 interviews lasting between 45 and 120 minutes were conducted, recorded and transcribed thereafter. A multi-informant approach was applied and the same semi-structured interview guide was used for all cases. The respondents were product managers, R&D heads and vice presidents from both, the Western headquarters as well as the Chinese subsidiary. The interview guideline was sent to the interviewee in advance so they were able to prepare. In addition to the interviews, data was triangulated (Gibbert, Ruigrok, & Wicki, 2008) with internal documents and MNC presentations, annual reports, press releases and other information such as product brochures and research articles that were publically available. Table 9 in the appendix provides an overview of the interview partners for this study.

Controls	GoodenoughFirmA	GoodenoughFirmB	FrugalFirmA	FrugalFirmB
Location of HQs	U.S.	Europe	Europe	Europe
Employees (global)	35.000	43.000	>50.000	>4000
R&D expenditure	>USD 1.1 bn	>USD 1.6 bn	>USD 1.6 bn	>USD 0.14 bn
R&D to sales ratio	8.1%	9%	6.5%	11%
EM context	China	China	China	China
China experience	25 years	20 years	20 years	10 years
Employees in China	5.200	3.500	3.000	>400

Table 7: Case firm descriptions.

### 3.3.3 Data analysis

Each case was written based on the transcripts and the additional information obtained. Data sets were analyzed in an iterative manner oscillating between data and emerging themes (Locke, 2001; Miles & Huberman, 1994). It was familiarized with each individual case before writing the single case studies and subsequently proceeding with the cross-case analysis (Eisenhardt, 1989). Based on tabular pattern matching (Miles & Huberman, 1994) and other visualization techniques, differences and similarities between the cases were identified. Finally, various iterations between literature, data, and the findings were made until a strong and consistent picture was reached. Table 8 in the next section summarizes the findings of this case research.



## 3.4 Findings

### 3.4.1 The case of GoodenoughFirmA

GoodenoughFirmA is one of the worldwide leading providers of diagnosis, screening, treatment and monitoring solutions in the medical equipment industry. The MNC has long experience in China where it maintains several firms and manufacturing sites. Due to increasing pressure from local low-cost brands particularly in China, GoodenoughFirmA created a new unit to develop and market patient monitors in emerging markets. While GoodenoughFirmA served tier one hospitals with their premium monitors successfully, the new unit was in charge of developing a monitor mainly for smaller hospitals in tier two and tier three cities. Since conditions in these hospitals are often not as favorable (such as, e.g. little product care, bad air conditioning, untrained personnel, and power surges), the new monitor required specific functionalities to overcome these issues. To reach this target, a local team started re-designing the simplest product of the existing premium product line. Through rigorous analysis of customer needs (i.e. less functionality but still high quality), the engineers re-designed the existing product. They omitted features not needed in these kinds of hospitals and thereby focused the product to its core operations. As one of the interview partners at GoodenoughFirmA said: *“What we realized is that we need very basic but very high quality products at a very good price. Every dollar you spend is important, so we do everything to drive cost down. Our product is unique, as it does not have high-end functionality. However, while it has only basic functionality, it is still high quality using the best components and the best measurements.”* Overall, based on established and reliable technology, the good-enough patient monitor offers very low cost (approx. 30% less) and basic functionality. The monitor became a great success in China and other emerging markets and is today sold worldwide (approx. 10% in developed markets).

While GoodenoughFirmA's monitor business for emerging markets is operationally based in China, the coordination is done by a small management team in the U.S. The initial initiative to develop the good-enough monitor was triggered in the HQs who recognized the need for a low-cost model to face local rivals. Subsequently, the local R&D unit was in charge of developing and manufacturing the monitor according to results from market research in China and other emerging markets. After the launch of the product in China and other emerging markets, the local unit and the global management team at the HQs in the U.S. discussed a global rollout of the product. The U.S. based management team assessed the market potential of the low-cost product in the West and approved a global distribution with transfer prices being paid to the Chinese subsidiary. In developed markets, the product is sold to customers in smaller but also big hospitals that use it for applications

that only require metering the most basic measures. To these customers, the good-enough monitor is sold via GoodenoughFirmA's existing sales channels.

### 3.4.2 The case of GoodenoughFirmB

GoodenoughFirmB is a producer of advanced medical equipment in the fields of medical imaging, laboratory diagnostics, and medical information technology. GoodenoughFirmB has been present in China for more than two decades where it maintains a network of several companies that produce medical equipment such as computed tomography (CT) or magnetic resonance. In order to better address customers in the mid- and low-end of the CT market, GoodenoughFirmB established a business unit in China that is responsible to develop products suited for resource-constrained environments in China and other emerging markets. In 2000, this subsidiary introduced the first low-cost CT system developed in China tailored for requirements of smaller hospitals and radiological practices in emerging markets. The low-cost system is characterized by a compact design, high ease of use for doctors less familiar with sophisticated equipment, a fast workflow to examine more patients per hour and all at very low cost (approx. 80% less than premium systems). To achieve this value proposition, local engineers developed a new system and software platform that allowed the above-mentioned characteristics. *"The low-end product is not just a disfeatured high-end. Low-end customers have different needs. They look for very cost effective products: lower price, high reliability, and high efficiency. If we disfeature from high-end systems, we are not able to meet these requirements"*, explained one interviewee at GoodenoughFirmB. Only the very core components for the low-cost scanners were taken from premium CT scanners. These were pre-assembled and shipped to China. Through continuous development in China, later upgraded low-cost models even contained functionalities that were not available in the premium products. After the successful launch in China and other emerging markets, the low-cost CT is also sold to developed markets (approx. 25% of global sales).

The strategy board of the CT division resides in Europe and takes globally relevant decisions (e.g. life cycle management, portfolio management, R&D budgeting as well as sales for both premium and low-end products). It also decided on target markets and product launch of the low-end CT. The local unit in China was responsible for the actual product definition as well as for the rest of the value chain activities (i.e. system design and engineering, quality management, sourcing and production for low-end machines). Further, the local unit was free to incorporate original functionalities stemming from insights on the local market. When the local unit realized global potential, they discussed a global rollout with the global strategy board, which approved the request. GoodenoughFirmB uses the

same sales channels for their premium and low-cost CT products and the Chinese unit is paid transfer prices for every unit sold in Western markets.

### 3.4.3 The case of FrugalFirmA

FrugalFirmA is a provider of medical premium solutions in areas such as imaging and information technologies, patient monitoring systems and medical diagnostics. In the early 1990s, the company started its China operations where it now holds a network of companies. In order to reach out to customers in resource-constrained areas, the Western HQs assigned a local development team to develop an ultrasound machine for remote areas. In 2002, an ultra-compact, low-cost, portable ultrasound machine was developed and commercialized by FrugalFirmA's Chinese subsidiary. The machine featured high ease of use, portability and battery based operation for the use in very remote rural areas, integration of local language and all at a very low price (approx. 80% less). To come up with such a product, the local development team had regularly visited small clinics and doctors in rural areas to develop an intimate understanding of rural market requirements. To develop this new value proposition technically, the small local team developed a new product from scratch. Specifically for the frugal product, they sourced an existing technology that was however different from the one used in premium ultrasounds before. Only this technology enabled the drastic volume reduction. The supplier of this technology was another subsidiary in the MNC network. Even though China was the initial and exclusive target market, later product updates were also sold to customers in the U.S. and Europe (approx. 30% of global sales).

The Chinese subsidiary is a fully integrated unit maintaining R&D, manufacturing, sourcing, production and sales. After the local team was assigned the job, it was free to develop the product according to their market insights. FrugalFirmA's HQs however provided access to the core technology. To access new formerly unserved customers in rural areas, FrugalFirmA installed a new sales team, as the existing sales organization was not covering these market segments. One informant at FrugalFirmA explained: *"We discovered that we need a separate channel as well. It is very easy to understand. If you think about premium products, your customers tend to be the large hospitals in the large cities. If you think about the low-cost segment, it tends to be smaller hospitals or even clinics in remote cities or rural areas. So you can't mix them up"*. When the local team realized the global potential of the product, it approached the global steering board and global head of ultrasound with a detailed business plan. They received a global mandate for low-cost ultrasounds including product strategy, marketing and service, as well as portfolio management for low-cost machines.

For the rollout in developed markets, the Chinese subsidiary further developed the product to ensure compatibility with Western standards. In these markets, the frugal product created a new market segment of portable ultrasound devices and is mostly used in situations where traditional stationary ultrasounds was not applicable due to their size (e.g. in operating rooms or ambulance vehicles).

#### **3.4.4 The case of FrugalFirmB**

FrugalFirmB is a leading Western multinational active in diagnostics and testing that developed and marketed a portable virus detection device for rural, resource-constrained areas in emerging markets (primary focus on China but also for other Asian, African and Latin American countries) in 2010. The company maintains several production and sales units in China and South East Asia. Due to its low cost, portability, speed (test run in 2.5hrs instead of 6.5hrs), as well as through the fact that it can be operated by non-professionals, this product allows testing large numbers of people directly in their rural communities.

The CEO first initiated the development of the frugal product. Subsequently, the HQs assigned a small autonomous team of engineers to design a machine that can perform virus detection in rural areas. The design team, (consisting of a Western team leader supported by four engineers of whom one resided in South East Asia and the rest in Europe and the US) defined the product specification based on information gathered through the MNCs local sales unit and NGOs active in the areas the product was supposed to be working. As the partner at FrugalFirmB described *“Only our CEO inquired about the project from time to time. So, we were always a bit under the radar, which was important for us to successfully develop the product and push it through with a small team”*. While the very core technology was taken from existing high-tech products within FrugalFirmB’s portfolio, the product architecture and workflow had to be developed newly from scratch. FrugalFirmB’s premium products are fully automated and multifunctional (i.e. multiple viruses can be tested in one setting). In contrast, the frugal product is single purposed and entails no automation, i.e. one virus can be tested and during the examination process an operator has to handle the probes. However, even though manual handling is required, this is so easy to do that untrained people can carry out the tests. The clear focus on the single purpose enabled the size-reduction of a magnitude and portable application.

After the product was specified, FrugalFirmB engaged internal as well as external partners to carry out the actual product development and, in a first phase the production of the components. Recently, the production and assembly of the components were internalized by FrugalFirmB into its existing production facility in South East Asia. FrugalFirmB commercializes the product within the scope of health and development programs

ministered by NGO's such as the World Health Organization by selling and delivering the product to country governments through its established sales channels. From there, the products are distributed, installed, and operated by NGOs in the rural communities. Financial incomes from sales to governments are complemented by rents from positive public relations through these corporate social responsibility programs. A transfer of the frugal product has been discussed within the team and FrugalFirmB's global business leaders; however, no suitable target market could be identified. Mainly, this is because tests for one particular virus in developed markets are not performed in preventative manner. In addition, the setting of group testing (i.e. entire villages or communities) runs counter current industry logics in Western healthcare.

Cases	Product characteristics	Initial target markets	R&D and product portfolio organization	Reverse innovation market/customer	Initiatives	Triggers / barriers for reverse innovation
GoodEnoughFirmA	Low-cost, bedside monitor with simple and limited functions, robust design, high reliability and high ease of use for local staff	Hospitals and clinics in second and third tier cities in China and other emerging markets	<ul style="list-style-type: none"> <li>Steering and responsibility in the U.S.</li> <li>Development in Chinese subsidiary incl. product strategy development, R&amp;D, engineering, manufacturing, quality management, and sourcing</li> <li>Separation of R&amp;D team from premium product line</li> <li>Separated low-end portfolio for emerging markets</li> </ul>	Western hospitals that seek a low-cost alternative to premium providers (basic functionality at affordable cost).	<p><i>RC/ Init.:</i> Top-down from Western HQs</p> <p><i>Reverse Init.:</i> Joint initiative between HQs and Chinese subsidiary</p>	<p><i>Triggers:</i> Low-cost competitors entering the healthcare market in the West, expansion of customer base at the low-end, transfer prices</p>
GoodEnoughFirmB	Low-cost CT scanner, high reliability, faster workflow, and high ease of use for local staff	Hospitals and clinics in second and third tier cities in China and other emerging markets	<ul style="list-style-type: none"> <li>Steering and responsibility in Europe</li> <li>Development in Chinese subsidiary incl. R&amp;D, sourcing and production</li> <li>In collaboration with European R&amp;D center</li> <li>Integrated global product portfolio</li> </ul>	Western hospitals, seeking for a low-cost alternative to premium providers (basic functionality at affordable cost)	<p><i>RC/ Init.:</i> Top-down from Western HQs</p> <p><i>Reverse Init.:</i> Joint initiative between HQs and Chinese subsidiary</p>	<p><i>Triggers:</i> Low-cost competitors entering the healthcare market in the West, expansion of customer base at the low-end, transfer prices</p>
FrugalFirmA	Low-cost, portable, ultrasound machine, simple and limited functions, battery based, very robust design for operation outside the hospital, high ease of use for doctors unfamiliar with ultrasound technology	Rural doctors and smaller hospitals in China	<ul style="list-style-type: none"> <li>Full responsibility in China.</li> <li>Fully vertically integrated Chinese subsidiary</li> <li>Separation of R&amp;D team from premium product line</li> <li>Separate low-end portfolio for emerging markets</li> </ul>	Western hospitals use the portable ultrasound's new mobile imaging application as new, additional first-in line instrument in operation theaters and ambulance vehicles.	<p><i>RC/ Init.:</i> Top-down from Western HQs</p> <p><i>Reverse Init.:</i> Bottom-up from Chinese subsidiary</p>	<p><i>Triggers:</i> New applications created new markets (mobile ultrasound) that could not be addressed with prior products, global product mandate</p>
FrugalFirmB	Low-cost, portable, virus detection device, simple and reduced functions, very fast processing designed to test groups of people, robust design for use outside the hospital in resource-poor regions, very high ease of use for non-medics	Rural communities outside the hospital served by country governments and NGOs	<ul style="list-style-type: none"> <li>Mandate from Group CEO</li> <li>Designed in separated, small, virtual team for product design (in Europe, US, and Asia)</li> <li>Outsourcing of product development activities to low-cost product development specialists</li> <li>Separated from premium product portfolio</li> </ul>	No transfer	<p><i>RC/ Init.:</i> Top-down from Western HQs</p> <p><i>Reverse Init.:</i> -</p>	<p><i>Barriers:</i> No market for preventative „group testing“ in Europe or the U.S., no multi-functionality</p>

Table 8: Summary of findings.



## **3.5 Discussion and propositions development**

### **3.5.1 Extending existing vs. creating new markets**

The cases show that there are differences in the way good-enough and frugal innovations can overcome institutional voids and infrastructure constraints. Good-enough innovations overcome constraints at existing customer segments (i.e. small hospitals) that could not afford advanced products before. Due to resource-constraints and institutional voids (Khanna & Palepu, 2000; Ricart et al., 2004) in the form of limited budget, higher number of patients but less sophisticated infrastructure and less trained staff, different product requirements prevailed compared to Western hospitals and hospitals in the major cities in emerging markets. For example, the CT scanner portrayed in this study was built to ensure a quick patient positioning to reduce the time per patient needed for one scan. Using this machine means that hospitals can reduce lead times, which in turn also reduces the unit cost per scan and thereby increases affordability for patients. These product requirements also hold true for frugal innovations; however, these products are designed to work even outside the hospital and could address rural practitioners and other organizations that possessed no instruments before. Here not only a reduced but an almost absent infrastructure in remote areas is overcome. The most eminent infrastructure gaps that are bridged by the frugal products are electricity, transportation infrastructure, and the lack of medical staff. Both frugal innovations are small and highly portable and can be carried in backpacks, so that areas without road access can be covered. Battery operation in both devices ensures that operations can be carried out without access to electricity. Most importantly however, the devices can be operated by non-experts, which bridges the resource-constraint consisting of untrained medical staff.

Overall, MNCs were able to enlarge their customer bases by providing cost efficient solutions to institutions and doctors that could not afford and use premium products and thus signifies an instant referred to as low-end market disruptions (Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006). The difference in customer segments is that good-enough products can address hospitals, which were potential customers before but simply could not afford or use the premium products. The new value proposition now allows tackling this market segment. Frugal innovations, on the other hand are much more disruptive. Based on the application innovation (Wan et al., 2015), they can take healthcare out of the hospital and bring it to the patients and communities in remote and rural areas. The cases show that frugal innovations may also address

smaller hospitals like good-enough innovations. However, *additionally*, frugal innovations created a new market, in this case the mobile healthcare market for rural examinations, which did not exist before. Hence, this instance reflects a new market disruption (Christensen & Raynor, 2003; Govindarajan & Kopalle, 2006). This finding advances a line of literature on disruptive innovation in emerging markets. Specifically, Hang et al. (2014) argued on firm level that innovations from emerging market firms can be both – low-end and new market disruptions. This study further specifies this view by adding a product-centric perspective. Based on the above arguments, this study proposes:

*P1: Resource-constrained innovations are more likely to create new markets the greater their capacity is to bridge institutional voids and resource-constraints.*

*P1a: Good-enough innovations (i.e. product re-designs) create low-end extensions of existing markets in resource-constrained environments.*

*P1b: Frugal innovations (i.e. application innovations) create low-end extensions of existing markets and new markets in resource-constrained environments.*

### **3.5.2 Local initiative: location, autonomy, and prior experience**

The Western MNCs organized differently to develop the frugal and good-enough innovations. Local, Chinese engineers who had an intimate understanding of the local market conditions developed products in cases of GoodEnoughFirmA and B and FrugalFirmA in the Chinese subsidiary. This is in line with earlier studies that emphasize the importance of local embeddedness of R&D for resources-constrained innovations (e.g. Ernst et al., 2015; Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Zeschky, Widenmayer, et al., 2014). In case of FrugalFirmB, however, the development team was not present in China and resided mainly in developed markets, where it designed the frugal product based on insights from sales colleagues and partnerships with NGOs. This suggests that not the geographic location of the R&D unit is decisive for resource-constrained innovation but the focus of engineers assigned for resource-constrained innovation.

In all cases, the initiative to develop a good-enough or frugal innovation was strategically initiated by the HQs in developed markets. Only afterwards, the local subsidiary had the mandate to sense product requirements, to develop the product locally and in some cases also to constantly upgrade the product in a later stage. This approach implies a differentiation of autonomy on strategic and operational level as suggested by earlier literature (Birkinshaw & Morrison, 1995; Keupp et al., 2011). All



units were forced in the first place to start the development at all. Western HQs clearly assigned the units in charge to develop a product for either rural applications or smaller hospitals. This finding is counterintuitive with regard to extant literature on resource-constrained innovation. Building on literature on subsidiary innovativeness (e.g. Asakawa, 2001; Mudambi, Mudambi, & Navarra, 2007), this literature suggests that local subsidiaries in emerging markets need strategic autonomy to develop resource-constrained innovations independently and under their own responsibility as a local market initiative (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Mudambi, 2011). Also, data showed that in the cases of GoodEnoughFirmB and FrugalFirmA, the subsidiaries were assigned more strategic autonomy after the successful launch of the first low-cost product. In FrugalFirmA the local subsidiary even gained a global product mandate for the low-cost product line. In other words, strategic autonomy was only assigned to the subsidiaries after the subsidiary proofed that it had the necessary capabilities. The pilot project to test these capabilities was initiated by the Western HQs. This suggests that dynamic subsidiary autonomy (Ambos, Asakawa, & Ambos, 2011) might be very distinct in emerging market subsidiaries.

While strategic autonomy was not given in any of the subsidiaries or development group, the cases show that units enjoyed different degrees of operational autonomy for the product development. Operational autonomy is defined as the ability of units to manage activities in a way determined by themselves (Bailyn, 1985; Keupp et al., 2011). GoodenoughFirmA and GoodenoughFirmB assigned the local unit to develop a low-cost product for smaller hospitals and monitored development activities rather tightly. In contrast, FrugalFirmA and FrugalFirmB demanded the development units to develop a product for rural solutions and provided them a great deal of operational autonomy to achieve the new application. Hence, this shows that units that developed frugal innovations enjoyed a higher degree of operational autonomy than the units that developed good-enough innovations. Based on these arguments, this research proposes:

*P2: First-time resource-constrained innovation initiatives of Western MNCs tend to be taken by the MNCs' Western HQs.*

*P3: The development of resource-constrained innovations is less bound to R&D functions located in emerging markets the better the Western MNC is capable of sensing market knowledge locally and transferring it within its network.*

*P4: The development of resource-constrained innovations does not require strategic autonomy at the level of the unit in charge of the development.*

*P5: The degree of product novelty achieved with resource-constrained innovation activities depends on the initial target market defined and the degree of operational autonomy assigned to the unit in charge of the development.*

*P6: The more operational autonomy is assigned to development units in charge of resource-constrained innovations, the more likely is it that frugal innovations are developed.*

### **3.5.3 Global initiative: engagement and transferability**

Three out of the four cases reported in this study were reverse innovations (Govindarajan & Ramamurti, 2011; Von Zedtwitz et al., 2015) i.e. transferred from China to Europe and the U.S. All three cases of reverse innovations involved an emerging market subsidiary. These units engaged actively in the global initiative to transfer the resource-constrained innovation out of the emerging market and all units were incentivized with internal transfer prices for every unit sold to other units in the respective MNC network or with a global product mandate. In case of FrugalFirmB, the reverse innovation did not take place, it is also the only one that was not driven by a specific subsidiary nor was the transfer incentivized in any form. In two cases (GoodenoughFirm A and B) the subsidiaries jointly initiated the global roll-out with the HQs. Only the case of FrugalFirmA represents a true subsidiary initiative (cp. Birkinshaw, 1997) as it was the Chinese subsidiary that proactively addressed the HQs with a global roll-out plan. Subsequently, this subsidiary received a global mandate for low-cost ultrasound machines becoming a center of excellence (Frost, Birkinshaw, & Ensign, 2002) for the low-cost ultrasound business within that MNC. The empirical data shows that reverse innovations are more driven by the subsidiaries in emerging markets than the initiative to develop the initial good-enough or frugal innovation. Beyond the fact that transfer prices are being paid or a global mandate is assigned, this behavior is comprehensible, since a reverse innovation initiative is a good opportunity for the subsidiary to gain attention at the HQs (Bouquet & Birkinshaw, 2008) and present itself as a very capable unit within the MNC (Monteiro, Arvidsson, & Birkinshaw, 2008).

As described above, the two good-enough innovations represented low-end disruptions in the emerging market context. This is also true for their reverse innovations in the West, which are sold to smaller hospitals that could afford the

respective products for the first time<sup>3</sup>, but also to big Western hospitals that had premium versions of the products before but appreciate a more cost efficient alternative for less demanding tasks<sup>4</sup>. In the same line as frugal innovations allowed new applications in emerging markets, they do in developed markets (i.e. mobile ultrasound examinations). This created a completely new market for FrugalFirmA in Europe and the U.S where mobile ultrasound devices are now used in ambulance vehicles or operating rooms – areas where they could not be used before due to their size. The frugal innovation at FrugalFirmB could not be reversed since “mobile virus testing in groups” does not respond to a market need in the West. In developed markets it is against current practice and apparently against customer’s preferences to take these tests preventative in a group setting. This finding deepens earlier studies on frugal innovation that suggested that frugal innovations are difficult to transfer to developed markets as they are tailored to highly specific emerging market requirements (Zeschky, Winterhalter, et al., 2014). Indeed studies have shown that firms might need to re-design frugal products again to make them usable in developed markets (Immelt et al., 2009). Building on this and previous arguments on the effect of product novelty on market disruption (see first set of propositions), this study argues that good-enough innovations are easier to transfer to developed markets than frugal innovations. However, since frugal innovation creates additional new markets, the rewards from transferred frugal innovations are potentially higher. Based on these arguments, this research proposes:

*P7: Reverse innovation initiatives are more triggered by emerging market subsidiaries than the initial resource-constrained innovation initiatives.*

*P8: Reverse innovation initiatives are more likely to succeed, the more the emerging market subsidiary is incentivized to transfer the good-enough or frugal innovation to other subsidiaries.*

*P9: Reverse innovations initiatives based on good-enough innovations are more likely to succeed than reverse innovation initiatives based on frugal innovations.*

---

<sup>3</sup> Prior to the reverse innovations, these hospitals had to send patients to bigger hospitals for screening.

<sup>4</sup> Also in Western hospitals, basic examinations often do not require the state-of-the art, premium product.

### 3.6 Implications to literature

This research advances research on resource-constrained and reverse innovation. Extant research has adopted a rather simplistic view on resource-constrained innovations mainly focusing on the low-cost perspective without considering the product differences inherent between good-enough and frugal innovation (Govindarajan & Ramamurti, 2011; Ricart et al., 2004; Von Zedtwitz et al., 2015). This is the first empirical study that adopts a more fine grained, product centric approach on resource-constrained innovation in order to shed light on antecedents and outcomes of good-enough, frugal and subsequently reverse innovations. This study challenges earlier notions in literature on the management of the MNC regarding the autonomy granted to development units for resource-constrained innovations (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Mudambi, 2011). This study distinguished between strategic and operational autonomy (cp. Birkinshaw & Morrison, 1995; Keupp et al., 2011). Overall, Western HQs in the present study are much more involved in resource-constrained innovation activities than earlier research has suggested. None of the development units enjoyed strategic autonomy and the initiatives to develop the resource-constrained innovation were in all cases initiated by the Western HQs. Extant research argued that these initiatives were driven by subsidiaries (Govindarajan & Ramamurti, 2011; Immelt et al., 2009; Mudambi, 2011). However, this study also reveals, that subsidiaries become more active, when resource-constrained innovation may be exported to global markets and they are incentivized to do so. Thus, this research highlights the temporal separation and sequential character regarding the development of the resource-constrained innovation for an emerging market and the subsequent global commercialization (cp. Govindarajan & Ramamurti, 2011). By introducing operational autonomy, this study refines earlier studies, which only focused on strategic autonomy and suggests that the degree of operational autonomy, together with the initial target market defined, influence the degree of product novelty development units may achieve.

By providing empirical evidence, this study also challenges the notion that Western MNCs need to establish R&D units in emerging markets in order to develop resource-constrained innovations for emerging market customers (cp. Immelt et al., 2009; Zeschky, Widenmayer, et al., 2014). This study argues that local R&D in emerging markets are no prerequisite for resource-constrained innovation.

Lastly, the distinction between frugal and good-enough innovation reveals that resource-constrained innovations differ in their capacity to bridge institutional voids and resource-constraints and have different effects on market disruption, i.e. low-end vs. new market disruptions.

### **3.7 Managerial implications**

This research provides important managerial and practical implications. Primarily, the results of this study suggest that if Western MNCs want to engage in resource-constrained innovation, they should initiate these efforts in their Western HQs by assigning dedicated units with the task to develop these kinds of innovation. By communicating clearly, which target market should be addressed, in connection with the assignment of operational autonomy, Western HQs can steer resource-constrained innovation activities. For resource-constrained innovation in Western MNCs, it is more important that the unit assigned to the task is specialized and enjoys a high degree of operational autonomy, than the fact that this unit is located in an emerging market.

### **3.8 Limitations and future research**

Considering its early state, research on resource-constrained and particular on reverse innovation offers rich avenues for future research. This study aims to provide some grounds to unravel this emerging phenomenon. However, typical limitations of case study based research apply for this study (Eisenhardt & Graebner, 2007; Yin, 2014). The largest limitation stems from the small sample size inherent in qualitative research. For this reason, this study's theoretical contribution lies in formulating propositions testable for future quantitative studies. To rule out alternative explanations of the phenomena under investigation (Yin, 2014) the sample of case firms was carefully selected and represents four Western MNCs in the same industry within the context of China. However, as favorable this sampling is, it also has effects on the generalizability of results. Different industries in B2B and B2C sectors might offer new insights and different approaches of how MNCs approach resource-constrained and reverse innovation. This also applies to the location the resource-constrained innovation is first conceived and adopted. This study focused on China and while many insights gained from this research should be transferable to other settings, future investigations might examine resource-constrained innovations in other emerging markets and further clarify the role of location (Alcácer & Chung, 2011a, 2011b; Yang & Jiang, 2007).

While this study is a first attempt, future research on subsidiaries in Western MNCs should strengthen their focus on innovation in emerging market subsidiaries. Considering the discrepancy regarding this study's and extant literature's findings from developed markets contexts, it seems a promising road to intensify studies on subsidiary autonomy and extend these efforts to other subfields in subsidiary management research, such as subsidiary embeddedness (e.g. Andersson, Forsgren, & Holm, 2001; Dellestrand & Kappen, 2011) or the role of subsidiary managers (e.g. Dörrenbächer & Geppert, 2009; Williams & Lee, 2011). This study investigates the first cases of resource-constrained and reverse innovation within the respective MNCs. Building on the notion of dynamic subsidiary autonomy (Ambos et al., 2011), future research might study how the level of strategic and operational autonomy of emerging market subsidiaries changes over time. Last, this study touches upon first insights regarding the question why innovations flow from emerging to developed markets. Research on the antecedents of reverse innovation thus offers interesting ground for future research also with regard to various theoretical approaches such as the international product lifecycle theory (Vernon, 1966) or the lead market concept (Beise & Cleff, 2004; Beise, 2004).

### **3.9 Conclusion**

This research investigated how Western MNCs organize for good-enough, frugal and ultimately reverse innovation. As one of the first empirical studies, it is argued that resource-constrained innovation activities in emerging market subsidiaries of Western MNCs differ from how they were reported in earlier studies. It is shown that resource-constrained innovation activities are initiated by Western HQs rather than by emerging market subsidiaries. HQs may further influence the outcome of resource-constrained activities by defining the initial target market and assigning different levels of operational autonomy, which in turn has effects on the type of market disruption.

### 3.10 Appendix: List of interviews

Interview partners	
<b>GoodenoughFirmA</b>	<ul style="list-style-type: none"> <li>▪ Head of Research &amp; CTO China</li> <li>▪ GM Specialty &amp; and Emerging Markets Patient Care</li> </ul>
<b>GoodenoughFirmB</b>	<ul style="list-style-type: none"> <li>▪ Head Corporate Technology</li> <li>▪ General Manager CT China</li> <li>▪ R&amp;D project leader CT China</li> <li>▪ Head of Systems Engineering</li> <li>▪ VP CT, Head of Global R&amp;D</li> </ul>
<b>FrugalFirmA</b>	<ul style="list-style-type: none"> <li>▪ Director Global Research Europe</li> <li>▪ General Manager China Technology Center</li> <li>▪ General Manager of global Technology Healthcare China</li> </ul>
<b>FrugalFirmB</b>	<ul style="list-style-type: none"> <li>▪ Head Global Lifecycle Management Instruments</li> <li>▪ Project Leader</li> </ul>

*Table 9: List of interview partners.*





## 4 Business models for frugal innovations in emerging markets: The case of the medical device and laboratory equipment industry

Co-authored by Marco Zeschky and Oliver Gassmann

### Abstract

*This study investigates business models for frugal innovation (i.e. a specific form of resource-constrained innovation) in the medical device and laboratory equipment industry in emerging markets. Based on original data from five case studies, we investigate how firms can set up value creation and value capturing mechanisms to reach new customer segments in remote rural areas with unprecedented value propositions. With this research, we contribute to literature on frugal innovation and business models in emerging markets. It is one of the first empirical studies to apply a fine-grained perspective on resource-constrained innovation in emerging markets. Doing so, we focus on its most disruptive form, which is when these innovations enable new applications. We advance and detail the value proposition for frugal innovation in these industries and argue that frugal innovation creates completely new markets. Further, we show how firms set up their value creation and value capturing mechanisms to achieve the frugal value proposition and identify two distinct R&D strategies for frugal innovation.*

**Keywords:** Business models, resource-constrained environments, frugal innovation, emerging markets, medical device industry, Western multinationals, emerging market firms

## 4.1 Introduction

The economic growth of emerging markets has significantly influenced the global business landscape. With average growth rates far above Western markets, emerging markets and particularly the BRIC states (Brazil, Russia, India, and China), constitute a strategic growth market for global firms (Drummond, 2012). Within emerging markets, the so-called middle and low-end market represents one of the fastest growing global customer segment (Kravets & Sandikci, 2014). To compete successfully in these market segments, firms need to provide customers with “resource-constrained” innovations and business models that create high value at very low cost (George et al., 2012; Mudambi, 2011). Authors have used different terminologies for this phenomenon such as *cost innovation* (Williamson, 2010), *good-enough innovation* (Gadiesh et al., 2007; Hart & Christensen, 2002) or *frugal innovation* (Cunha et al., 2014; Zeschky, Winterhalter, et al., 2014). Resource-constrained innovations are particularly difficult to achieve for Western firms they are traditionally specialized in advanced innovation for high-tech products and business models (Halme et al., 2012). However, to successfully tap new markets in the middle or the low end, firms need to develop capabilities for resource-constrained innovation and business models (George et al., 2012; Mudambi, 2011; Zeschky, Widenmayer, et al., 2014).

Extant research has provided important first insights on how firms can achieve resource-constrained business models and innovations for emerging markets. Particularly literature on the base of the pyramid (Prahalad, 2010) has identified ways how to address rural people with very basic products in industries such as hygiene and health (Ahlstrom, 2010; Anderson & Markides, 2007; Christensen, Siemsen, & Balasubramanian, 2015), food and agriculture (Gold et al., 2013; London et al., 2010) or telecommunications (Foster & Heeks, 2013; Seelos & Mair, 2007). These studies particularly highlight the social element of these business models as they not only make goods accessible to former non-consumers but also how these models create wealth in involved regions and societies (Sinkovics et al., 2014; Wilson & Post, 2013). Very little attention has been paid to more sophisticated products, which are typically produced by Western companies. However, if these companies want to compete in resource-constrained markets, they need to make their products affordable and accessible to the middle and low-end customer segments, too. Moreover, literature on resource-constrained innovation for emerging markets has so far adapted a very coarse approach with regard to product characteristics. While it has been shown that

resource-constrained innovations for emerging markets differ drastically in terms of product novelty and disruptiveness (Wan et al., 2015) there are very few empirical studies that investigate specific types of resource-constrained innovation and their business models. This is a problem, since firms require different capabilities to achieve different types of resource-constrained innovations in emerging markets (Zeschky, Winterhalter, et al., 2014). Adopting this fine-grained perspective, frugal innovation is the most disruptive type of all resource-constrained innovations as it enables unprecedented applications specifically developed for resource-constrained environments in emerging markets (Wan et al., 2015). To our knowledge, the present article is the first to address these gaps by examining five firms (two Western MNCs, and three Indian firms), which successfully implemented business models for frugal innovations in the medical device and laboratory equipment industry.

Doing so, we advance the ongoing debates on business models and resource-constrained innovation in emerging markets and provide several contributions for literature and management practice. *First*, this study is the first empirical study to adopt a more fine-grained view of resource-constrained innovation in emerging markets by focusing on frugal innovations. *Second*, we contribute to a refined understanding of the relationship between resource-constrained innovation and disruptive innovation. *Third*, we improve our understanding of the multidimensional value proposition needed for emerging markets and identify the threefold value proposition for frugal innovations in the medical device and laboratory equipment industry. *Fourth*, we shed light on how firms can design their business model to achieve this frugal value proposition in the medical device and laboratory equipment industry. *Lastly*, we identify two specific R&D approaches for frugal business models.

## 4.2 Literature review

### 4.2.1 Resource-constrained innovation for emerging markets

Resource-constrained innovation in emerging markets is increasingly gaining attention from practitioners and scholars alike. Based on Prahalad's work on the base of the pyramid (Prahalad & Hammond, 2002; Prahalad, 2010) this stream of literature is concerned how firms can create innovations that provide high value at very low-cost for resource-constrained people. A plethora of different concepts and nomenclatures for this emerging phenomenon have been developed (see e.g. Von Zedtwitz et al. (2015) and Zeschky, Winterhalter, et al. (2014) for an overview). While rather anecdotal reports have provided first insights on this topic, rigorous empirical studies

are still scarce (Cunha et al., 2014). It has been argued that resource-constrained innovations are types of disruptive innovations (Wan et al., 2015) and it has been highlighted that particularly Chinese and Indian firms have adopted specific processes in R&D to develop disruptive low-cost products for emerging markets (Lim et al., 2013; Wan et al., 2015). On firm level, it was found that emerging market firms make use of these resource-constrained innovations to create a new low-end segment of existing markets (Hang et al., 2015; Lim et al., 2013). A major shortcoming in these extant studies is that they have mostly regarded and treated all sorts of resource-constrained innovations for emerging markets the same and in one data sample (e.g. Ernst et al., 2015; Hang et al., 2014; Sanchez and Ricart, 2010). However, recent works have shown that these low-cost products differ significantly in terms of novelty and target customer segments (Wan et al., 2014;). According to Zeschky et al. (2014), resource-constrained innovations can be low-cost alternatives of existing Western products (i.e. *cost innovations*), re-designed and tailored products to make them particularly suited for resource-constrained customers in emerging markets (i.e. *good-enough innovations*), or new products that allow new applications specifically developed for resource-constrained customers (i.e. *frugal innovations*). This study only focuses on frugal innovations, which enable new applications in emerging markets. A well-known example of frugal innovation is M-Pesa, a SMS-based microfinance solution for people in Africa, which brought banking to the “unbanked”. The new application there is that people in remote areas get access to financial transaction with simple SMS messaging – an application inexistent before (Foster and Heeks, 2013). Another example of frugal innovation is a portable electrocardiograph for rural India developed by General Electric. The application innovation is that these examinations are mobile and can be carried out at the patient’s domicile. Previously, patients had to visit far-away hospitals to receive treatment (Govindarajan & Trimble, 2012; Immelt et al., 2009).

#### **4.2.2 Core elements of business models**

Effective business models can be a source of competitive advantage (Markides & Charitou, 2004) and ultimately of firm performance (Afuah & Tucci, 2001; Afuah, 2004; Zott & Amit, 2008). They create and capture value for the focal firm and its stakeholders (Chesbrough, 2007; Frankenberger et al., 2013) with the aim of providing a holistic view of the business by combining internal and external factors of a firm (Zott et al., 2011). We adopt the business model definitions provided by Doganova and Eyquem-Renault (2009) and Tongur and Engwall (2014) consisting of the tripod of value creation, value capturing and value proposition. Value creation is about how a firm

creates value and delivers that value to the customer and other stakeholders. This involves firms' activities such as R&D, production and sales (Morris et al., 2005) including processes, capabilities, resources, and channels through which an offering is created and delivered to the customer (Doganova & Eyquem-Renault, 2009). Value capturing refers to the revenue model and defines how a firm appropriates some of the total value created (Amit & Zott, 2001). While some authors consider the revenue model as the firm's gross income (e.g. Johnson et al., 2008), others consider the revenue model as the "bottom line of the business model" as it reflects and integrates the value creation activities into flows of revenues and costs (Doganova & Eyquem-Renault, 2009). Based on the latter perception, we consider value capturing as the reflection of the firm's value creation activities in terms of financial expenses and income. Finally, the value proposition consolidates the embedded value of the firm's offering (Doganova & Eyquem-Renault, 2009) in products or services for the customers.

### **4.2.3 Business models in emerging markets**

Business models in resource-constrained environments in emerging markets differ from business models in developed markets (Eyring, Johnson, & Nair, 2011; George et al., 2012). This is why many Western firms have to change their existing business models to make them work in an emerging market environment (George et al., 2012; Sanchez & Ricart, 2010; Simanis, 2012). Scholars investigating the success factors of business models in emerging markets have found that these business models can be either low-cost replications of established business models for developed markets or entirely new business models, which specifically create value in low-income environments (Sanchez & Ricart, 2010). Low-cost replications are often employed to expand market reach achieved by making internal processes more efficient. In contrast, new business models often involve collaborations with external, local partners as these have access to and acceptance in the target market (e.g. London & Hart, 2004; Pitta et al., 2008; Prahalad, 2012). These business models often entail a strong value proposition not only by reducing costs and, consequently, per-unit-prices but by offering solutions, which increase the customers' willingness to pay. In line with this, it has been highlighted that business models in resource-constrained environments need to create value both for firms as well as for the people and social environment (London et al., 2010; Mair & Martí, 2006; Seelos & Mair, 2007; Sinkovics et al., 2014; Yunus et al., 2010). For example, Seelos and Mair (2007) report a case of Grameen Telecom in which the company aims to create social value by lending basic mobile phones to the

so-called “village phone ladies”. These women act as micro-entrepreneurs by selling phone calls to other village inhabitants creating an income for themselves and their families. People borrowing the phone for calls can save money as they only pay a small amount for the call, but they save a much bigger amount for the trip to the otherwise nearest available phone. Through this, both the phone ladies and Grameen Telecom earn money and the callers even save money, increasing overall welfare. Similar cases were reported in microfinance (e.g. Bruton et al., 2011; Foster & Heeks, 2013) as well as in other industries such as food, basic hygiene and health (e.g. Gold et al., 2013; Pitta et al., 2008; Thompson & MacMillan, 2010), or agriculture (e.g. London et al., 2010). Despite the many potential benefits, such as the prospect of reaching new customer segments, Western MNCs often have severe difficulties when doing business in resource-constrained environments (Simanis, 2012). Great challenges for them are the often weak institutional environment and missing infrastructure (Hoskisson et al., 2013; Khanna & Palepu, 2000; Ricart et al., 2004). Studies on more sophisticated technical products that require a whole value chain (incl. new product development) are almost absent. A noteworthy exception is Halme et al. (2012) who find that the development of frugal innovation is completely different from what Western firms do for their advanced innovations and that entrepreneurial bricolage is key to set up frugal business models (Halme et al., 2012). Overall, research has never specifically investigated business models for application innovations and has generally had a bias towards low-tech products (such as agricultural products, or basic sanitation products), paying very little attention to more sophisticated, technical products. This is a major shortcoming as typical Western firms produce exactly these kinds of products. Consequently, if they want to participate in the economic growth of emerging countries they need to find ways to make these products accessible and affordable to resource-constrained customers. Hence, the question that was guiding our research is as follows: *How can firms design business models for frugal innovations in emerging markets?*

## **4.3 Method**

### **4.3.1 Research design and background**

Because of the few insights on business models in resource-constrained environments, particularly with regard to frugal innovation, we adopted a qualitative research approach using a multiple case study design according to Eisenhardt (1989) and Yin (2014). We draw from five cases of frugal innovation within the medical and



laboratory equipment industry in India and China. Like in many other emerging markets, the healthcare markets in India and China are characterized by a poor infrastructure in terms of roads and public transport, energy and water supply, or healthcare access. In particular, rural people often have no knowledge of, access to, or the resources for medical treatment. This is why these countries are generally prone to innovations that are able to overcome institutional and infrastructural shortcomings. Consider some details of the Indian healthcare market. In India, 70% of the healthcare infrastructure is confined to the top 20 cities, leaving rural areas heavily under-served (PWC, 2014). For example, the doctor-to-patient-ratio, which measures the density of doctors in a country, in 2012 was 1:1428 in India and is even lower in the poorest countries in Africa with a ratio of 1:5000 in 2009 in Angola (WHO, 2014). In contrast, in advanced economies this ratio is 1:416 for the USA, 1:357 for the UK, or even 1:256 for Switzerland (WHO, 2014). In India, roughly, 10% of the population suffers from severe eye diseases and again 10% thereof suffer from blindness. In numbers, this means that approximately 12 million people are blind in India (of a global 40-45 million), of which however 80% would have been preventable if screened and treated early enough (Harsimran & Peerzada, 2013). This situation is largely caused by the lack of eye care availability as the overall ophthalmologist-to-patient-ratio in India is only 1:60000 and even lower in the rural countryside (Pieroni, 2013).

The Indian healthcare market is one of the countries' major markets valuing at US\$78.6 billion in 2012 and is expected to grow annually at a pace of 15% to US\$158 billion in 2017 (Harsimran & Peerzada, 2013). Within the healthcare market (of which 65% is based on imported goods from global players), the medical device industry makes up US\$5.2 billion and – apart from Western firms – consists of approximately 700 Indian medical equipment companies. In the past few years, many of these local firms have developed from importers and distributors of Western products, to manufacturers and developers of tailored medical devices for India, aiming at delivering cost-efficient alternatives to the imported medical devices by Western premium brands (Harsimran & Peerzada, 2013). Although the recipients of the examinations enabled by the products of this study were ultimately the patients, the immediate downstream customers of the products were medical institutions and doctors.

### **4.3.2 Data sample, collection, and analysis**

All frugal innovations in this study are industrial products in the B2B market, which are marketed at comparable investment levels (i.e., less than US\$ 15k). The firms in this study are established Western multinationals (Medtech1 and Labtech1), one Indian

multinational (Medtech2) and two growing Indian firms (Medtech3 and Labtech2), which are described in more detail below. An overview of the case firms is also provided in Table 10. For the cases in this study, we interviewed senior managers who were involved in either the development, marketing, and/or general management of the frugal innovations. This provides us with an in-depth understanding of processes and structures within the firms. Our interview partners received the main questions in advance so they were able to prepare. The interviews were recorded and transcribed in verbatim immediately afterwards. Subsequently, the interview transcripts were sent back to the interviewees for confirmation before we continued developing the full case studies. We triangulated data (Gibbert et al., 2008; Jick, 1979) by cross-checking interview data with publicly available information and internal documents as well as by interviewing several managers within the same company in all except of two cases. These two cases are special as they are based in rather young companies compared to the others. Only the co-founders interviewed were able to provide us with complete but still very detailed pictures of their companies' business models. In total, we conducted 13 interviews, which lasted between 30 and 120 minutes, on average 53 minutes, and which accumulated to a total of 11.5 hours interview material (Table 12 in the appendix for a full account of the interviews). Subsequently, we developed the case studies based on the transcripts and additional primary and secondary data. The data were analyzed independently by two researchers (Miles & Huberman, 1994) and the analysis was carried out in an iterative way, oscillating between data and emerging themes and patterns within the three core pillars of business models (Locke, 2001; Miles & Huberman, 1994). We familiarized with each single case before proceeding to the cross-case analysis (Eisenhardt, 1989) and used visualization techniques and tabular pattern matching (Miles & Huberman, 1994) to identify differences and similarities between the cases. Lastly, we conducted various iterations between literature, data, and our findings until we arrived with a strong and consistent picture.

	<b>Medtech1</b>	<b>Medtech2</b>	<b>Medtech3</b>	<b>Labtech1</b>	<b>Labtech2</b>
<b>Foundation</b>	1896	2007	2010	1984	2000
<b>Headquarters</b>	U.K.	India	India	Netherlands	India
<b>Employees (global)</b>	>50, 000	>440	>65	>4000	>50
<b>Size of low-cost product portfolio</b>	med-large	med-large	one product	one product	one product
<b>EM context</b>	China	India	India	China and other EMs	India
<b>EM experience</b>	20 years+	7 years	4 years	10 years	12 years
<b>Employees in EM context</b>	5,200	>400	>65	>400	>50

*Table 10: Overview of case firms.*



### 4.3.3 Case overviews

#### *Case 1: Medtech1*

Medtech1 is an U.S. based multinational firm with an extensive product and solutions portfolio in the healthcare sector. The company is maintaining a growing portfolio of low-cost products targeted at resource-constrained customers all over the world. The product investigated in this study is a low-cost, portable, and battery-operated ultra sound machine. While the machine has less features and lower performance compared to the firm's advanced machines, it is a first-in-line screening device that delivers immediate results enabling patients to be sent directly to a specialist with more specialized equipment. To develop and market such products, Medtech1 set up a new business unit in China dedicated to the development and marketing of low-cost products especially for rural areas.

#### *Case 2: Medtech2*

Medtech2 is an emerging market multinational (EMNE) based in India, which develops medical devices targeting major city hospitals as well as remote healthcare centers and rural doctors. The company's operations are mainly based in India and it maintains a dedicated unit that develops products specifically for the healthcare needs in rural areas. Medtech2 has developed a portable electrocardiogram (ECG) which enables the screening of large quantities of patients in remote areas. While data acquisition from the patient's body involves standard electrodes, the ECG data processing is performed by an ordinary laptop PC that is available at the doctor's office. The frugal product developed is a small interface connected to the laptop via USB that entails the necessary software to perform the analysis using the processing power of the customer's own PC. With its integrated sender unit the ECG data can be sent to hospitals or healthcare centers where specialist can analyze them.

#### *Case 3: Medtech3*

Medtech3 is an Indian company that aims at developing solutions for healthcare problems in India. The firm developed an intelligent pre-screening device for rural clinics and optometrists to detect preventable blindness. Currently, it is the firm's only product and is developed, produced, and sold mainly in India. Medtech3 developed the product, manufactures it with the help of partners, and sells the product using distributors and direct selling. The device is rugged, portable, easy to use, and can be operated with a battery or a solar panel. For complicated cases, the machine has a

telemedicine application through which the results can be sent to a specialist over the internet, enabling fast curing before the patient becomes irrevocably blind.

#### *Case 4: Labtech1*

Labtech1 is a Dutch based multinational that provides sample and assay technologies for molecular diagnostics, applied testing, and research. Its traditional customers are large hospitals and laboratories in Western markets and in major cities of emerging economies. Labtech1 developed a portable device for the detection of an infectious disease, which can be operated in rural, resource-constrained areas in China and other emerging markets. A small group of Western engineers was assigned to develop this machine with the help of external partners. Production takes place in South East Asia. The product can operate only 48 samples compared to over 300 in Western advanced machines; however, it executes the analysis up to four times faster than advanced machines. The final distribution and examinations are usually performed by NGOs, which also carry medicine for immediate treatment.

#### *Case 5: Labtech2*

Labtech2 is an Indian company that developed a device for the detection of infectious diseases that is targeted at smaller hospitals as well as remote healthcare centers and rural doctors. Labtech2 developed its frugal product internally and outsourced production and sales to a joint venture with a group of Indian diagnostic companies. The joint venture maintains production facilities in India and markets its products in 88 countries. The product under study is battery-based and designed in a way that non-medics can operate it. It allows faster testing of a single sample than established systems and patients receive their test results in an instant at their treatment site. While the device can test only one sample for one disease at the time, the single examination is very quick, making it viable for small hospitals or doctors and for primary healthcare centers.

### **4.4 Results: Value proposition, creation, and capturing for frugal business models**

The analysis of the data shows that value proposition, creation, and capturing inherently depend on each other. In resource-constrained environments, the value proposition is that the customers may afford the solution that creates very high value for them. On top of that, all business models not only served their target customers but also improved the entire healthcare system. To live up to this value proposition, the

firms needed to be very innovative but also strict in their value creation activities. The firms' portion of the value created was captured mostly by product sales – apart from invaluable marketing effects. Table 11 provides the full overview of the five business models under study.

#### 4.4.1 Value proposition

All firms's value propositions are specifically targeted for the needs of rural patients, which differ drastically from traditional patient needs in major hospitals. For example, the ophthalmologic device developed by Medtech3 allows the early detection of symptoms leading to blindness so that these can be immediately treated before blindness sets in. This creates a tremendous value proposition for people in rural India where severe eye problems are omnipresent and where access to and availability of eye specialists is almost non-existent. Therefore, the device was built for easy handling due to the lack of doctors to operate the instruments. Traditional eye screening devices must be operated by specialists and are used when patients already suffer from severe sight loss. These machines are expensive, bulky, and rely on a stable infrastructure and are consequently purely stationary. As traveling from rural India to hospitals or eye clinics in major cities is time-consuming and costly, many people simply receive no treatment at all despite their need. In contrast, Medtech3's device is durable, portable, and can be operated by people without medical training and is thus designed for use in harsh, rural conditions in India. The machine can be run with a battery or a solar panel and integrates five devices into one at roughly 20% of the cost of the traditional machines. A built-in software analyzes the screening results and automatically performs the diagnosis. For complicated cases, the machine supports a function through which the results can be sent to a specialist over the internet. As the CEO of Medtech3 said: *"You can carry it in a suitcase. It is rugged and has already been transported on bus tops and even on horses. Right from day one it was designed to keep it affordable; this is the most, most, most important part of our design"*.

The motivation and value propositions were very similar for Labtech1 and Labtech2, both developers of detection devices for infectious diseases. In remote areas of India or China, it is very difficult for patients to get access to basic testing and treatment. The patient-to-labworker-ratio is even lower than the patient-to-doctors ratio and was for the case of China at 1:7000 in 2010 (WHO, 2014). Traditional, advanced detection machines are used in central laboratories and hospitals in major cities to test large quantities of blood samples and other substances for a manifold of diseases. The testing process of these high-end machines is fully automated and executed in a sterile

environment by well-educated and expensive lab specialists. They can test more than 300 samples in six to eight hours. Due to their full automation, the required presence time to operate the machine is very low and the lab specialist's free time can be used to do other analyses in the lab while the machine is running, thereby increasing the overall lab efficiency. The situation is completely different for small rural hospitals, clinics or NGOs working in communities, where it is more important to have people tested and treated immediately. Hence, the frugal products were designed for speed and not overall efficiency, doing the job in 1 to 2.5 hours. Therefore, the number of tests that can be carried out with the frugal machines is low, however at high frequency. This way, a single patient or a small group of people receives their tests on the same day, which is of utmost value to infected patients. Furthermore, the device developed by Labtech1 is able to work in a warm and humid environment and tolerates variations in the temperature of the sample. It can be operated by untrained people as the product has only one operating button (i.e., the start button) and displays the test results in a very simple and intuitive manner (i.e., green smileys for not infected, red smileys for infected). As the Head of Global Lifecycle Management explained: *"We can deploy the product in any market in the world because it is so intuitively easy to use"*. In case of an infection of a patient, NGOs are provided with vaccination and other medicine to allow immediate treatment of more common diseases while people with more severe diseases are immediately sent to a specialist. The same value propositions in the field of ultrasound and ECG are provided by other two cases of Medtech1 and Medtech2.

Further, all value propositions not only delivered high value for the end-customer (i.e. patient or rural communities), and the B2B customer (i.e. doctors and small hospitals) but also reduced overall cost for the entire healthcare system in the emerging market. Most of these system cost savings occur from the fact that these products come into play as prophylactic pre-screening device or locally at the patients domicile with the aim to treat people where they live. Through this, these primary health care devices help reducing the number of patients in hospitals, as only the severe cases that need hospital treatment will be sent there. This saves resources in terms of "doctor's time" who can focus better on the patients that need their help the most. All frugal value propositions improved the healthcare system by making it more efficient.

#### **4.4.2 Value creation**

To achieve the frugal value propositions, firms optimized costs in every value creation activity to meet the harsh price-performance requirements of their resource-constrained customers. At the same time, the firms' product development activities

focused on novel applications, which were based on established technologies and which were exactly tailored to the customers' needs. This innovation approach allowed the firms to meet the strict cost criteria while creating unprecedented applications for the resource-constrained customer. This drastic – and to some extent paradox – simultaneous focus on application innovation and cost minimization can be termed the “frugal mindset” of organizations doing business in resource-constrained environments.

#### *Identifying rural patients' and doctors' needs*

As the previous section shows, the frugal products were precisely developed to enable medical examinations in rural areas. Consequently, the value proposition for patients (i.e., the end-user) is the affordable provision of healthcare, often for the first time in their lives. A statement by the Managing Director of Labtech2 summarizes the motivation for frugal product innovations in emerging markets: *“In our case it [the need for the application] was the limited resources in developing countries. During the development of the device, we have never compromised on any specifications of the actual need. We only left out features that don't affect the need directly.”* Due to the unique circumstances in emerging markets, especially in the light of the poor or missing public infrastructure, the firms took specific measures to obtain a new perspective on customer knowledge. The Western firms employed dedicated teams separated from their premium business model to explore local conditions and requirements while the local firms relied on the personal experience of the founders. The local firms Medtech2, Labtech2, and Medtech3 possessed deep customer knowledge due the personal experience of the founding team, which were all natives and had worked in the industries for many years. Medtech2 additionally set-up a dedicated rural market unit to gain even more market knowledge. As the CEO of Medtech3 said: *“Market knowledge is the most critical thing. Because we knew the market very well, we understood the limitations in the market very well and we were able to come up with an appropriate product. Building the product is comparably easy when you know what you have to build”*. Only through this intimate understanding of market and context conditions did Medtech1 know that rural doctors are not familiar with ultrasound technology and with the handling of such machines. Therefore, they developed their frugal product in a way that it was very intuitive and easy to use for local doctors. The lack of professional doctors was even a greater constraint in other cases. In fact, the head of the rural healthcare business at Medtech2 said: *“So, we went to the rural areas; we saw that most of the primary healthcare centers, based by the government, were*

*vacant – because there were no doctors.*” Similarly, also Labtech1 did not develop a machine for lab specialist but for non-medics working for NGOs. Hence, they developed a device that could be operated by people without prior knowledge of neither the disease nor any diagnostic device.

#### *Creation and delivery of the application innovation*

In all cases, the newly developed applications had only become possible through new frugal product architectures, which were based on existing technologies and especially included the design for portability. The cases show that frugal innovation is fundamentally different from anything that would be developed for customers in mature, Western markets. Two main approaches were observed to achieve the frugal product architecture: first, the *transfer of a new but established technology* from another context and second, the *decomposition of multi-purpose machines* into focused single-purpose devices. Three cases (Medtech1, 3 and Labtech2) applied the first approach. The two Medtech firms took existing software technology (which were initially developed for other applications) and transferred them into the medical application (e.g. ultrasound and eye screening). Labtech2 introduced a very different but established core technology into their device than traditional devices of this kind were using. The other approach was applied by Medtech2 and Labtech1, both decomposing the traditional multifunctional high-end machine into a tailored device that executes one single operation. For the case of Labtech1 this means that the product can detect exactly one type of virus; for the case of Medtech2 the device only serves as a technical interface that processes and transmits data (i.e. ECG data).

As outlined above, the firms took measures, which allowed them to focus exclusively on the understanding of the true customer, and market needs to craft proper value propositions. Medtech1 maintains a separate R&D unit within its ultrasound business that is located in China dedicated to the development of low-cost products for emerging markets. With regard to marketing and sales, Medtech1 employs a dedicated sales force for the low-cost segment products in rural areas that complements its existing sales force targeting at urban hospitals. Medtech2’s ECG device was developed internally in India by a dedicated unit specifically responsible for resource-constrained, rural areas. Similarly, at Labtech1, a dedicated and independent group of engineers focuses solely on the frugal product development and makes the product design as well as the specification of the components. The product specification is done based on market insights from local sales units in emerging markets as well as field trips to rural regions. *“We thought: If you have nothing – and I mean literally nothing – what do*



*you need to conduct the analysis? So, we literally started with a zero-environment in mind: no electricity, no water, and no educated staff” (Project Head at Labtech1).*

### 4.4.3 Value capturing

#### *Income*

While our case firms applied very special approaches to create and deliver value to the customer, the approach for value capturing was very straightforward. In a nutshell, the attitude of the firms regarding value capturing can be summarized by the statement of the Managing Director of Medtech1’s Technology Center in China: *“If you can make your product and business model low-cost enough, you can still make a very good margin”*. All firms, apart from one, appropriated value through traditional product sales<sup>5</sup>. Medtech 3 is the only one applying several revenue models such as pay-per-use, software as a service or leasing to even better accommodate the financial constraints of their customers.

#### *Expense minimization for frugal value creation*

As outlined by our cases, the firms paid extreme focus on cost minimization in all value creation elements including the R&D, supply chain, manufacturing, and sales. The frugal product architecture is not only crucial to enable the application innovation but the design of the frugal products is also the biggest lever for cost reduction. Frugal innovations in this study have less features and/or performance compared to existing Western standards but at the same time feature characteristics, which are superior to Western advanced products. Due to their unique product architectures, these devices work with much cheaper, established technologies and require only a fraction of material and components compared to advanced products. Labtech1’s product for example only needs two electric motors instead of the 38 in their advanced, Western product. Moreover, and as explained above, the firms innovated the frugal product architectures without new technology development, thereby limiting overall development costs and increasing the value captured from product sales.

At the same time, all firms benefitted from local cost advantages in emerging markets. Product development was carried out mostly by local engineers, i.e., native people who were located in India or China to both improve the value orientation and the cost position than if they had developed the frugal products in their Western R&D centers.

---

<sup>5</sup> Labtec2 has additional income streams stemming from the organizational form of their joint venture in the form of shareholder income. However, the actual revenue model stemming from the frugal innovation are also product sales.

Labtech1 is an exception as it designed their product mostly in the West, however outsourced the actual product development to save cost. In addition, and in line with common Western strategies (Weber et al., 2010), production of and sourcing for these frugal innovations are localized in low-cost countries in plants in Asia, mainly in China and India. An additional benefit of local operations is that they lower transportation and logistics costs due to their proximity to markets. Finally, dedicated marketing and sales units/channels for rural customers – often located right in the emerging market and led by local people – support these units. The use of local sales people and existing sales channels of partners and distributors enabled the firms to appropriate further cost savings than if they had to build new channels or train existing sales people for selling frugal products.

While Medtech1's sourcing is set-up globally, most of the materials for frugal products are sourced from low-cost suppliers in China, thereby minimizing transportation cost and ensuring quick response times. Production is also localized in existing facilities in low-cost countries, mostly in China. For the frugal product, Labtech1 sources globally, most of which in emerging markets, with the exception of critical core parts. Production takes place in its production facilities in South East Asia. The devices of the Indian firms are produced and sourced in India to leverage local cost advantages. *"The cost of labor is low in India. Most medical products are manufactured in rather small numbers and hence a lot of manual intervention is required. The cost of manual technical labor in India is about 10% of the costs in the developed world. Hence we are able to provide low cost for low volumes"*, said Medtech2's Managing Director.

The cases show that partnering with other firms and outsourcing were often-used vehicles to achieve the low-cost requirements of the frugal value proposition. While outsourcing for cost reasons is a common business practice (Kenney et al., 2009), the data showed that outsourcing came particularly into play when the firms were lacking crucial frugal competences and the internal development of those would be too expensive. With the cost pressure inherent in frugal innovation, there is only little room for additional costs to build specific capabilities internally. The firms therefore outsourced activities in cases of missing low-cost competencies or capacities, which were, however, essential to achieve the low-cost positions. Labtech2, for example, teamed up with a partner that contributed with low-cost production know-how and an extensive international sales network. R&D is done internally at Labtech2 but sourcing, production, as well as sales and service is done in the joint venture. The partner executes these steps in its own existing facilities and delivers the products with its own



sales force. These measures reduce Labtech2's costs to R&D expenses only. As Labtech2's MD explained: *"The reason why we tied up with our partner firm is that they already have distributors [in India and] in 60 other countries... So, the joint venture is manufacturing and sales [...] all the sales people are in the joint venture and not in Labtech2."*

Similarly, Labtech1, which is specialized in complex high-end product developments, lacked the low-cost development capability needed for the frugal product. Therefore, only the design and specification was done internally while the majority of the product development was outsourced to firms specialized in low-cost product development. In addition, NGOs organized Labtech1's distribution of the products to the rural communities and operated the machines in the field. *"Of course, we could have built competences and new sales channels in-house, but this would have been far too expensive to pay off in the end"*, commented Labtech1's Project Head. The same pattern applies for the other two cases: Medtech2 realized low-cost production internally, while Labtech2 completely outsourced production and sales. Table 11 provides the full overview of the five business models under study.

Case	Value proposition	Value creation			Value capturing		
		Engineering	Sourcing	Production	Sales	Expenses	Income
Medtech1	<ul style="list-style-type: none"> <li>Affordability and access to healthcare at low costs (possibly for the first time)</li> <li>Patients do not have to travel to remote hospitals</li> <li>Easy to use for rural general practitioner</li> <li>Efficiency gains for the healthcare system</li> </ul>	<ul style="list-style-type: none"> <li>Recombination of established technologies (imaging and probing unit) into a new, software-based product (new product platform); dedicated R&amp;D unit, located in China</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost raw materials incl. local supply chain in China</li> <li>Global sourcing for critical parts.</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost technology sourcing from India, commodities sourced from China</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost production in India</li> </ul>	<ul style="list-style-type: none"> <li>Customers: rural hospitals, clinics, and doctors</li> <li>Access to customers through new additional sales unit for rural areas in China</li> </ul>	<ul style="list-style-type: none"> <li>Cost minimization in each upstream and downstream value chain activity (see value creation)</li> <li>Product sales</li> </ul>
Medtech2	<ul style="list-style-type: none"> <li>Affordability and access to healthcare at low costs (possibly for the first time)</li> <li>Patients do not have to travel to remote hospitals</li> <li>Easy to use for rural general practitioner (telemedicine)</li> <li>Efficiency gains for the healthcare system</li> </ul>	<ul style="list-style-type: none"> <li>Decomposition of multipurpose machines through decoupling image acquisition and processing by using established technology (new product platform); dedicated R&amp;D unit, located in India</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost raw materials incl. local supply chain in India</li> <li>Global sourcing for three critical parts.</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost production in India (partly outsourced)</li> </ul>	<ul style="list-style-type: none"> <li>Customers: (rural) hospitals, eye clinics, and primary healthcare centers</li> <li>Distribution still in growth phase: channels via distributors and direct selling.</li> </ul>	<ul style="list-style-type: none"> <li>Cost minimization in each upstream and downstream value chain activity (see value creation)</li> <li>Product sales, pay-per-use, leasing, and software as a service</li> </ul>	
Medtech3	<ul style="list-style-type: none"> <li>Affordability and access to healthcare at low costs (possibly for the first time)</li> <li>Preventive screening: preventable blindness can be detected and treated</li> <li>Ease of use: no doctor required (telemedicine + automated analysis by software)</li> <li>Efficiency gains for the healthcare system</li> </ul>	<ul style="list-style-type: none"> <li>Decomposition of established technologies into a new, software-based product (new product platform); R&amp;D unit located in India.</li> </ul>	<ul style="list-style-type: none"> <li>Low cost raw materials incl. local supply chain (apart from critical components)</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost production in South East Asia</li> </ul>	<ul style="list-style-type: none"> <li>Customers: Country governments and NGOs.</li> <li>Final distribution with the help of NGOs.</li> </ul>	<ul style="list-style-type: none"> <li>Cost minimization in each upstream and downstream value chain activity (see value creation)</li> <li>Product sales</li> </ul>	
Labtech1	<ul style="list-style-type: none"> <li>Affordability and access to healthcare at low costs (possibly for the first time)</li> <li>Preventive screening: infections are detected before people have symptoms</li> <li>Ease of use: no specialist required</li> <li>Speed: 48 samples in 2.5h instead of 300+ in 6-8h</li> <li>Efficiency gains for the healthcare system</li> </ul>	<ul style="list-style-type: none"> <li>Decomposition of multipurpose machines into a focuses single purpose device (new product platform); dedicated, global virtual team</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost raw materials incl. local supply chain in India</li> <li>Global sourcing for one critical component</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost production in India (outsourced to JV partner)</li> </ul>	<ul style="list-style-type: none"> <li>Customers: Hospitals, rural clinics and primary healthcare centers.</li> <li>Distributor (JV) with its sales force</li> </ul>	<ul style="list-style-type: none"> <li>Cost minimization in each upstream and downstream value chain activity (see value creation)</li> <li>Product sales, licence fee and shareholder income (from stake in JV)</li> </ul>	
Labtech2	<ul style="list-style-type: none"> <li>Affordability and access to healthcare at low costs (possibly for the first time)</li> <li>Patients are tested where they are treated (in rural hospitals or rural primary healthcare centers)</li> <li>Ease of use: No specialist required</li> <li>Speed: 1 sample in 1h minutes instead of 300+ in 6-8h</li> <li>Efficiency gains for the healthcare system</li> </ul>	<ul style="list-style-type: none"> <li>Cost saving through new technology (but established technology not used for his analysis before (new product platform); dedicated R&amp;D unit, located in India.</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost raw materials incl. local supply chain in India</li> <li>Global sourcing for one critical component</li> </ul>	<ul style="list-style-type: none"> <li>Low-cost production in India (outsourced to JV partner)</li> </ul>	<ul style="list-style-type: none"> <li>Customers: Hospitals, rural clinics and primary healthcare centers.</li> <li>Distributor (JV) with its sales force</li> </ul>	<ul style="list-style-type: none"> <li>Cost minimization in each upstream and downstream value chain activity (see value creation)</li> <li>Product sales, licence fee and shareholder income (from stake in JV)</li> </ul>	

Table 11: Overview of all frugal business models under study.

## 4.5 Discussion

### 4.5.1 The threefold value proposition in frugal business models

This study provides insights regarding the specific value proposition of the frugal business models. All firms addressed three key stakeholders with their products and business models. Being active in a B2B setting, all firms provided their business customers with a tailored value proposition, which is low-cost for high affordability, plus the provision of operational requirements such as battery based operation, durability, or easy handling that allow them to actually use the products in rural settings. Additionally, the frugal value proposition also addresses the end customer or in our case the patients. The value proposition for them is accessibility in rural environments and low-cost as healthcare treatments are usually paid out of pocket. As evidenced by our data, all cases provided an additional third value proposition towards the entire healthcare system by generating overall efficiency gains. Because frugal innovations allow these basic examinations to be taken outside the hospital by very basically trained staff, the specialists in hospitals can focus on the severe health cases that need a fully trained specialist. This reduces the number of people examined and treated in hospital and improves the effective resource allocation within the healthcare system. In other words: the frugal business models serve as a pre-filter for the healthcare system making it more efficient. Figure 5 visualizes the frugal value proposition for the medical device and laboratory equipment industry.

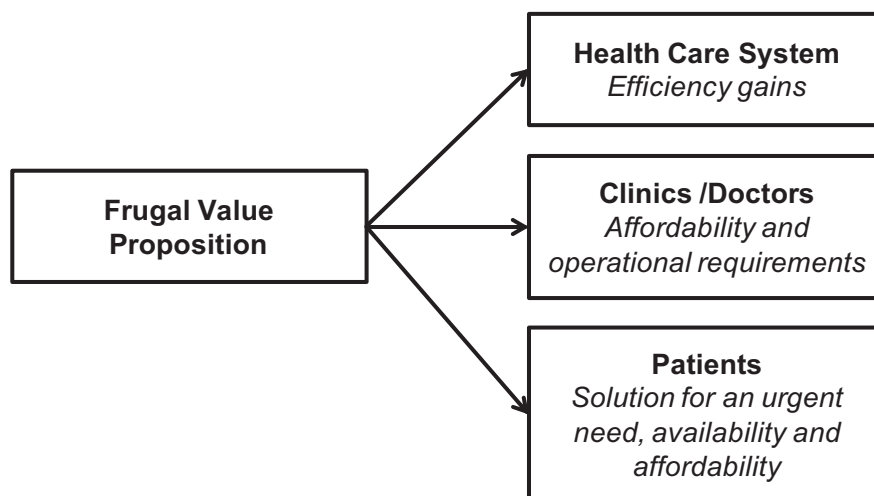


Figure 5: The value proposition of frugal business models.

Research on social value creation has highlighted that activities at the BoP need to create social value in addition to economic value (Seelos & Mair, 2007; Sinkovics et al., 2014; Wilson & Post, 2013). Mostly the social value is concerned with poverty alleviation and/or wealth creation (Bruton et al., 2013, 2011; Seelos & Mair, 2007; Yunus et al., 2010) often through the means of inclusion (George et al., 2012; Mair et al., 2012). Some scholars also highlight the need for sustainability in resource-constrained environments (Gold et al., 2013; Sharma & Iyer, 2012). Business model research has only started to transfer the multidimensional notion of social value creation into the construct of the value proposition. Most authors in the field of business models in emerging markets focus on the particular value proposition towards the end-customer (e.g. Sanchez and Ricart, 2010; Yunus et al., 2010) and some work also towards the community in resource-constrained areas (e.g. Seelos and Mair, 2007). Advancing and specifying this research, this study argues that there is a threefold value proposition in frugal business models towards the end customer, the business customer and the entire healthcare system.

#### **4.5.2 The nature of and the organization for application innovations**

Overall, the cases show that it requires some sort of “smart” innovation to realize application innovations at low-cost. Indeed, these frugal innovations are disruptive innovations (Christensen & Raynor, 2003; Markides, 2006) as suggested by earlier studies (Wan et al., 2015). The concept of disruptive innovation builds on the premise that innovations either lead to the creation of new markets or deliver an already existing customer value at drastically lower costs (Christensen & Raynor, 2003). While extant research has already highlighted that resource-constrained innovations create new low-cost segments of existing markets (Hang et al., 2015; Lim et al., 2013), the empirical evidence provided by this study suggests that resource-constrained innovation can even create new markets, if they enable a new application. Consider the case of Medtech1: The frugal ultrasound created a whole new market segment for mobile ultrasound applications through which ultrasound technology can now be used in completely new settings (such as rural clinics or ambulance vehicles). This applies for all cases in this study, as they all transformed a procedure that was initially bound to existing infrastructure and professional staff into an easy-to-use, mobile application.

The cases also show how firms organized their value creation activities to achieve the frugal value proposition. The firms’ overall business model design is tailored to reduce cost wherever possible (e.g. in manufacturing, sourcing, and partnering in all value chain activities) while at the same time doing the necessary to achieve the frugal value

proposition (R&D) and reach customers in remote areas (e.g. specific sales teams and channels as well as partnering). This is in line with literature arguing that cost reasons are generally a major driver for firms' presence in low-cost countries (Dunning, 1993; Lee, 1986; Lewin et al., 2009; Weber et al., 2010) and business model literature arguing that business model gaps are a major driver for open business models (Frankenberger et al., 2014). The main lever for frugal business models, however, remains in firms' R&D and how they achieve the new application. This study is amongst the first to find that there are two generic approaches, either a technology transfer from another ambit or the decomposition of a multipurpose machine into a single purpose device, to enable frugal innovation. Therefore, frugal innovation is a poster child example that disruptive innovation does not necessarily require radical technological innovation (Govindarajan & Kopalle, 2006).

## **4.6 Conclusion**

### **4.6.1 Summary and contributions**

In this article, we have analyzed the business models of five firms that have implemented business models for frugal innovation in the medical and laboratory equipment industry in India and China. In doing so, this study advances the understanding of innovation and business model design for resource-constrained environments. The main contributions of this study are as follows: *First*, we are amongst the first to adapt a more fine-grained view of low-cost innovation in emerging markets by focusing exclusively on frugal product innovations, which enable new, unprecedented applications in resource-constrained environments. *Second*, we refine the understanding regarding the relationship between resource-constrained innovation and disruptive innovation. While extant research on resource-constrained innovation has mainly argued that these sorts of innovations create low-end segments of existing markets, we provide evidence that frugal innovations can create new markets. *Third*, we identify the threefold value proposition for frugal innovations in the medical device and laboratory equipment industry, thus specifying and detailing earlier studies on value propositions for resource-constrained environments. *Fourth*, we show how firms can design their value creation and value capturing activities to achieve the frugal value proposition. Particularly, we highlight the role of R&D for frugal business models. *Lastly*, and detailing the role of R&D for frugal innovation, we are the first to identify two specific R&D strategies for the development of frugal innovations.

The findings of this study also have several implications for management practice. Overall, it becomes evident that firms need to develop a frugal mindset in their organization, if they wish to engage in frugal business models. This frugal mindset stands for the creation of very high customer value at very low costs for resource-constrained customers in emerging markets. The findings suggest that this can be achieved by several tactics within the three core elements of the business models. First, while local firms may naturally possess in-depth customer and market know-how, Western MNCs should establish dedicated organizational units that focus on these markets. This might imply that new organizational units for need sensing, R&D, and customer interaction need to be built. Second, based on this in-depth customer and market context understanding, firms should develop the threefold value proposition at very low cost. To realize this task, firms can draw upon the two frugal R&D strategies presented to arrive at simple but robust and cheap solutions for the resource-constrained customer. After all, a cheap solution that does the job is worth more than no solution, especially in markets where people are in severe need.

On the cost side, firms must take every possible action within their value creation activities to reduce costs to a minimum. Ultimately, low-cost is not an option to ensure or improve profitability in this business segment; it is the prerequisite to initiate business in the first place. In line with Prahalad (2010), we argue that frugal products do not compete with other low-cost alternatives but they compete with non-consumption, leaving rural doctors and hospitals with the choice between a frugal product solution or no solution at all.

#### **4.6.2 Future research**

To our knowledge, this is the first study to empirically investigate frugal innovation defined as application innovation for emerging markets. Many research avenues evolve from such exploratory research. *First*, the findings of this study describe the status-quo, not the development, of the firms' frugal business models. As many studies in business model research adopt a static view, there is rather limited insight in the question how business models evolve and how tactics within value creating and capturing activities vary and change over time. This is particularly true for business models for frugal innovation. Longitudinal studies analyzing the dynamics of frugal business models over time would improve our understanding how they can be effectively changed and adapted to specific circumstances. *Second*, future research could advance our understanding of the multidimensionality of the value proposition in emerging markets, specifying it in other industries and markets. *Third*, while this study

has focused on frugal business models in emerging markets, it has been argued that frugal products may be commercialized in developed markets as well (Govindarajan & Ramamurti, 2011). For research concerned with the global dimension of business models, it would be interesting how these business models differ from the ones in emerging markets. Following this road, one major question that has not yet received much attention despite its high importance for globally operating Western firms, is how these firms can integrate low-cost business models for emerging markets in their global operations (Kachaner et al., 2011; Markides, 2012). Overall, frugal innovation and business models in emerging markets are two thriving fields of research whose integration offers rich opportunities for future research.

## 4.7 Appendix: List of interviews and interview partners.

<b>Firms</b>	<b>Interview partners</b>	<b>Interviews</b>	<b>Minutes</b>
<b>Medtech1</b>	Director Global Research-Europe General Manager China Technology Center General Manager of Global Technology Healthcare	5	190
<b>Medtech2</b>	Managing Director and founding member Head of Rural Healthcare Business Head of European Design Center	3	135
<b>Medtech3</b>	CEO and founding member	1	95
<b>Labtech1</b>	Head of Global Lifecycle Management Instruments Project Manager	3	180
<b>Labtech2</b>	Managing Director and founding member	1	95

*Table 12: Overview of interviews.*



## 5 Managing dual business models in emerging markets: An ambidexterity perspective

Co-authored by Marco Zeschky and Oliver Gassmann

Accepted for publication in *R&D Management* <sup>6</sup>

### Abstract

*Research on dual business models has highlighted the challenge for firms when they compete with different business models in a market. Drawing from ambidexterity literature, we investigate the question how firms integrate or separate business models on the level of value chain activities, which constitute the core operational activities within each business model. We employ a qualitative research approach based on eleven case studies of Western firms that implemented a low-cost business model in parallel to their premium business model in emerging markets. We find that firms may become ambidextrous in their business models by means of domain separation. In doing so, firms may separate value chain activities to address different additional customer segments in emerging markets. This study contributes to the emerging topic of dual business models and provides the ground for future research on ambidexterity in a global context.*

**Keywords:** Dual business models, ambidexterity, domain separation, low-cost business models, emerging markets, multinational corporations

---

<sup>6</sup> This article will be published as: Winterhalter, S., Zeschky, M.B. & Gassmann, O. (2015). Managing dual business models in emerging markets: An ambidexterity perspective. *R&D Management* (in press.)

## 5.1 Introduction

With the rise of emerging markets, especially India and China, a new type of low-cost innovation emerged to tap the business potential of resource-constrained customers in these economies. Traditionally, Western firms targeted affluent customers in emerging markets (i.e. top of the economic pyramid) with their global premium products and business models as these customers are rather similar to Western customers in terms of preferences and buying power (Arnold & Quelch, 1998). With his seminal work on the base of the pyramid, Prahalad (cp. Prahalad & Hammond, 2002; Prahalad & Lieberthal, 1998; Prahalad, 2010) broke ground for resource-constrained people to be an interesting ground for profit making and not only for doing good. Resource-constrained customers (i.e. in the middle and at the base of the pyramid) face significant constraints in the form of low purchasing power (London & Hart, 2004; Ricart et al., 2004), institutional voids (Khanna & Palepu, 1997, 2000) and infrastructure gaps (Hoskisson et al., 2013). This is mostly caused by the fact that these customers live in second and third tier cities or even remote rural areas, where economic progress has not resulted in Western standards and thus still impose these constraints (Anderson et al., 2010; Mair et al., 2012). Therefore, these customers have different requirements towards products and business models than affluent customers in major cities (Cui & Liu, 2001; Prahalad & Hammond, 2002). Prominent examples are low-cost cars (Lim et al., 2013), low-cost batteries or shipping containers (Zeng & Williamson, 2007), low-cost medical devices (Immelt et al., 2009; Zeschky, Widenmayer, et al., 2014), low-cost home appliances (Ge & Ding, 2007; Hang et al., 2010), low-cost mini wind turbines (Awate, Larsen, & Mudambi, 2012; Tan & Mathews, 2015) or low-cost consumer products such as mini sachets for detergent (Kaur, 2013). Due to the peculiarities of these environments it is argued that firms need to create unique and new business models to meet the prevailing harsh price-performance requirements in these markets (George et al., 2012; Seelos & Mair, 2007; Zeschky, Widenmayer, et al., 2014). This is particularly challenging for Western firms, whose existing business models are typically designed to develop advanced innovations for customers with excess income (Halme et al., 2012). Thus, their activities traditionally target high quality, performance, and reliability, which result in rather high costs that can be passed on to the customer. To serve resource-constrained customers, however, Western firms need to take local circumstances into account and re-design their business models (Sanchez & Ricart, 2010; Seelos & Mair, 2007; Zeschky, Widenmayer, et al., 2014). At the same time, established Western firms cannot

abandon their traditional premium business model (i.e. their top the pyramid customers) – and thus they have to manage two business models (i.e. dual business models) for the same market (Markides & Charitou, 2004; Markides, 2013). While research has created significant progress in analyzing certain business models in specific industries and market situations (cp. Casadesus-Masanell & Zhu, 2013; Chesbrough & Rosenbloom, 2002; Richter, 2013; Svejenova, Planellas, & Vives, 2010) rather little is known about how firms manage dual business models. Most extant work suggests that new business models need to be set up in separated organizational units. While this approach is intuitively appealing, it has been argued that this view is rather simplistic and might not always be the best solution (Markides, 2013). With this study, we follow up on the call for more in-depth studies to investigate *how* firms can integrate or separate new business models in/from the existing business model (Kachaner et al., 2011; Markides, 2013). We do this in the context of premium vs. low-cost business models in emerging markets. As one of the first studies on business models, we specifically draw on ambidexterity literature (Lavie et al., 2011; O'Reilly & Tushman, 2004; Raisch, Birkinshaw, Probst, & Tushman, 2009) as suggested by Markides (2013). Our empirical analysis is based on case studies at eleven Western multinational firms that have set up additional low-cost business models to their premium business models in emerging markets to address resource-constrained customers. We adopt an activity system perspective of business models (Zott & Amit, 2010) and analyze how the firms integrate/separate the new low-cost business model in/from their premium business model with regard to the value chain activities of the two activity systems.

The contribution of this work is fivefold. *First*, we shed light on how firms can implement dual business models on the level of value chain activities. *Second*, we are amongst the first drawing on ambidexterity literature to explain how firms can overcome dualities among competing business models. In this respect, we particularly highlight the role of domain separation, i.e. the separation of a discrete field of activity (Lavie et al., 2011) in resolving such dualities. *Third*, we show how Western multinationals employ different degrees of domain separation to reach new customer segments in emerging markets. *Fourth*, this work provides evidence that the business model as a unit of analysis for ambidexterity literature may have the power to overcome tensions occurring from exploration and exploitation (March, 1991) within firms. In doing so, this work shows that business model research can profit strongly by drawing on ambidexterity literature. Vice versa, we argue that this relationship is not a one-way-street and that the business model can further enlarge the reach of the ambidexterity

concept. *Fifth*, and building on the notion of domain separation, we outline how research on ambidexterity in business models may pave the way for an entirely new stream of research on ambidexterity through global operations.

## **5.2 Literature review**

### **5.2.1 Business model elements**

Extant research has highlighted the importance of business models as they may influence firm performance (Afuah & Tucci, 2001; Afuah, 2004), first mover advantage (Markides & Sosa, 2013) and can lead to competitive advantage (Zott & Amit, 2008). Despite some conceptual discord regarding what exactly a business model is, scholars have come to the basic agreement that business models entail value creation, value delivery and value capturing elements (Casadesus-Masanell & Ricart, 2010b) with the aim of providing a holistic view of the business (Zott et al., 2011). We adopt the notion that business models are activity systems consisting of various interdependent activities, such as a the firm's value chain activities, its choice of customers as well as its choice of products and services (e.g. Casadesus-Masanell & Ricart, 2010; Markides, 2013; Teece, 2010; Zott & Amit, 2010). Value creation and delivery involve the firms' activities in development, production and product/service delivery, as well as how the offering is made available to the customers (Morris et al., 2005). These activities are very much related to Porter's (1985) "primary activities" within the value chain (Amit & Zott, 2001; Zott & Amit, 2013). Value capturing describes how some of the total value created for all stakeholders in the activity system can be appropriated by the focal firm through its revenue model (Zott & Amit, 2010).

### **5.2.2 Ambidexterity and dual business models**

Building on March (1991), literature has intensively studied how firms can manage exploration and exploitation and become ambidextrous to better manage dualities (O'Reilly & Tushman, 2004). Ambidexterity literature provides four basic approaches to overcome these tensions: organizational separation, temporal separation, domain separation and contextual separation (Lavie, Stettner, & Tushman, 2010). Organizational separation means that firms separate conflicting activities in two independent organizational units (O'Reilly & Tushman, 2004). Firms adopting temporal separation execute conflicting activities in the same unit but at different times (Markides, 2013). Domain separation means that firms can separate exploration and exploitation across domains, i.e. being explorative in one domain (e.g. in R&D) while

being exploitative (e.g. in marketing) at the same time (Lavie et al., 2011). Lastly, contextual ambidexterity argues that firms can be explorative and exploitative at the same time when the right context is provided (Gibson & Birkinshaw, 2004). Some of these approaches have been transferred to the business model literature, however mostly without explicitly drawing from ambidexterity literature. By far the most frequently adopted perspective is organizational separation, arguing that new business models should be established in new organizational units (e.g. Chesbrough & Rosenbloom, 2002; Markides, 2006). In this view, firms can best manage dualities by establishing separate structures (e.g. firms or business units) so that each of them can follow its own goals, value chain activities, and culture without being impeded or diluted by the other unit (Lavie et al., 2010; Markides, 2013). Typically, authors mention an additional low-cost business model that accompanies an existing premium business model or vice versa, an instance that has been termed “dual business model” (Markides & Charitou, 2004). Dow Corning for example introduced a no frills, low-cost business model called Xiameter (Ryans, 2009), British Airways started the low-cost carrier Go, and Nestlé created Nespresso as a premium coffee brand in a separate business unit (Matzler, Bailom, von den Eichen, & Kohler, 2013). Since new business models are however not always radically different from the existing business model, it has been argued that complete organizational separation may not always be the best solution (Markides, 2006). A contingency approach was proposed to either integrate or separate two businesses based on the *strategic similarity* of the two respective markets and the *seriousness of conflicts* between the two business models (Markides & Charitou, 2004). Based on a case study at Chilean LAN Airlines, it has been further suggested that separation or integration of business models should be considered based on whether the business models are *substituting* or *complementing* each other (Casadesus-Masanell & Tarziján, 2012). However, in all these studies, business model scholars have hardly ever touched upon ambidexterity literature. Moreover, there is a strong tendency towards organizational separation on the corporate or business unit level, leaving temporal and domain separation as well as contextual separation aside (Markides, 2013). A notable exception is a very recent work by Khanagha, Volberda, and Oshri, (2014) who show how a European telecom provider applied temporal separation to implement cloud computing. While the above-mentioned studies are very valuable for getting a first understanding that firms need to consider different implementation modes for business models (i.e. integration or separation) there is little knowledge about *how* or *where* firms integrate or separate different business models.

Ambidexterity literature on domain function separation (Lavie et al., 2011) offers a lens to address this gap. Business models are constituted by a firm's value chain activities, its choice of products/services and customers (Zott & Amit, 2010). In ambidexterity literature, value chain activities are regarded as domains and firms can switch between exploration and exploitation across domains (Lavie et al., 2011) – or in business model terms: along the value chain. In the context of dual business models (premium vs. low-cost), this means that firms may separate individual value chain activities to explore a new business model (i.e. the new low-cost business model) while keeping other activities integrated with the premium business model and exploit synergies. Consider the case of Dow Corning and Xiameter (Ryans, 2009). Dow Corning is a premium manufacturer of silicones and other chemical products that provides customized solutions for premium industrial clients. Xiameter is a new, self-standing unit that offers a different, no-frills value proposition towards customers (i.e. a pre-defined selection of standard silicones in large quantities with rather long lead times but at lower cost). Despite being an independent business unit, the integration of Xiameter's low-cost and Dow Corning's premium business model is big, particularly with regard to production, logistics and IT. Customers even pick up the orders at Dow Corning's manufacturing plants. On the other hand, with regard to sales channels and customer interaction in general, the two business models are very different and separate (Ryans, 2009). Thus, Dow Corning explored (i.e. separated) the domain "sales and marketing" while it exploited (integrated) other domains such as "production and sourcing". This example shows that one unit's business model may share domains with other units' business models – even though they constitute self-standing entities. Hence, the two business units have overlaps in their activity systems. Building on this, it becomes evident that the question of business model integration/separation cannot be fully understood by looking at the macro-structure of a firm (i.e. corporate or business unit level). For business model research to progress in this matter it is vital to adapt a more micro-level perspective of how firms integrate or separate value chain activities (Kachaner et al., 2011; Markides, 2013).

### **5.2.3 Innovation and business models for emerging markets**

#### *Market segments and resource-constraints in emerging markets*

Customer and market segments in emerging markets differ from mature Western markets (Eyring et al., 2011; George et al., 2012). While few are very affluent, the largest part of the population in emerging markets belongs to the middle or lower part of the economic pyramid and is resource-constrained (Prahalad, 2010). The largest



discrepancy between affluent and resource-constrained consumers can be found between urban and rural populations (Anderson et al., 2010; Cao et al., 2009; Sun & Wu, 2004). It is thus a common notion that infrastructure gaps, institutional voids and poverty generally increase the more rural an area is (e.g. Anderson et al., 2010). Stemming from this, market segments in emerging markets are traditionally premium markets, where multinationals compete with global business models for the few affluent customers; middle or good-enough markets, consisting of local and international firms that compete for the emerging middle class in tier two and three cities; and low-end markets where mostly local firms and micro-businesses address the needs of rural customers at the base of the pyramid (Gadiesh et al., 2007; Gebauer et al., 2009).

#### *Low-cost innovation and business models for emerging markets*

Literature on low-cost innovation for emerging markets shows that firms can innovate and market products and services in emerging markets – in middle markets and even in poor rural areas (Immelt et al., 2009; Zeschky, Winterhalter, et al., 2014). These so-called “resource-constrained innovations” (RCIs) enjoy high demand among customers who suffer from resource-constraints in the form of very limited budgets, poor infrastructure and missing institutions that prevail in emerging markets (Ray & Ray, 2010; Zeschky et al., 2011).

A plethora of terminologies and concepts has been developed to describe the broad phenomenon of resource-constrained innovation in emerging markets (for an overview see e.g. Von Zedtwitz, et al. (2015) and Zeschky, Winterhalter et al. (2014)). While still in its infancy, most of this research is case study based and provides rather anecdotal evidence (Cunha et al., 2014). Specific firm capabilities to develop RCIs are key to succeeding in emerging markets and it has been found that firms’ investments in RCI pay off financially (Ernst et al., 2015). Due to the peculiarities of resource-constrained environments outside the major cities, firms need to create new business models to meet the prevailing harsh price-performance requirements in these markets (George, McGahan, & Prabhu, 2012).

Literature on how firms innovate these kinds of innovations have come to different conclusions. It has been argued that Western firms need to set up independent units with local staff that have their own business models separate from the premium business model (Govindarajan & Ramamurti, 2011; Immelt et al., 2009). This enables firms to achieve the low cost base needed to address resource-constrained consumers’ limited budget, but also to best sense these customers’ requirements.

However, other studies report that there are approaches, which keep the low-cost business model closer to the firm's established premium business model (Zeschky et al., 2011). For example, based on a study in China, Schanz et al. (2011) argue that RCIs can be developed in newly created and separated units but also in existing integrated structures. In line with this it has been argued that low-cost business models for emerging markets may be low-cost replications of those applied in advanced economies or new business models specifically developed for resource-constrained environments (Sanchez & Ricart, 2010).

This review of the literature allows us to conclude that while the literature has provided helpful first insights, the question of *how* Western firms integrate or separate their low-cost from their premium business on the level of domains/value chain activities has so far remained unanswered. Thus, the overall question guiding this research is as follows: *How can Western firms separate low-cost business models in emerging markets from their premium business model at the value chain level?*

## **5.3 Method**

### **5.3.1 Research design and sampling**

Adopting an ambidexterity perspective, this research aims to describe and explain how firms integrate or separate dual business models, i.e. premium and low-cost business models at the domain level, to reach resource-constrained customers in emerging markets. We employed a qualitative research approach (Yin, 2014), because research on dual business models in low-cost settings of emerging markets from an ambidexterity perspective is virtually absent. A multiple case study design as adopted in this paper is particularly fitting when existing research is in an early phase, or when a new perspective is sought (Eisenhardt, 1989).

Since this study aims to understand how firms can handle both premium and low-cost business models, we applied theoretical sampling criteria (Eisenhardt, 1989). We started with the aim to better understand how Western firms address low-cost market segments in emerging markets. To do so, we compiled case studies from 23 Western firms that had developed a low-cost business model in emerging markets. After excluding cases that provided insufficient information for our analysis, we arrived at eleven Western manufacturing firms (European and U.S. firms), which originally entered emerging markets with a premium business model by selling global products with a local sales unit and in some cases employing local production. Subsequently,



these firms developed an additional low-cost business model to address resource-constrained customers in the middle or low-end market. While we did not focus on a particular industry, we focused on manufacturing firms, as we were interested in domain separation. Hence, we chose manufacturing firms (in contrast for example to service firms) that maintained a full value chain (from R&D to sales and marketing) in their premium business model to identify how the new low-cost business model was integrated or separated. All case firms chosen maintain their low-cost business model under the same brand as the premium business model. Since we are interested in the organization of business models at the domain level, we concentrate our analysis on the value creation and delivery mechanisms within the business models. While not in the focus of our analysis, all case firms appropriate value from their low-cost business models and are increasing their efforts in this matter by extending their product portfolio and/or bringing their low-cost business model to other markets.

### **5.3.2 Data collection**

We interviewed senior managers from the companies who were involved in either the development, marketing, or general management of the low-cost business model. These informants could provide information about how the value chain of the low-end and the premium business models are organized. We used a semi-structured interview guide and concentrated our lead questions on the firms' value chain activities and how these activities were separated or integrated for the premium and the low-cost business models. We recorded and transcribed the interviews after they were conducted and began developing the full cases. When possible, we triangulated data (Gibbert et al., 2008; Jick, 1979) by interviewing several managers within the same company, as well as by cross-checking interview data with secondary information in the form of publically available information and internal documents. In total, we conducted 27 interviews, which lasted between 40 and 120 minutes. Table 15 in the appendix provides an overview of our empirical data.

### **5.3.3 Data analysis**

Based on the validated transcripts and the additional information obtained, we wrote case histories for each case. Two researchers analyzed the data independently (Mayring, 2007) and the analysis was carried out in an iterative way oscillating between data and emerging themes (Locke, 2001; Miles & Huberman, 1994). Before proceeding to the cross-case analysis (Eisenhardt, 1989), we familiarized ourselves with each case individually. Further we applied visualization techniques and tabular

pattern matching (Miles & Huberman, 1994) to identify differences and similarities between the cases. Finally, various iterations between literature, data, and our findings were made until we achieved a consistent picture. Table 13 in the next section provides an overview of the low-end business models and how they are separated from the premium business models.

As explained above, we adopt an ambidexterity perspective. March's (1991) initial broad notion of exploitation was associated with attributes such as "refinement", "efficiency", or "execution", while he associated exploration with "search", "variation", or "innovation" (p.71). Generally, exploitation is described as doing things known to the firm by leveraging existing skills and capabilities, while exploration is described as a 'shift away' from an organization's current capabilities and skills set (Lavie & Rosenkopf, 2006; Lavie et al., 2010). Hence, in our setting, we refer to exploitation when firms are leveraging their existing knowledge, structures, and processes to address low-cost markets in emerging markets. Exploration is referred to when firms build new knowledge, structures, and processes to address low-cost market segments in emerging markets. We follow prior works on functional domain separation (Lavie et al., 2011) to identify which strategy (i.e. exploration or exploitation) firms applied for each domain. Thus, in the context of our study, we speak of exploitation when a specific domain (e.g. R&D) of the low-cost business model is integrated in the domain of the premium business model (i.e. R&D in the same unit for the premium and low-cost business models). Conversely, we speak of exploration when domains are separated (i.e. two different R&D units for the low-cost and the premium business models).

We used a rating method to identify where and how much firms integrate or separate the two business models. To do so, we used the central value chain activities "development", "production", and "sales" and identified who carried out the activities for the low-cost business model and whether that unit or group differed from the premium business model. To better determine the degree of integration and separation, we created three categories, which were all rated from 1-3 for each value chain activity. Category A (1 point) resembles fully integrated activities, i.e. the low-cost business model lies in the same organizational unit with the same people. Category B (2 points) is a mixed approach, i.e. a partial separation or collaboration for certain activities within a domain. Category C (3 points) is fully separated, i.e. the low-cost business model is independent from the premium business model. In total, the low-cost business model ratings can range from 3 points (3x1 point in each value

creation and delivery step for a full integration) to a maximum of 9 points (fully separated in all three value creation and delivery steps).

## 5.4 Findings

### *IndEquip1*

IndEquip1 is a globally leading European company in the electric frequency converter business. The company set up its first sales offices in the late 1980s, and subsequently built production and R&D facilities in the Beijing area. Traditionally, IndEquip1 targets and innovates for high-income customers that have demanding requirements regarding innovation and quality. Because of this, they were not in the position to compete in the middle-market segment against low-cost Chinese producers. IndEquip1's Chinese market unit, which was only running a premium business model at that time, developed a new low cost product targeted at China and other emerging markets that is cost engineered to enable more efficient production. To explore further cost advantages, IndEquip1 outsourced production to a local company that could produce the product at lower cost than IndEquip1 could in their existing premium production facility in China. Apart from production, all value chain activities are operated in the same facilities and by the same organizational units as the premium business model.

### *IndEquip2*

The power systems segment of IndEquip2, a globally leading European company, provides industrial equipment such as Switch Integrated Rectifiers (SIRs). This product is frequently used to reduce particulate emissions from flue gases from power plants and industrial processes. To gain a foothold in the Chinese middle market for SIRs (consisting of industrial clients and smaller power plants), IndEquip2 developed a low-cost business model. Development and production for the premium business model is located in Europe. For the low-cost business model, IndEquip2 transferred production to China, where it sources locally from Chinese suppliers. The development team based in Europe is responsible for development and design, and when the product is finally developed, the responsibility for production for the low-end business model is transferred to China. The local unit sells the product via its sales force from the premium business model.

### *MachineFirm1*

MachineFirm1 is a global leader in construction tools such as rotary hammers and breakers. With its premium business model, MachineFirm1 targets professional users with machines that provide high flexibility, quality and robustness with the aim of maximizing efficiency on construction sites. For China and India, MachineFirm1 developed a low-cost business model for specific applications on construction sites in emerging markets. For the low-cost business model, MachineFirm1 relies on co-development by premium European engineers and some engineers in China who are dedicated to low-cost developments. The machine is produced and sourced in MachineFirm1's manufacturing plant in China, which is specialized in producing these low-cost machines (but now also produces products for the premium business model) and leaves marketing and sales to the premium business model team.

### *LabEquip1*

LabEquip1 is a European company that is active in the premium segment of the laboratory equipment industry (one of several divisions). LabEquip1 developed a low-cost business model to pre-empt Chinese competitors from upgrading from the low-end to the middle and ultimately to the high-end markets in the laboratory scale business. With minor assistance from the European premium R&D center, an R&D department in China developed a low cost scale by using cost efficient technology to achieve good-enough gauging accuracy. While development and production of the premium business model is based in developed markets, the low-cost business model produces and sources locally in China. Sales and marketing of the low-cost business model is carried out by the existing premium sales force.

### *MachineFirm2*

MachineFirm2 is a European company that produces premium electronic discharging machines, which are used in the tool and mould making industry. To better serve the middle market in China, the company developed a low-cost business model for the reduced requirements (e.g. easier handling, smaller size, and less accuracy) of local customers in China. R&D for the low-cost model is separated from premium R&D and located in a dedicated low-cost R&D unit in China. Production is also in China, however to some extent integrated in production activities of the premium business model. Sales and marketing is done with MachineFirm2's premium business model sales staff.

### *Medtech1*

Medtech1 is based in Europe and one of the globally leading companies for medical equipment. Apart from their premium business model, the firm built a low-cost business model on computer tomography to target smaller clinics in remote cities. For the low-cost business model, Medtech1 built a separated R&D unit in China focusing on low-cost products. Manufacturing for the low-cost business is also separated and located in China. However, some core components are still manufactured in Europe's premium manufacturing plants and then shipped to China. The low-cost business model uses the same sales units as the premium business units.

### *MachineFirm3*

MachineFirm3 is a Switzerland-based twisting machine manufacturer for the textile industry. MachineFirm3 realized that it is missing out on the fast growing middle market against local, Chinese competitors. To better serve small customers in remote cities, MachineFirm3 started a low-cost business model specifically for Chinese middle market customers. A new local R&D team developed (together with Western colleagues) a low-cost machine whose production was separated from the premium model and transferred to China. The low-cost business model also entailed a new sales force that was less technically trained and thus cheaper while being paid with a strong variable regime (i.e. depending on how many machines they sold instead of a fixed salary, which is in place with the premium business model).

### *Medtech2*

Medtech2, a U.S. firm and global leader in the medical equipment industry, employs a low-cost business model for patient monitoring systems specifically for emerging markets. While R&D for the premium business model is located in developed markets, Medtech2 established a separated unit in China that develops low-cost machines for small hospitals in smaller cities. Low-cost production is transferred to China (where machines for the premium business model are now also produced). A new low-cost sales team was set up to serve this new segment of customers.

### *LabEquip2*

LabEquip2 is a provider of premium equipment for molecular diagnostics, applied testing, academic and pharmaceutical research. Their premium business model targets big hospitals and laboratories as their core customers. To better serve patients in rural areas, they developed a low-cost business model based on a battery-based, portable device, which is marketed in emerging markets (mostly in China). The low-

cost business model is very separated from the premium business model, which maintains development and most of production in developed markets. For the low-cost business model, product development takes place in a small team of engineers dedicated to the low-cost business model, which also cooperates strongly with external partners experienced in low-cost design. Production and sourcing is located in South East Asia. In the low-cost business model, LabEquip2 relies on country governments and NGOs, which deliver the product to rural communities and operate it in the field.

#### *MachineFirm4*

Machinefirm4 is a European firm specialized in plants, equipment and related services for processing food and manufacturing advanced materials. Traditionally, MachineFirm4 sells customized premium mills to industrial customers, which process agricultural products. To serve local, small farmers in Africa, MachineFirm4 developed a low-cost business model based on a standard, mobile, compact mill that can be operated by small producers or even communities. The low-cost business model is very separate from the premium business model, which operates with development and production in developed markets. A team of engineers in South Africa carries out the development for the low-cost business model, while production takes place in China from where the mill is pre-assembled and shipped to Africa. For the low-cost business model, MachineFirm4 has set up a separate sales organization, which apart from selling the mills themselves collaborates strongly with NGOs, which also use the machine in their programs.

#### *Medtech3*

Medtech3 is a U.S. based firm active in the premium segment of medical equipment. To better serve rural customers in China, Medtech3 developed a portable ultrasound machine, which is very low cost, easy to operate and which can be carried by local doctors to visit patients in their villages instead of bringing patients to hospitals. For the low-cost business model, Medtech3 set up a separate R&D unit in China that is dedicated to low-cost product development. Production and sourcing are also separated from the premium business model and located in China. An additional sales team for the new business model was installed to reach rural doctors and small clinics.



Case	Product description and target customer	Development approach	Production and sourcing approach	Sales and marketing approach
IndEquip1	Low-cost frequency converter for middle-market manufacturers in China.	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Development within premium R&amp;D unit in Europe and China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production at an external local manufacturer</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
IndEquip2	Low-cost SIR for middle-market customers in China.	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Within premium R&amp;D unit in Europe</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
MachineFirm1	Low-cost rotary hammer for basic applications, limited features, increased robustness, durability and ease of use for construction site operators in emerging markets	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Co-development of premium and low-cost R&amp;D unit</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Low-cost sourcing and production in China where some products for the premium BM are also produced</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
LabEquip1	Low-cost, basic weighing scale, with reduced feature set and increased ruggedness for laboratories with limited budgets and gauging accuracy needs	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Dedicated low-cost R&amp;D unit in China with assistance from premium R&amp;D in Europe</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
MachineFirm2	Low-cost, electronic discharging machine for middle-market customers, with adequate accuracy, reduced feature set and high ease of use	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost R&amp;D unit in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Low-cost sourcing and production in China where some products for the premium BM are also produced</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
Medtech1	Low-cost CT scanner, high reliability, fast workflow, and high ease of use for clinics in smaller cities	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost R&amp;D unit in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Low-cost sourcing and production in China with preassembled core components shipped from Europe</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Integrated</i>: Same sales force and channels as premium business model</li> </ul>
MachineFirm3	Small, low-cost, energy efficient twisting machine with reduced but tailored feature set and high ease of use for small textile producers in the middle market	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Dedicated low-cost R&amp;D unit in China with assistance from premium R&amp;D in Europe</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: A separate sales team from the premium business model</li> </ul>
Medtech2	Bedside monitors with simple and limited functions, robust design, high reliability, ease of use for small hospitals and clinics in smaller cities	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost R&amp;D unit in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Mixed</i>: Low-cost sourcing and production in China where some products for the premium BM are also produced</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: A separate sales team from the premium business model</li> </ul>
LabEquip2	Low-cost, portable, rugged virus detection device for rural regions sold to country governments	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Team of engineers dedicated to low-cost R&amp;D and collaboration with external partners</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production in South East Asia.</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: A different channel (NGOs) than with the premium business model</li> </ul>
MachineFirm4	Mobile, compact mill for decentralized processing of agricultural products for small businesses, nascent entrepreneurs, and communities	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Team of engineers dedicated to low-cost R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing, production and pre-assembling in China; shipping to South Africa for final assembly</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: A separate sales team from the premium business model</li> </ul>
Medtech3	Portable, battery-based low-cost, ultrasound machine, for clinics and doctors in small cities and remote rural areas	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost R&amp;D unit in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: Low-cost sourcing and production in China</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Separated</i>: A separate sales team from the premium business model</li> </ul>

Table 13: Integration of low-cost business models in premium business models.



## 5.5 Discussion

The analysis of the eleven low-cost business models revealed various differences regarding their overall degree of separation and more specifically regarding which domains firms separate from the premium business model to explore their low-cost business models. No firm fully integrated its low-cost business model into the premium business model as all separated at least one domain completely or two domains partially from their premium business model (see Table 14 in the appendix). Figure 6 shows how firms integrated their business models overall to reach resource-constrained customers in emerging markets depending on the targeted customer segment.

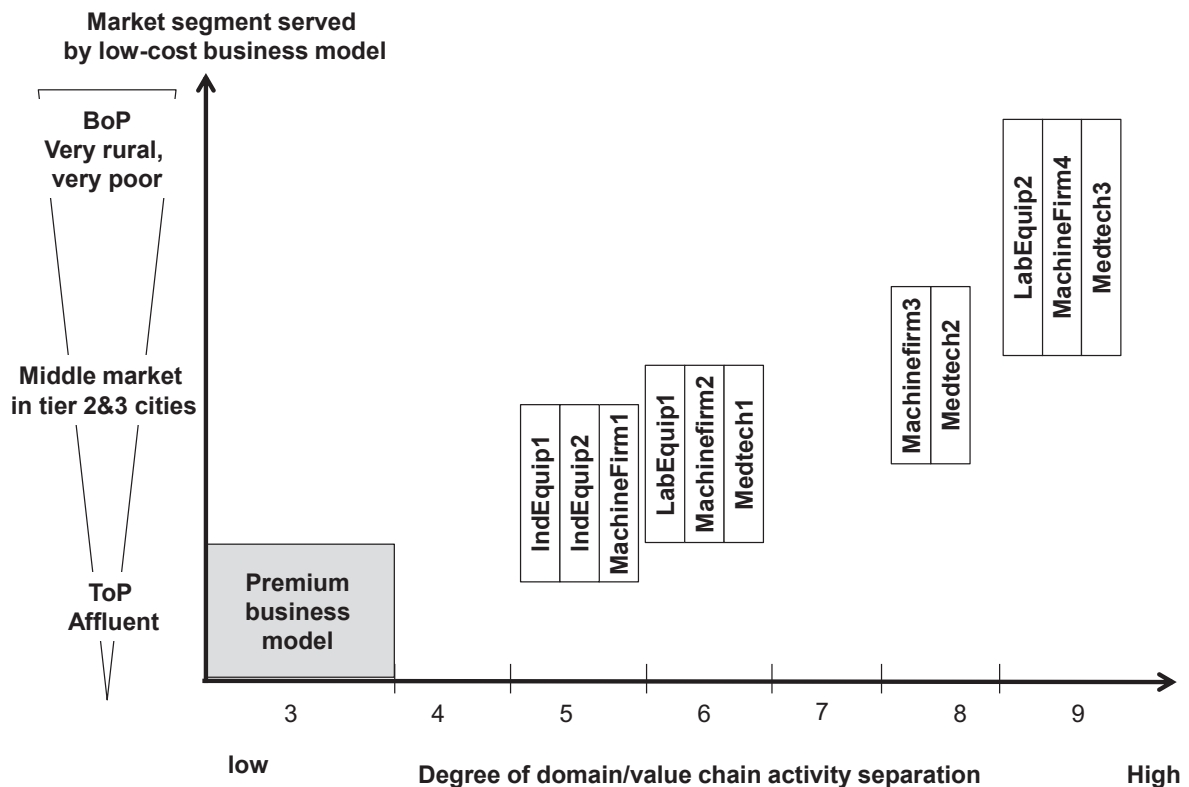


Figure 6: Overall domain separation for low-cost business models.

### 5.5.1 Different degrees of domain separation for different target customer segments

The findings of this study provide evidence that firms with premium business models apply different degrees of separation to achieve an additional low-cost business model. While extant research has adopted a rather dichotomous view mostly promoting market organizational separation at the business unit or corporate level (Markides,

2013), this study provides a more fine-grained and gradual picture. As Figure 7 illustrates, domain separation (Lavie et al., 2011) offers firms with the opportunity to extend the reach of the original premium business model to tap new customer segments.

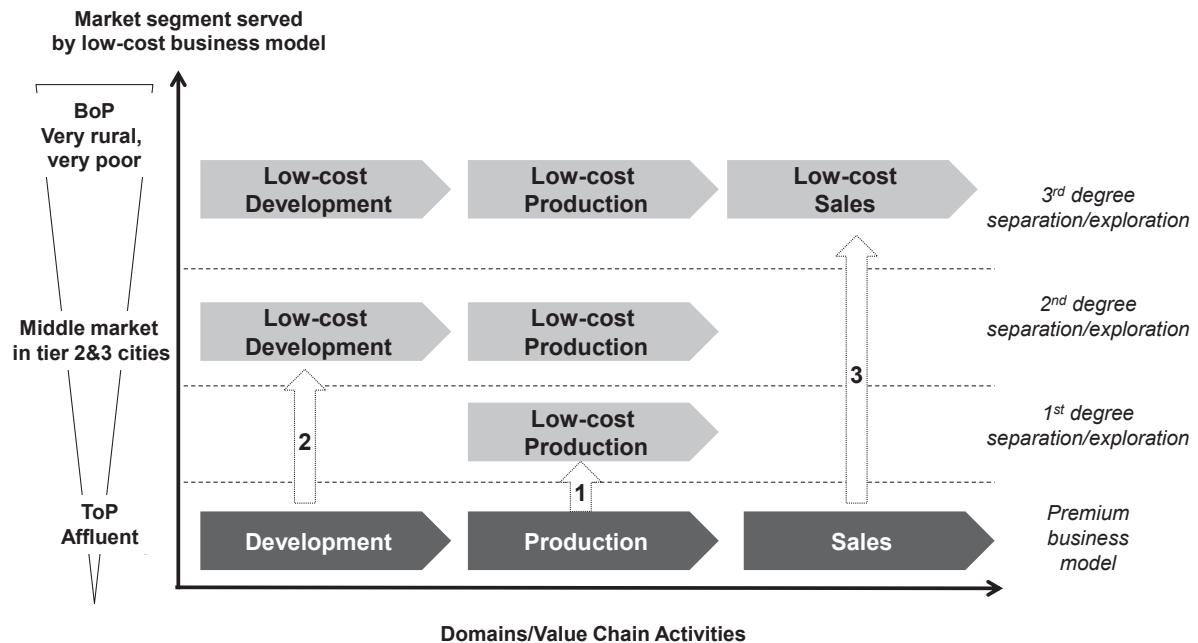


Figure 7: Separation at domain level and sequence of separation.

Concretely, to tap new resource-constrained customer segments in emerging markets, Western firms in a first step separate production from their premium business model by transferring this domain into low-cost environments. This allows them to provide customers with products that are lower in cost compared to the ones produced in premium manufacturing sites in developed markets. *“Using local labor and sourcing in China is our main lever to reduce costs for our low-cost business model,”* said IndEquip1’s VP of R&D. While this move mostly affects the firm’s cost base, customers are rather similar to existing customers of the premium business model. This is why the other domains of development and sales may be integrated in the premium business model.

The second level of separation affects development activities. In addition to exploration in production, in these cases, all or at least the majority of development is executed in dedicated low-cost R&D units mostly in emerging markets to better design products for use in resource-constrained environments. *“For China you have to make the product rugged and bullet proof, because conditions are rough and difficult, [..which is] why Western products fail. That’s a mindset that has been difficult for*

*people in the US and Germany to get their heads around” (VP Emerging Market Patient Care at Medtech2). Extant research has highlighted that local and independent R&D units are best suited to innovate specifically for resource-constrained customers as they have intimate customer and market understanding (Immelt et al., 2009; Schanz et al., 2011; Zeschky et al., 2011). Being situated in a low-cost environment, these units contribute to further reduce overall costs. Exploration in development resulted in products that were more specifically designed for resource-constrained users and enabled firms to extend their reach and tap new customers in the middle market. “[...] focus is the most important thing. Wherever you develop products for emerging markets, that’s all you should be doing. [...] you need a different mindset and every dollar you spend is important. (VP Emerging Market Patient Care at Medtech2).*

The last level of exploration towards resource-constrained customers is concerned with sales channels. All firms in the sample already had sales channels or sales units for their premium business model. Five firms set up new sales channels or additional sales organizations to reach customers in rural or small remote cities where they were out of reach for their premium business model’s sales organization. *“We discovered that we need a separate channel as well. It is very easy to understand. If you think about premium products, your customers tend to be the large hospitals in the large cities. If you think about the low-cost segment, it tends to be smaller hospitals or even clinics in remote cities or rural areas. So you can’t mix them up” (General Manager of Global Technology Healthcare China at Medtech3).* This is in line with earlier research findings particularly in BoP literature, which argue that Western firms often rely on new forms of sales or delivery (often with the help of external partners) to reach rural customers (Dahan, Doh, Oetzel, & Yaziji, 2010; Seelos & Mair, 2007). While coverage is one reason for separation, the other one is cost as firms may adopt different salary regimes for their low-cost and premium sales channels. In the case of MachineFirm3, members of the new sales unit were paid with a reduced and more variable salary system. Concluding from this, we propose:

*P1: The bigger the environmental/institutional differences between customers of premium and low-cost business models, the more domain separation Western firms employ to reach low-cost customers.*

*P2: Firms with premium business models in emerging markets, separate production, then development and ultimately sales from their premium business*

*model along with the increasing degrees of constraints of the target customer in emerging markets*

### **5.5.2 Business models as new unit of analysis for ambidexterity research**

Data shows that firms applied different organizational approaches to implement the different business models. In particular, it becomes evident that the “lines of separation” do not always go along different business units as many of the extant research suggests (Chesbrough & Rosenbloom, 2002; Markides & Charitou, 2004; Markides, 2013) but go along the value chain, *across* organizational units. For example, “first degree” dual business models were all integrated in the same organizational units, only the “production” domain was separated to a low-cost country or supplier. Earlier business model research with the corporate or the business unit as level of analysis would have argued that this is a complete integration. However, data shows clearly that firms explored the domain of production. On the other side of the continuum, “dual business models of third degree separation” have very separated domains. Medtec<sup>3</sup> for example, has established an independent business unit that focuses on the low-cost ultrasound business and has its own activity system. Within our sample, this is the closest case of organizational separation promoted by earlier literature (e.g. Chesbrough & Rosenbloom, 2002; Markides & Charitou, 2004). However, here too the separation is not as strong as extant research suggests. While this unit has an independent value chain, it is still marketed within the same brand as the premium business model. Hence, the question of integration or separation of business models is not primarily a question of separating business units but rather a question of domain separation.

This line of argument fits well with the activity system perspective of business models that particularly highlights its ability to cross organizational boundaries (Zott & Amit, 2007, 2010). While many business model authors may have had external partners in mind in this context e.g. through open innovation or alliances (e.g. Frankenberger, Weiblen, & Gassmann, 2014), this also applies to organizational boundaries within the firm. Ambidexterity literature argues that firms may achieve ambidexterity by exploring and exploiting across domains (Lavie et al., 2011). While this stream of research also focused on internal (exploitation) vs. external (exploration) activities, it has explicitly called for more research investigating domain separation in intrafirm constellations (Lavie et al., 2011). The business model has not been a unit of analysis in ambidexterity research (Raisch & Birkinshaw, 2008), but this empirical study provides first evidence that the business model may serve as a construct for firms to better

achieve ambidexterity by separating domains. For ambidexterity research, the business model (defined as activity system) offers the advantage that it can be gradually separated along domains thereby allowing better integration compared to a strict dichotomous business unit view.

## **5.6 Conclusion, limitations, and future research**

Based on case evidence of eleven Western firms in emerging markets, this research sheds light on how firms can manage dual business models in emerging markets. *First*, we provide insights on how firms can implement premium and low-cost business models at the level of value chain activities. *Second*, we argue that firms can separate their value chains to diverse degrees to reach different resource-constrained customer segments. *Third*, we are among the first to apply an ambidexterity perspective to business models, and particularly show that domain separation (Lavie et al., 2011) is a vehicle to bridge the business model and ambidexterity literatures. *Fourth* and consequently, this research is among the first to apply the business model as a unit of analysis for ambidexterity thereby enhancing the reach of the ambidexterity concept.

Apart from typical limitations that apply to any qualitative research and hence present areas for future research, we explicitly highlight three areas of future research stemming from our efforts to bridge business models in emerging markets with the ambidexterity perspective. *First*, this study focused on the organizational separation of business models at the domain level. Ambidexterity literature has however offered other modes to overcome dualities in the form of contextual ambidexterity and temporal separation. While this study offered some hints that contextual ambidexterity may also be achieved at the domain level (i.e. through the integration of sales or development for low-cost business models), future research should further investigate which context needs to be provided to facilitate contextual ambidexterity in domains. *Second*, this study investigated global firms active in emerging markets that adopted different forms of dual business models. Through this setting, it becomes evident that the international context is important. This however, also raises the question, whether domain separation differs between emerging and developed markets. While the *sequence* of separation to address new customers in emerging markets is production, development and then sales, documented cases of dual business models of manufacturing firms in developed markets have suggested a different approach. Consider again the case of Xiameter and Dow Corning (Ryans, 2009): Here the firm separated the business models with regard to sales and marketing, however

maintained strong integration in production and development (Ryans, 2009). The same applies for Hilti's famous fleet management (Johnson et al., 2008). Thus, research on how the institutional environment influences the design of dual business models might offer a promising path for future research. *Third and last*, this study highlights that global firms can explore and exploit across domains and business units, which also means across geographical markets. This notion of "global ambidexterity" i.e. resolving tensions through international operations is absent in extant ambidexterity literature (Raisch & Birkinshaw, 2008) but entails interconnections with theories on the MNC that build on the promise of local responsiveness and global efficiency (e.g. Bartlett & Ghoshal, 1989). Hence, enriching ambidexterity literature with an international perspective by adopting the business model as unit of analysis has the potential to open an entirely new stream of research.

Firms may become ambidextrous by implementing dual business models through the means of domain separation. This can help them to address new customers while leveraging existing knowledge. The line of separation between dual business models goes along the value chain and may go across internal and external organizational boundaries. We invite future research to broaden the scope of our study and further advance the understanding of dual business models in emerging markets.

## 5.7 Appendix 1: Separation/integration of domains

Cases	Development	Production	Sales	Total*
IndEquip1	1	3	1	5
IndEquip2	1	3	1	5
MachineFirm1	2	2	1	5
LabEquip1	2	3	1	6
MachineFirm2	3	2	1	6
Medtech1	3	2	1	6
MachineFirm3	2	3	3	8
Medtech2	3	2	3	8
LabEquip2	3	3	3	9
MachineFirm4	3	3	3	9
Medtech3	3	3	3	9

Table 14: Separation/integration of domains.

Explanation: 1= Fully integrated in premium business model; 2= Mixed/partly integrated in premium business model; 3= Separated from premium business model.  
 \*Degree of overall business model integration: 3=full integration; 9=full separation; 4-8= partial integration.

## 5.8 Appendix 2: Overview of empirical data for case studies

Firm	Primary data	Interview partners
IndEquip1	2 Interviews	VP Global R&D Development Director
IndEquip2	1 Interview	Director Product Management
LabEquip1	2 Interviews	Head of R&D Senior Market Manager
LabEquip2	3 Interviews	Head Global Lifecycle Management Instruments Project Leader
MachineFirm1	2 Interviews	Project Manager Technical Project Manager
MachineFirm2	1 Interview	Head of R&D (former Managing Director Chinese Subsidiary)
MachineFirm3	---	Secondary data: Ryans (2005, 2006, 2009) R&D Process Manager Product Manager
MachineFirm4	5 Interviews	Project Engineer, Product Manager Head of Corporate Technology Head of Corporate Technology India
Medtech1	3 Interviews	Head Corporate Technology, General Manager CT China R&D Project Leader CT China, Head of Systems Engineering VP CT, Head of Global R&D
Medtech2	3 Interviews	Head of Research & CTO China GM Specialty & and Emerging Markets Patient Care
Medtech3	5 Interviews	Director Global Research Europe General Manager China Technology Center General Manager of Global Technology Healthcare China

Table 15: Overview of empirical data.



## **6 Conclusion**

### **6.1 Overall summary**

This thesis investigates how firms can manage resource-constrained innovation in and for emerging markets to better address resource-constrained customers. Drawing on the innovation, international business and business model literatures and building on rich original data, this thesis provides empirical evidence of the phenomenon of resource-constrained innovation as well as grounds for future research to move forward in a systematic manner. Overall, research on resource-constrained innovation still is at an early stage. Thus, this research of exploratory character contributes to a better and broader understanding of the emerging phenomenon. Moreover, the thesis investigates specific aspects, namely the organization for resource-constrained innovation in Western MNCs, the particular design of frugal business models, and the management of dual business models in emerging markets, in depth. Particularly, new theoretical perspectives are introduced into the scholarly debate. In terms of content, this thesis studies the following aspects: Article A conceptualizes resource-constrained innovation, and provides definitions of three distinct types of resource-constrained innovations (cost, good-enough, frugal innovation) and defines reverse innovation as market innovation. Article B investigates how Western firms organize for resource-constrained innovation and specifies how good-enough and frugal innovation differ with regards to their antecedents and outcomes. Article C studies the business model design for frugal innovations. Finally, article D shows how firms can manage dual business models, i.e. a premium and a low-cost business model, in one market simultaneously. Based on a qualitative research approach in all four independent articles, this research further provides insights useful for management practice to better serve these new customer segments.

### **6.2 Implications for literature and future research opportunities**

#### **6.2.1 General management theories**

This field of research is still very young and offers many intriguing future research opportunities towards a better theoretical understanding. As a first step towards this goal, this thesis, namely article D, connects the ambidexterity literature with resource-constrained innovation and business model literatures. As shown by article D, ambidexterity is an ideal theoretical perspective to analyze dual business models

offering rich opportunities for future research. While this thesis' contribution is to introduce ambidexterity for dual business models in an exploratory fashion, future research should investigate specific questions arising from this integration. Building on the findings that firms can become ambidextrous in their business models, future research needs to investigate circumstances when firms should do so and to what extent they can increase their performance through ambidexterity in business models. Moreover, this study is the first to introduce the notion of "global ambidexterity" in business models. Ambidexterity research has so far not adopted an international perspective (Raisch & Birkinshaw, 2008), thus this view may open up an entirely new stream of literature that investigates how firms may become ambidextrous through global operations.

Apart from ambidexterity, this thesis touches upon other theories potentially relevant for research on resource-constrained innovation in emerging markets. In article B, it is suggested that firms may adopt different organizational approaches to develop resource-constrained innovation contingent on their capability to absorb relevant market knowledge locally and transfer it within the firm's network. Hence, the adoption of absorptive capacity theory (Cohen & Levinthal, 1990; Zahra & George, 2002) offers an interesting path for future research. Such studies would deepen the integration of absorptive capacity theory with theories of the multinational firm (Bartlett & Ghoshal, 1989). Future research specifically concerned with reverse innovation may focus on the international product lifecycle theory (Vernon, 1966) and lead market theory (Beise & Cleff, 2004; Beise, 2004) to explain how the context of emerging markets influences internationalization activities.

### **6.2.2 Literature on innovation in and for emerging markets**

One major contribution to this stream of literature is the typology developed in article A of this thesis, as it is amongst the first attempts to provide a better and more holistic understanding of the phenomenon of resource-constrained innovation. This sharpens the view for researchers, helps to establish a common language, and may serve as an analytical framework for research to progress in a more systematic manner. Future research should state clearly, which kind of resource-constrained innovation is under study and thereby produce more specific findings.

Further, article B and C of the present thesis provide first insights regarding the question of how disruptive resource-constrained innovations are and more specifically, which kind of disruption (cp. Christensen & Raynor, 2003) they cause. Future research

may follow this road and test the propositions empirically. For reverse innovation, which occurs less frequently than resource-constrained innovation, case study based research offers great potential. For example, very little is known about how industry structure and the institutional environment in developed markets shape the disruption caused by reverse innovations.

### **6.2.3 Literature on business models**

The present study provides in-depth insights regarding two aspects of business models. First, article C studies the business model design for the particular instance of frugal innovation in detail. It is the first multiple case study to focus solely on frugal innovations. Since frugal innovation is an extreme case of resource-constrained innovation, as shown by article A, many insights generated may be potentially valid for other types of resource-constrained innovation. Quantitative studies on frugal innovation might be difficult to conduct for reasons of data availability. However, case study based research in different settings (e.g. in Africa, or Latin America) and in other industries than the medical and laboratory equipment industry are promising options for future research to develop insights complementary to this study.

Second, dual business models (Markides & Charitou, 2004; Markides, 2013) are investigated in the context of emerging markets in article D. This article is the first to investigate dual business models empirically on the level of value chain activities and with an explicit ambidexterity perspective. This research focuses on a very specific question, i.e. how to manage premium and low-cost business models in emerging markets. However, the specific perspective presented, may pave the way for research to start investigating the big overarching question of how firms manage “business model portfolios”. Building on the premises of the multinational firm (Bartlett & Ghoshal, 1989; Rugman, Verbeke, & Yuan, 2011), these firms employ business models on a global scale (efficiency), which they adapt to local requirements (responsiveness). Hence, global firms use business model portfolios to address different customer needs in different locations. The business model perspective may offer an interesting new lense for literature on the multinational firm to address issues of local responsiveness and global efficiency.

### **6.2.4 Literature on international business and emerging markets**

Following earlier studies on the internationalization of R&D (Kuemmerle, 1997; von Zedtwitz & Gassmann, 2002), this thesis provides evidence that firms increase their efforts to develop innovations suitable for local requirements. This field of study has a

large literature base stemming from extant research in the context of the triad nations. However, as article B shows, particularities associated with the institutional and firm environment in emerging markets challenge some established assumptions in global strategy research. This is particularly the case regarding the management of emerging market subsidiaries in the multinational firm, specifically with regard to subsidiary autonomy and innovativeness (Asakawa, 2001; Mudambi et al., 2007). Hence, more in-depth studies of reverse innovations in the form of subsidiary initiatives from emerging market subsidiaries in Western firms will be helpful to understand how the shift towards emerging markets (Mudambi, 2011) affects Western multinational firms.

Further, article B raises the question of how strongly firms need to internationalize their R&D to develop local solutions. As previously elaborated, future research on absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002) in the global context may offer a theoretical perspective to tackle this issue.

At last, it is mentioned in the section above that business models are increasingly a global phenomenon as firms employ global value chains for local customers. Thus, the integration of business model and international business literature, as proposed by this thesis and others (e.g. Luo, Buckley, & Yeung, 2013) offers great possibilities for research to move forward.

### **6.2.5 Implications for management practice**

Besides the theoretical implications, this thesis also has several implications for management practice. The broadest practical implication is provided by article A, which holds a conceptualization of resource-constrained innovation. This typology provides management practice with a framework to better understand the phenomenon, establish a common language and derive strategies for future innovation efforts in this field.

The other three papers hold practical implications in more focused areas. Article B deepens the understanding regarding how firms can organize for good-enough and frugal innovation, as well as how to transfer such innovations to developed markets. Article C highlights the role of a “frugal mindset” in order to achieve frugal business models; it offers practical innovation strategies for frugal innovation. Lastly, article D shows how firms may separate specific value chain activities from their existing business models to address new customer segments.

Research on resource-constrained innovation is very much driven by real world phenomena and today’s business practice. Hence, unanswered questions relevant for

management practice are likely to steer directions of future research. Among the many practical questions still to be answered, building on the results of this thesis, the following ones are particularly worthwhile studying: In which industries are resource-constrained innovations most effective? Are there product categories for which frugal innovation is not possible? Should firms adapt their innovation processes for resource-constrained innovations, and, if yes, how? Are there innovation methods that are particularly suited to sense frugal customer requirements? Research and consultancy work is encouraged to tackle these highly relevant practical questions.



## 7 References

- Abraham, S. (2013). Will business model innovation replace strategic analysis? *Strategy & Leadership*, 41(2), 31–38.
- Afuah, A. (2004). *Business models: A strategic management approach*. Boston, MA: McGraw-Hill.
- Afuah, A., & Tucci, C. L. (2001). *Internet Business Models and Strategies*. Boston, MA: McGraw-Hill International Editions.
- Agarwal, N., & Brem, A. (2012). Frugal and Reverse Innovation - Literature Overview and Case Study Insights from a German MNC in India and China. In B. Katzy, T. Holzmann, & K. D. Thoben (Eds.), *Proceedings of the 2012 18th International Conference on Engineering, Technology and Innovation* (pp. 1–22).
- Ahlstrom, D. (2010). Innovation and Growth: How Business Contributes to Society. *Academy of Management Perspectives*, 24, 11–24.
- Alcácer, J., & Chung, W. (2011a). Benefiting from location: Knowledge retrieval. *Global Strategy Journal*, 1, 233–236.
- Alcácer, J., & Chung, W. (2011b). Benefiting from location: Knowledge seeking. *Global Strategy Journal*, 1, 132–134.
- Al-Debei, M. M., & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, 19(3), 359–376.
- Alexy, O., & George, G. (2011). Category Creation in Open Business Models and Its Implications for Firm Value. *SSRN Electronic Journal*.
- Ambos, B., Asakawa, K., & Ambos, T. C. (2011). A dynamic perspective on subsidiary autonomy. *Global Strategy Journal*, 1, 301–316.
- Amit, R., & Zott, C. (2001). Value creation in E-business. *Strategic Management Journal*, 22(6-7), 493–520.
- Anderson, J., & Markides, C. (2007). Strategic Innovation at the Base of the Pyramid. *MIT Sloan Management Review*, 49(1), 82–88.
- Anderson, J., Markides, C., & Kupp, M. (2010). The Last Frontier: Market Creation in Conflict Zones, Deep Rural Areas and Urban Slums. *California Management Review*, 52(4), 6–28.
- Andersson, U., Forsgren, M., & Holm, U. (2001). Subsidiary embeddedness and competence development in MNCs a multi-level analysis. *Organization Studies*, 22(6), 1013–1034.
- Ansoff, H. I. (1965). *Corporate strategy. Corporate Strategy*. New York: McGraw-Hill.



- Arnold, D. J., & Quelch, J. A. (1998). New Strategies in Emerging Markets. *MIT Sloan Management Review*, 40(1), 7–20.
- Asakawa, K. (2001). Organizational tension in international R&D management: The case of Japanese firms. *Research Policy*, 30, 735–757.
- Athreye, S., Tuncay-Celikel, A., & Ujjual, V. (2014). Internationalisation of R&D into Emerging Markets: Fiat's R&D in Brazil, Turkey and India. *Long Range Planning*, 47(1-2), 100–114.
- Awate, S., Larsen, M. M., & Mudambi, R. (2012). EMNE catch-up strategies in the wind turbine industry: Is there a trade-off between output and innovation capabilities? *Global Strategy Journal*, 2, 205–223.
- Baden-Fuller, C., & Mangematin, V. (2013). Business models: A challenging agenda. *Strategic Organization*, 11(4), 418–427.
- Baden-Fuller, C., & Morgan, M. S. (2010). Business Models as Models. *Long Range Planning*, 43, 156–171.
- Bailyn, L. (1985). Autonomy in the Industrial R&D Lab. *Human Resource Management*, 24, 129–146.
- Barboza, D. (2011). Bridge Comes to San Francisco With a Made-in-China Label. *The New York Times*. Retrieved April 8, 2014, from [http://www.nytimes.com/2011/06/26/business/global/26bridge.html?\\_r=2&pagewanted=2&](http://www.nytimes.com/2011/06/26/business/global/26bridge.html?_r=2&pagewanted=2&)
- Bartlett, C. A., & Ghoshal, S. (1989). *Managing across borders: The transnational solution* (1st ed.). Boston: Harvard Business School Press.
- Beise, M. (2004). Lead markets: country-specific drivers of the global diffusion of innovations. *Research Policy*, 33(6-7), 997–1018.
- Beise, M., & Cleff, T. (2004). Assessing the lead market potential of countries for innovation projects. *Journal of International Management*, 10(4), 453–477.
- Bhatti, Y., & Ventresca, M. (2013). How Can “Frugal Innovation” Be Conceptualized? *Said Business School Working Paper Series*.
- Birkinshaw, J. (1997). Entrepreneurship in Multinational Corporations: The Characteristics of Subsidiary Initiatives. *Strategic Management Journal*, 18(3), 207–229.
- Birkinshaw, J. (1999). The determinants and consequences of subsidiary initiative in multinational corporations. *Entrepreneurship Theory and Practice*, 24(1), 11–38.
- Birkinshaw, J., & Fry, N. (1998). Subsidiary Initiatives to Develop New Markets. *MIT Sloan Management Review*, 39 (3), 51-61.

- Birkinshaw, J., Hood, N., & Jonsson, S. (1998). Building firm-specific advantages in multinational corporations: The role of subsidiary initiative. *Strategic Management Journal*, 19, 221–241.
- Birkinshaw, J., & Morrison, A. (1995). Configurations of strategy and structure in subsidiaries of multinational corporations. *Journal of International Business Studies*, 26(4), 729–753.
- Björkdahl, J. (2009). Technology cross-fertilization and the business model: The case of integrating ICTs in mechanical engineering products. *Research Policy*, 38(9), 1468–1477.
- Bouquet, C., & Birkinshaw, J. (2008). Weight Versus Voice: How Foreign Subsidiaries Gain Attention From Corporate Headquarters. *Academy of Management Journal*, 51(3), 577–601.
- Brem, A., & Wolfram, P. (2014). Research and Development from the bottom up - Introduction of Terminologies for New Product Development in Emerging Markets. *Journal of Innovation and Entrepreneurship*, 3, 1–22.
- Brouthers, L. E., Donnell, E. O., & Hadjimarcou, J. (2005). Generic Product Strategies for Emerging Market Exports into Triad Nation Markets : A Mimetic Isomorphism Approach. *Journal of Management Studies*, 42(1), 225–245.
- Brown, J. S., & Hagel, J. (2005). Innovation blowback : Disruptive management practices from Asia. *McKinsey Quarterly*, (1), 34–45.
- Bruton, G. D., Ketchen, D. J., & Ireland, R. D. (2013). Entrepreneurship as a solution to poverty. *Journal of Business Venturing*, 28(6), 683–689.
- Bruton, G. D., Khavul, S., & Chavez, H. (2011). Microlending in emerging economies: Building a new line of inquiry from the ground up. *Journal of International Business Studies*, 42(5), 718–739.
- Buckley, P. J., & Hashai, N. (2014). The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. *Research Policy*, 43(2), 423–437.
- Calia, R., Guerrini, F., & Moura, G. (2007). Innovation networks: From technological development to business model reconfiguration. *Technovation*, 27(8), 426–432.
- Cao, S., Wang, X., & Wang, G. (2009). Lessons learned from China's fall into the poverty trap. *Journal of Policy Modeling*, 31(2), 298–307.
- Cappelli, P., Singh, H., Singh, J., & Useem, M. (2010). The India way: lessons for the US. *The Academy of Management Perspectives*, 24(2), 6–24.

- Casadesus-Masanell, R., & Ricart, J. E. (2010a). Competitiveness : business model reconfiguration for innovation and internationalization. *Management Research: The Journal of the Iberoamerican Academy of Management*, 8(2), 123–149.
- Casadesus-Masanell, R., & Ricart, J. E. (2010b). From Strategy to Business Models and onto Tactics. *Long Range Planning*, 43(2-3), 195–215.
- Casadesus-Masanell, R., & Ricart, J. E. (2011). How to Design A Winning Business Model. *Harvard Business Review*, 89(2), 100–107.
- Casadesus-Masanell, R., & Tarziján, J. (2012). When One Business Model Isn't Enough. *Harvard Business Review*, 90(1/2), 132–137.
- Casadesus-Masanell, R., & Zhu, F. (2013). Business Model Innovation and Competitive Imitation: the case of sponsor- based business models. *Strategic Management Journal*, 34(4), 464–482.
- Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, 35(6), 12–17.
- Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, 11(3), 529–555.
- Christensen, C. M., & Raynor, M. (2003). *The innovator's solution*. Boston, MA: Harvard Business School Press.
- Christensen, L. J., Siemsen, E., & Balasubramanian, S. (2015). Consumer behavior change at the base of the pyramid: Bridging the gap between for-profit and social responsibility strategies. *Strategic Management Journal*, 36(2), 307–317.
- Cohen, W., & Levinthal, D. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Coombes, P. H., & Nicholson, J. D. (2013). Business models and their relationship with marketing: A systematic literature review. *Industrial Marketing Management*, 42(5), 656–664.
- Corsi, S., & Di Minin, A. (2014). Disruptive Innovation ... in Reverse: Adding a Geographical Dimension to Disruptive Innovation Theory. *Creativity and Innovation Management*, 23(1), 76–90.
- Corsi, S., Di Minin, A., & Piccaluga, A. (2014). Reverse Innovation at Speres. *Research-Technology Management*, 57(4), 28–34.
- Cuervo-Cazurra, A. (2012). Extending theory by analyzing developing country multinational companies: Solving the Goldilocks debate. *Global Strategy Journal*, 2(3), 153–167.

- Cui, G., & Liu, Q. (2001). Emerging market segments in a transitional economy: a study of urban consumers in China. *Journal of International Marketing*, 9(1), 84–106.
- Cunha, M. P. E., Rego, A., Oliveira, P., Rosado, P., & Habib, N. (2014). Product Innovation in Resource-Poor Environments: Three Research Streams. *Journal of Product Innovation Management*, 31(2), 202–210.
- Dahan, N. M., Doh, J. P., Oetzel, J., & Yaziji, M. (2010). Corporate-NGO Collaboration: Co-creating New Business Models for Developing Markets. *Long Range Planning*, 43(2-3), 326–342.
- DaSilva, C. M., & Trkman, P. (2014). Business Model: What It Is and What It Is Not. *Long Range Planning*, 47(6), 379–389.
- Dawar, N., & Chattopadhyay, A. (2002). Rethinking Marketing Programs for Emerging Markets. *Long Range Planning*, 35(5), 457–474.
- Dellestrand, H., & Kappen, P. (2011). Headquarters Allocation of Resources to Innovation Transfer Projects within the Multinational Enterprise. *Journal of International Management*, 17(4), 263–277.
- Desyllas, P., & Sako, M. (2013). Profiting from business model innovation: Evidence from Pay-As-You-Drive auto insurance. *Research Policy*, 42(1), 101–116.
- Dobbs, R., Remes, J., Manyika, J., Roxburgh, C., Smit, S., & Schaer, F. (2012). Urban world. Cities and the rise of the consuming class. *McKinsey & Company Research Report*. McKinsey Global Institute.
- Doganova, L., & Eyquem-Renault, M. (2009). What do business models do? Innovation devices in technology entrepreneurship. *Research Policy*, 38(10), 1559–1570.
- Dörrenbächer, C., & Geppert, M. (2009). A micro-political perspective on subsidiary initiative-taking: Evidence from German-owned subsidiaries in France. *European Management Journal*, 27(2), 100–112.
- Drummond, A. (2012). Research on emerging economies: Challenges are always opportunities. *Global Strategy Journal*, 2, 48–50.
- Dunning, J. H. (1993). *Multinational enterprises and the global economy*. Wokingham: Addison-Wesley.
- Dunning, J. H., & Lundan, S. (2009). The Internationalization of Corporate R&D: A Review of the Evidence and Some Policy Implications for Home Countries. *Review of Policy Research*, 26(1-2), 13–34.
- Economist. (2010). A world turned upside down: A special report on innovation in emerging markets. *The Economist*. Retrieved from [http://www.economist.com/node/15879369?story\\_id=15879369](http://www.economist.com/node/15879369?story_id=15879369)

- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review*, 14(4), 532–550.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory Building From Cases: Opportunities and Challenges. *Academy of Management Journal*, 50(1), 25–32.
- Ernst, H., Kahle, H. N., Dubiel, A., Prabhu, J., & Subramaniam, M. (2015). The Antecedents and Consequences of Affordable Value Innovations for Emerging Markets. *Journal of Product Innovation Management*, 32(1), 65–79.
- Eyring, M., Johnson, M., & Nair, H. (2011). New business models in emerging markets. *Harvard Business Review*, 89(1), 88–98.
- Foss, N. J., & Pedersen, T. (2004). Organizing knowledge processes in the multinational corporation: an introduction. *Journal of International Business Studies*, 35(5), 340–349.
- Foster, C., & Heeks, R. (2013). Innovation and scaling of ICT for the bottom-of-the-pyramid. *Journal of Information Technology*, 28(4), 296–315.
- Frankenberger, K., Weiblen, T., & Gassmann, O. (2013). Network configuration, customer centricity, and performance of open business models: A solution provider perspective. *Industrial Marketing Management*, 42(5), 671–682.
- Frankenberger, K., Weiblen, T., & Gassmann, O. (2014). The antecedents of open business models: an exploratory study of incumbent firms. *R&D Management*, 44(2), 173–188.
- Frost, T. S., Birkinshaw, J., & Ensign, P. C. (2002). Centers of excellence in multinational corporations. *Strategic Management Journal*, 23(11), 997–1018.
- Gadiesh, O., Leung, P., & Vestring, T. (2007). The battle for China's good-enough market. *Harvard Business Review*, 85(9), 80–89.
- Gambardella, A., & McGahan, A. M. (2010). Business-Model Innovation: General Purpose Technologies and their Implications for Industry Structure. *Long Range Planning*, 43(2-3), 262–271.
- Gassmann, O., & Han, Z. (2004). Motivations and barriers of foreign R&D activities in China. *R&D Management*, 34(4), 423–437.
- Gassmann, O., & Keupp, M. M. (2008). The internationalisation of Western firms' R & D in China. *International Journal of Entrepreneurship and Small Business*, 6(4), 536–561.
- Gassmann, O., & Winterhalter, S. (2013). Chinas Innovationen : Angriff ist die beste Verteidigung. *Die Volkswirtschaft*, 86(10), 28–30.



- Gassmann, O., Winterhalter, S., & Wecht, C. H. (2013). Frugale Produkte: Oder Lernen von China? *IM+io - Das Magazin Für Innovation, Organisation Und Management*, 28(4), 62–69.
- Gassmann, O., Winterhalter, S., & Wecht, C. H. (2014). Frugal Innovation – die aufstrebende Mittelklasse gewinnen. *HSG Focus*, 16–18.
- Gaur, A. S., Kumar, V., & Singh, D. (2014). Institutions, resources, and internationalization of emerging economy firms. *Journal of World Business*, 49(1), 12–20.
- Ge, G. L., & Ding, D. Z. (2007). A strategic analysis of surging Chinese manufacturers: The case of Galanz. *Asia Pacific Journal of Management*, 25(4), 667–683.
- Gebauer, H., Fischer, T., & Fleisch, E. (2009). Entering the Chinese mid-market segment: key to long-term success? *Strategy & Leadership*, 37(5), 31–39.
- George, G., & Bock, A. J. (2011). The Business Model in Practice and its Implications for Entrepreneurship Research. *Entrepreneurship Theory and Practice*, 35(1), 83–111.
- George, G., McGahan, A. M., & Prabhu, J. (2012). Innovation for Inclusive Growth: Towards a Theoretical Framework and a Research Agenda. *Journal of Management Studies*, 49(4), 661–683.
- Ghosh, B. (2004). Hindustan Lever relaunches “Rin Shakti.” *The Hindubusinessline*. Retrieved January 31, 2014, from <http://www.thehindubusinessline.in/2004/01/04/stories/2004010401430200.htm>
- Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, 29, 1465–1474.
- Gibson, C., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *The Academy of Management Journal*, 47(2), 209–226.
- Gold, S., Hahn, R., & Seuring, S. (2013). Sustainable supply chain management in “Base of the Pyramid” food projects—A path to triple bottom line approaches for multinationals? *International Business Review*, 22(5), 784–799.
- Govindarajan, V. (2012). A reverse-innovation playbook. *Harvard Business Review*, 90(4), 120–124.
- Govindarajan, V., & Kopalle, P. K. (2006). The Usefulness of Measuring Disruptiveness of Innovations Ex Post in Making Ex Ante Predictions. *Journal of Product Innovation Management*, 23, 12–18.
- Govindarajan, V., & Ramamurti, R. (2011). Reverse Innovation, Emerging Markets, and Global Strategy. *Global Strategy Journal*, 1, 191–205.

- Govindarajan, V., & Trimble, C. (2012). *Reverse Innovation*. Boston: Harvard Business School Press.
- Graham, F. (2010). M-Pesa : Kenya ' s mobile wallet revolution. *BBC News*. Retrieved April 11, 2013, from <http://www.bbc.co.uk/news/business-11793290>
- Gulati, R. (2010). Management lessons from the edge. *The Academy of Management Perspectives*, 24, 25–28.
- Gupta, A. K., & Govindarajan, V. (2000). Knowledge flows within multinational corporations. *Strategic Management Journal*, 21, 473–496.
- Håkanson, L., & Nobel, R. (2001). Organizational characteristics and reverse technology transfer. *MIR: Management International Review*, 41(4), 395–420.
- Halme, M., Lindeman, S., & Linna, P. (2012). Innovation for Inclusive Business: Intrapreneurial Bricolage in Multinational Corporations. *Journal of Management Studies*, 49(4), 743–784.
- Hang, C. C., Chen, J., & Subramanian, A. M. (2010). Developing disruptive products for emerging economies: lessons from Asian cases. *Research-Technology Management*, 53(4), 21–26.
- Hang, C. C., Garnsey, E., & Ruan, Y. (2015). Opportunities for disruption. *Technovation*, 39-40, 83–93.
- Harsimran, J., & Peerzada, A. (2013, February 8). India spawning top notch medical devices companies with cutting-edge tech at affordable prices. *The Economic Times*. Retrieved September 12, 2013, from [http://articles.economictimes.indiatimes.com/2013-02-08/news/36993332\\_1\\_medical-devices-perfint-healthcare-warmers](http://articles.economictimes.indiatimes.com/2013-02-08/news/36993332_1_medical-devices-perfint-healthcare-warmers)
- Hart, S. S. L., & Christensen, C. M. (2002). The great leap. *MIT Sloan Management Review*, 44(1), 51–56.
- Hedman, J., & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems*, 12(1), 49–59.
- Holm, A. A. B., Günzel, F., & Ulhøi, J. P. J. (2013). Openness in innovation and business models: lessons from the newspaper industry. *International Journal of Technology Management*, 61(3/4), 324–348.
- Hoover, W. J. (2006). Making China your second home market : An interview with the CEO of Danfoss. *McKinsey Quarterly*, (1), 84–93.
- Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. (2000). Strategy in emerging economies. *Academy of Management Journal*, 43(3), 249–267.



- Hoskisson, R. E., Wright, M., Filatotchev, I., & Peng, M. W. (2013). Emerging Multinationals from Mid-Range Economies: The Influence of Institutions and Factor Markets. *Journal of Management Studies*, 50(7), 1295–1321.
- Hu, J., Wan, H., & Zhu, H. (2011). The Business Model of a Shanzhai Mobile Phone Firm in China. *Australian Journal of Business and Management Research*, 1(3), 52–62.
- Hughes, N., & Lonie, S. (2007). M-PESA: Mobile Money for the “Unbanked.” *Innovations*, 2(1/2), 63–81.
- Immelt, J., Govindarajan, V., & Trimble, C. (2009). How GE is disrupting itself. *Harvard Business Review*, 87(10), 56–65.
- Isckia, T., & Lescop, D. (2009). Open Innovation within Business Ecosystems: A Tale from Amazon.com. *Communications & Strategies*, (74), 37–54.
- Jick, T. D. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly*, 24(4), 602–611.
- Johnson, M., Christensen, C. M., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86(12), 50–59.
- Kachaner, N., Lindgardt, Z., & Michael, D. (2011). Innovating low-cost business models. *Strategy & Leadership*, 39(2), 43–48.
- Kahle, H. N., Dubiel, A., Ernst, H., & Prabhu, J. (2013). The democratizing effects of frugal innovation: Implications for inclusive growth and state-building. *Journal of Indian Business Research*, 5(4), 220–234.
- Kaur, M. (2013). Rural Marketing : A Case Study on Hindustan Unilever Limited. *International Journal of Applied Research and Studies*, 2(6), 1–14.
- Kenney, M., Massini, S., & Murtha, T. P. (2009). Offshoring administrative and technical work: New fields for understanding the global enterprise. *Journal of International Business Studies*, 40(6), 887–900.
- Keupp, M. M., Beckenbauer, A., & Gassmann, O. (2008). How managers protect the intellectual property rights in China using de facto strategies. *R&D Management*, 39(2), 211–224.
- Keupp, M. M., Friesike, S., & von Zedtwitz, M. (2012). How do foreign firms patent in emerging economies with weak appropriability regimes? Archetypes and motives. *Research Policy*, 41(8), 1422–1439.
- Keupp, M. M., Palmié, M., & Gassmann, O. (2011). Achieving Subsidiary Integration in International Innovation by Managerial “Tools.” *Management International Review*, 51(2), 213–239.

- Khanagha, S., Volberda, H., & Oshri, I. (2014). Business model renewal and ambidexterity: structural alteration and strategy formation process during transition to a Cloud business model. *R&D Management*, 44(3), 322–340.
- Khanna, T., & Palepu, K. (1997). Why focused strategies may be wrong for emerging markets. *Harvard Business Review*, 75(4), 41–48.
- Khanna, T., & Palepu, K. (2000). The future of business groups in emerging markets: Long-run evidence from Chile. *Academy of Management Journal*, 43(3), 268–285.
- Khanna, T., Palepu, K., & Sinha, J. (2005). Strategies that fit emerging markets. *Harvard Business Review*, 83(6), 63–76.
- Kiani, B., Gholamian, M. R., Hamzehei, A., & Hosseini, S. H. (2009). Using causal loop diagram to achieve a better understanding of e-Business models. *International Journal of Electronic Business Management*, 7(3), 159–167.
- Kogut, B., & Zander, U. (2003). A memoir and reflection: knowledge and an evolutionary theory of the multinational firm 10 years later. *Journal of International Business Studies*, 34, 505–516.
- Kravets, O., & Sandikci, O. (2014). Competently Ordinary: New Middle Class Consumers in the Emerging Markets. *Journal of Marketing*, 78(4), 125–140.
- Kuemmerle, W. (1997). Building effective R&D capabilities abroad. *Harvard Business Review*, 75(2), 61–70.
- Lavie, D., Kang, J., & Rosenkopf, L. (2011). Balance Within and Across Domains: The Performance Implications of Exploration and Exploitation in Alliances. *Organization Science*, 22(6), 1517–1538.
- Lavie, D., & Rosenkopf, L. (2006). Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49(4), 797–818.
- Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and Exploitation Within and Across Organizations. *The Academy of Management Annals*, 4(1), 109–155.
- Lee, J. (1986). Determinants of offshore production in developing countries. *Journal of Development Economics*, 20, 1–13.
- Lewin, A. Y., Massini, S., & Peeters, C. (2009). Why are companies offshoring innovation? The emerging global race for talent. *Journal of International Business Studies*, 40(6), 901–925.
- Lim, C., Han, S., & Ito, H. (2013). Capability building through innovation for unserved lower end mega markets. *Technovation*, 33(12), 391–404.

- Linder, J. C., & Cantrell, S. (2001). Five business-model myths that hold companies back. *Strategy & Leadership*, 29(6), 13–18.
- Locke, K. (2001). *Grounded theory in management research*. London: Sage.
- London, T., Anupindi, R., & Sheth, S. (2010). Creating mutual value: Lessons learned from ventures serving base of the pyramid producers. *Journal of Business Research*, 63(6), 582–594.
- London, T., & Hart, S. S. L. (2004). Reinventing strategies for emerging markets: beyond the transnational model. *Journal of International Business Studies*, 35(5), 350–370.
- Luo, Y., Buckley, P., & Yeung, H. (2013). Call for Papers for a Special Issue: Innovating Business Models for Global Competition. *Global Strategy Journal*.
- Magretta, J. (2002). Why business models matter. *Harvard Business Review*, 80(5), 86–92.
- Mair, J., & Marti, I. (2009). Entrepreneurship in and around institutional voids: A case study from Bangladesh. *Journal of Business Venturing*, 24(5), 419–435.
- Mair, J., & Martí, I. (2006). Social entrepreneurship research: A source of explanation, prediction, and delight. *Journal of World Business*, 41(1), 36–44.
- Mair, J., Martí, I., & Ventresca, M. J. (2012). Building inclusive markets in rural Bangladesh: How intermediaries work institutional voids. *Academy of Management Journal*, 55(4), 819–850.
- Malone, T. W., Weill, P., Lai, R., Urso, V. D., Herman, G., Apel, T. G., ... D'Urso, V. (2006). *Do Some Business Models Perform Better than Others? MIT Sloan Working Paper 4615-06*.
- March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Markides, C. (2006). Disruptive Innovation: In Need of Better Theory. *Journal of Product Innovation Management*, 23, 19–25.
- Markides, C. (2012). How Disruptive Will Innovations from Emerging Markets Be? *MIT Sloan Management Review*, 54(1), 23–25.
- Markides, C. (2013). Business Model Innovation: What can the Ambidexterity Literature Teach Us? *The Academy of Management Perspectives*, 27(4), 313–323.
- Markides, C., & Charitou, C. (2004). Competing with dual business models: A contingency approach. *The Academy of Management Executive*, 18(3), 22–36.

- Markides, C., & Sosa, L. (2013). Pioneering and First Mover Advantages: The Importance of Business Models. *Long Range Planning*, 46(4-5), 325–334.
- Matzler, K., Bailom, F., von den Eichen, S. F., & Kohler, T. (2013). Business Model Innovation: Coffee Triumphs for Nespresso. *Journal of Business Strategy*, 34(2), 30–37.
- Mayring, P. (2007). *Qualitative Inhaltsanalyse* (9th ed.). Weinheim: Beltz.
- McMillan, A. F. (2011). The Rise of China's 2nd and 3rd Tier Cities. *CNBC Special Report*. Retrieved October 9, 2014, from <http://www.cnbc.com/id/41420632#>.
- Meyer, K. E., Mudambi, R., & Narula, R. (2010). Multinational Enterprises and Local Contexts: The Opportunities and Challenges of Multiple-Embeddedness. *Journal of Management Studies*, 48(2), 235–252.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis*. (R. Holland, Ed.) (2nd ed.). Thousand Oaks: Sage.
- Moghaddam, K., Sethi, D., Weber, T., & Wu, J. (2014). The Smirk of Emerging Market Firms: A Modification of the Dunning's Typology of Internationalization Motivations. *Journal of International Management*, 20(3), 359–374.
- Monteiro, F., Arvidsson, N., & Birkinshaw, J. (2008). Knowledge Flows Within Multinational Corporations: Explaining Subsidiary Isolation and Its Performance Implications. *Organization Science*, 19(1), 90–107.
- Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, 58(6), 726–735.
- Mudambi, R. (2011). Hierarchy, coordination, and innovation in the multinational enterprise. *Global Strategy Journal*, 323, 317–323.
- Mudambi, R., Mudambi, S. M., & Navarra, P. (2007). Global Innovation in MNCs: The Effects of Subsidiary Self-Determination and Teamwork. *Journal of Product Innovation Management*, 24(5), 442–455.
- Nobel, R., & Birkinshaw, J. (1998). Innovation in multinational corporations: Control and Communication patterns in international R&D operations. *Strategic Management Journal*, 19, 479–496.
- O'Reilly, C. A., & Tushman, M. L. (2004). The Ambidextrous Organization. *Harvard Business Review*, 82, 74–82.
- O'Reilly, C. A., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, 28, 185–206.
- OECD. (2012). Looking to 2060: Long-term global growth prospects. *OECD Economic Policy Papers*. OECDpublishing.

- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. Hoboken (NJ): Wiley.
- Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying Business Models : Origins , Present , and Future of the Concept. *Communications of the Association for Information Systems*, 16(1), 1–25.
- Palmié, M., Keupp, M. M., & Gassmann, O. (2014). Pull the Right Levers: Creating Internationally “Useful” Subsidiary Competence by Organizational Architecture. *Long Range Planning*, 47(1-2), 32–48.
- Pateli, A. G., & Giaglis, G. M. (2004). A research framework for analysing eBusiness models. *European Journal of Information Systems*, 13(4), 302–314.
- Pateli, A. G., & Giaglis, G. M. (2005). Technology innovation- induced business model change: a contingency approach. *Journal of Organizational Change Management*, 18(2), 167–183.
- Payaud, M. (2014). Marketing Strategies at the Bottom of the Pyramid: Examples From Nestlé, Danone, and Procter & Gamble. *Global Business and Organizational Excellence*, 33(2), 51–63.
- Peng, M., Wang, D., & Jiang, Y. (2008). An institution-based view of international business strategy: a focus on emerging economies. *Journal of International Business Studies*, 39(5), 920–936.
- Perkmann, M., & Spicer, A. (2010). What are Business Models ? Developing a Theory of Performative Representations. *Research in the Sociology of Organizations*, 29, 265–275.
- Petrick, I. J., & Juntiwassarakij, S. (2011). Special Issue: Innovation in Emerging Markets: the Rise of the Rest: Hotbeds of Innovation in Emerging Markets. *Research-Technology Management*, 54(4), 24–29.
- Pieroni, A. (2013). Forus : innovating healthcare, impacting people. Retrieved July 30, 2014, from <http://social.yourstory.com/2013/10/forus-innovating-healthcare-impacting-people/>
- Pitta, D., Guesalaga, R., & Marshall, P. (2008). The quest for the fortune at the bottom of the pyramid: potential and challenges. *Journal of Consumer Marketing*, 25(7), 393–401.
- Pogrebnyakov, N., & Kristensen, J. D. (2011). Building Innovation Subsidiaries in Emerging Markets: the Experience of Novo Nordisk. *Research-Technology Management*, 54(4), 30–37.
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: Macmillan.



- Prahalad, C. K. (2010). *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits* (5th ed.). 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., & Hammond, A. (2002). Serving the world's poor, profitably. *Harvard Business Review*, 80(9), 48–57.
- Prahalad, C. K., & Lieberthal, K. (1998). The end of corporate imperialism. *Harvard Business Review*, 81(8), 101–108.
- Prahalad, C. K., & Mashelkar, R. A. (2010). Innovation's holy grail. *Harvard Business Review*, 88(7/8), 132–141.
- PWC. (2014). Indian healthcare industry. Retrieved August 11, 2014, from <http://www.pwc.in/industries/healthcare.jhtml>
- Raisch, S., & Birkinshaw, J. (2008). Organizational Ambidexterity: Antecedents, Outcomes, and Moderators. *Journal of Management*, 34(3), 375–409.
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. (2009). Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance. *Organization Science*, 20(4), 685–695.
- Ramani, S. V., & Mukherjee, V. (2014). Can breakthrough innovations serve the poor (bop) and create reputational (CSR) value? Indian case studies. *Technovation*, 34(5-6), 295–305.
- Rao, B. C. (2013). How disruptive is frugal? *Technology in Society*, 35(1), 65–73.
- Rappa, M. (2004). The utility business model and the future of computing services. *IBM Systems Journal*, 43(1), 32–42.
- Ray, P., & Ray, S. (2010). Resource-Constrained Innovation for Emerging Economies: The Case of the Indian Telecommunications Industry. *IEEE Transactions on Engineering Management*, 57(1), 144–156.
- Ray, S., & Ray, P. (2011). Product innovation for the people's car in an emerging economy. *Technovation*, 31(5-6), 216–227.
- Reena, J. (2009). 5 Tips for Trickle-Up Innovation from C. K. Prahalad. *Business Week*. Retrieved from [http://www.businessweek.com/innovate/next/archives/2009/04/5\\_tips\\_for\\_trickle-up\\_innovation\\_from\\_ck\\_prahalad.html](http://www.businessweek.com/innovate/next/archives/2009/04/5_tips_for_trickle-up_innovation_from_ck_prahalad.html)
- Ricart, J. E., Enright, M. J., Ghemawat, P., Hart, S. L., & Khanna, T. (2004). New frontiers in international strategy. *Journal of International Business Studies*, 35(3), 175–200.

- Richter, M. (2013). Business model innovation for sustainable energy: German utilities and renewable energy. *Energy Policy*, 62, 1226–1237.
- Rugman, A., Verbeke, A., & Yuan, W. (2011). Re-conceptualizing Bartlett and Ghoshal's Classification of National Subsidiary Roles in the Multinational Enterprise. *Journal of Management Studies*, 48(2), 253–277.
- Ryans, A. (2005). SAURER: The China Challenge (B). *IMD Case*, IMD-5-0689.
- Ryans, A. (2006). SAURER: The China Challenge (A). *IMD Case*, IMD-5-0688.
- Ryans, A. (2009). *Beating Low Cost Competition*. Chichester: John Wiley & Sons Ltd.
- Sanchez, P., & Ricart, J. E. (2010). Business model innovation and sources of value creation in low-income markets. *European Management Review*, 7, 138–154.
- Santangelo, G. D., & Meyer, K. E. (2011). Extending the internationalization process model: Increases and decreases of MNE commitment in emerging economies. *Journal of International Business Studies*, 42(7), 894–909.
- Sarkar, M. (2011). Moving forward by going in reverse: emerging trends in global innovation and knowledge strategies. *Global Strategy Journal*, 1, 237–242.
- Schanz, C., Hüsig, S., Dowling, M., Gerybadze, A., & Hu, S. (2011). “Low cost–high tech” innovations for China: why setting up a separate R&D unit is not always the best approach. *R&D Management*, 41(3), 307–317.
- Schmid, S., Dzedek, L. R., & Lehrer, M. (2014). From Rocking the Boat to Wagging the Dog: A Literature Review of Subsidiary Initiative Research and Integrative Framework. *Journal of International Management*, 20(2), 201–218.
- Seelos, C. C., & Mair, J. (2007). Profitable business models and market creation in the context of deep poverty: a strategic view. *The Academy of Management Perspectives*, 21(4), 49–63.
- Sehgal, V., Dehoff, K., & Panneer, G. (2010). The Importance of Frugal Engineering. *Strategy + Business*, Summer(59), 1–5.
- Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business Horizons*, 48(3), 199–207.
- Sharma, A., & Iyer, G. R. (2012). Resource-constrained product development: Implications for green marketing and green supply chains. *Industrial Marketing Management*, 41(4), 599–608.
- Silverstein, J., Singhi, A., Liao, C., & Michael, D. (2012). *The \$10 Trillion Dollar Prize*. Boston: Harvard Business School Press.
- Simanis, E. (2012). Reality Check at the Bottom of the Pyramid. *Harvard Business Review*, 90(6), 120–125.



- Sinkovics, N., Sinkovics, R. R., & Yamin, M. (2014). The role of social value creation in business model formulation at the bottom of the pyramid – Implications for MNEs? *International Business Review*, 23(4), 692-707
- Soni, P., & Krishnan, R. (2014). Frugal innovation: aligning theory, practice, and public policy. *Journal of Indian Business Research*, 6(1), 29–47.
- Sun, T., & Wu, G. (2004). Consumption patterns of Chinese urban and rural consumers. *The Journal of Consumer Marketing*, 21(4/5), 245–253.
- Svejenova, S., Planellas, M., & Vives, L. (2010). An Individual Business Model in the Making: a Chef's Quest for Creative Freedom. *Long Range Planning*, 43(2-3), 408–430.
- Tan, H., & Mathews, J. (2015). Accelerated internationalization and resource leverage strategizing: The case of Chinese wind turbine manufacturers. *Journal of World Business*, 50(3), 417–427.
- Tapscott, D., Ticoll, D., & Lowy, A. (2000). *Digital Capital: Harnessing the Power of Business Webs*. Harvard Business School Press. Boston, MA: Harvard Business School Press.
- Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2-3), 172–194.
- Thompson, J. D., & MacMillan, I. C. (2010). Business Models: Creating New Markets and Societal Wealth. *Long Range Planning*, 43(2-3), 291–307.
- Timmers, P. (1998). Business Models for Electronic Markets. *Electronic Markets*, 8(2), 3–8.
- Tiwari, R., & Herstatt, C. (2012). Frugal Innovation: A Global Networks' Perspective. *Die Unternehmung*, 66(3), 245–274.
- Tongur, S., & Engwall, M. (2014). The business model dilemma of technology shifts. *Technovation*, 34(9), 525–535.
- Trimble, C. (2012). Reverse innovation and the emerging-market growth imperative. *Ivey Business Journal*. Retrieved from <http://iveybusinessjournal.com/topics/innovation/reverse-innovation-and-the-emerging-market-growth-imperative#.Um52doGwVFI>
- Verbeke, A., & Yuan, W. (2013). The Drivers of Multinational Enterprise Subsidiary Entrepreneurship in China: A New Resource-Based View Perspective. *Journal of Management Studies*, 50(2), 236–258.
- Vernon, R. (1966). International investment and international trade in the product cycle. *The Quarterly Journal of Economics*, 80(2), 190–207.

- Von Zedtwitz, M., Corsi, S., Søberg, P. V., & Frega, R. (2015). A Typology of Reverse Innovation. *Journal of Product Innovation Management*, 32(1), 12–28.
- Von Zedtwitz, M., & Gassmann, O. (2002). Market versus technology drive in R&D internationalization: four different patterns of managing research and development. *Research Policy*, 31, 569–588.
- Wan, F., Williamson, P. J., & Yin, E. (2015). Antecedents and implications of disruptive innovation: Evidence from China. *Technovation*, 39-40, 94–104.
- Ward, A. (2009). Huawei contract win is blow to Ericsson. *The Financial Times*. Retrieved October 28, 2013, from <http://www.ft.com/cms/s/0/8946acb4-ec3e-11de-8070-00144feab49a.html>
- Weber, M., Hiete, M., Lauer, L., & Rentz, O. (2010). Low cost country sourcing and its effects on the total cost of ownership structure for a medical devices manufacturer. *Journal of Purchasing and Supply Management*, 16(1), 4–16.
- Weill, P., Malone, T. W., & Apel, T. G. (2011). The Business Models Investors Prefer. *MIT Sloan Management Review*, 52(4), 17–19.
- Weill, P., & Vitale, M. R. (2001). *Place to Space: Migrating to e-Business Models*. Boston, MA: Harvard Business School Press.
- WHO. (2014). Global Health Observatory Data Repository. Retrieved from [http://www.who.int/gho/health\\_workforce/physicians\\_density/en/](http://www.who.int/gho/health_workforce/physicians_density/en/)
- Widenmayer, B. (2012). *Reverse Innovation Insights from Western Medical Equipment Manufacturers in China*. Lichtenberg: Harland Media.
- Williams, C., & Lee, S. H. (2011). Political Heterarchy and Dispersed Entrepreneurship in the MNC. *Journal of Management Studies*, 48(6), 1243–1268.
- Williamson, P. (2010). Cost Innovation: Preparing for a “Value-for-Money” Revolution. *Long Range Planning*, 43, 343–353.
- Williamson, P., & Zeng, M. (2009). Value-for-money strategies for recessionary times. *Harvard Business Review*, 87(3), 66–74.
- Wilson, F., & Post, J. E. (2013). Business models for people, planet (& profits): Exploring the phenomena of social business, a market-based approach to social value creation. *Small Business Economics*, 40, 715–737.
- Wirtz, B. W., Schilke, O., & Ullrich, S. (2010). Strategic Development of Business Models Implications of the Web 2.0 for Creating Value on the Internet. *Long Range Planning*, 43(2-3), 272–290.

- Wright, M., Filatotchev, I., Hoskisson, R. E., & Peng, M. W. (2005). Strategy Research in Emerging Economies: Challenging the Conventional Wisdom\*. *Journal of Management Studies*, 42(1), 1–34.
- Yang, Q., & Jiang, C. X. (2007). Location advantages and subsidiaries' R&D activities in emerging economies: Exploring the effect of employee mobility. *Asia Pacific Journal of Management*, 24(3), 341–358.
- Yao, S., Zhang, Z., & Hanmer, L. (2004). Growing inequality and poverty in China. *China Economic Review*, 15(2), 145–163.
- Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Thousand Oaks: Sage.
- Yunus, M., Moingeon, B., & Lehmann-Ortega, L. (2010). Building Social Business Models: Lessons from the Grameen Experience. *Long Range Planning*, 43(2-3), 308–325.
- Zahra, S., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185–203.
- Zeng, M., & Williamson, P. (2007). *Dragons at your door*. Boston: Harvard Business School Press.
- Zeschky, M., Widenmayer, B., & Gassmann, O. (2011). Frugal Innovation in Emerging Markets. *Research-Technology Management*, 54(4), 38–45.
- Zeschky, M., Widenmayer, B., & Gassmann, O. (2014). Organising for reverse innovation in Western MNCs: the role of frugal product innovation capabilities. *International Journal of Technology Management*, 64(2/3/4), 255–275.
- Zeschky, M., Winterhalter, S., & Gassmann, O. (2014). From Cost to Frugal and Reverse Innovation: Mapping the Field and Implications for Global Competitiveness. *Research-Technology Management*, 57(4), 20–27.
- Zhu, S., & Shi, Y. (2010). Shanzai manufacturing – an alternative innovation phenomenon in China: Its value chain and implications for Chinese science and technology policies. *Journal of Science and Technology Policy in China*, 1(1), 29–49.
- Zott, C., & Amit, R. (2007). Business Model Design and the Performance of Entrepreneurial Firms. *Organization Science*, 18(2), 181–199.
- Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, 29, 1–26.
- Zott, C., & Amit, R. (2010). Business Model Design: An Activity System Perspective. *Long Range Planning*, 43(2-3), 216–226.

Zott, C., & Amit, R. (2013). The business model: A theoretically anchored robust construct for strategic analysis. *Strategic Organization*, 11(4), 403–411.

Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management*, 37(4), 1019–1042.



# Curriculum Vitae

Stephan Roland Winterhalter

## Personal information

---

Date of birth: May 13, 1985  
Place of birth: St.Gallen, Switzerland  
Nationality: Swiss

## Higher education

---

2/2012 – 4/2015 PhD in Management at the **University of St.Gallen (HSG)**, Switzerland  
2/2009 – 1/2012 Master of Arts in Business Administration (Information-, Media- and Technology Management) at the **University of St.Gallen (HSG)**  
9/2005 – 1/2009 Bachelor of Arts in Business Administration at the **University of St.Gallen (HSG)**  
9/1998 – 7/2004 Matura at the **Gymnasium Untere Waid** (Mörschwil, Switzerland)

## Professional experience

---

Since 2/2015 **IESE Business School**, University of Navarra, Barcelona (Spain): Visiting Scholar  
1/2012 – 1/2015 **Institute of Technology Management at the University of St.Gallen (HSG)**: Research Associate  
9/2008 – 2/2009 **Helvetia Insurances** (St.Gallen, Switzerland) in Corporate Communications and Brand Management  
4/2005 – 9/2005 **Metrohm Italiana s.r.l.** (Rome, Italy)  
7/2004 – 11/2004 **Metrohm UK Ltd.** (Buckingham, United Kingdom)